# Journal of the Medical Library Association

www.mlanet.org

Vol. 113 No.4 (2025) | October 2025

ORIGINAL INVESTIGATION
DOI: dx.doi.org/10.5195/jmla.2025.2209

# Cognitive biases as interrupters in evidence based practice decision-making

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**Objectives:** To identify the most frequently-observed forms of cognitive bias among Health Information Professionals (HIPs) during decision-making processes. To determine if number of years in the profession influences the types of cognitive biases perceived in others' decisions.

**Method:** This cross-sectional study invited participation of 498 elected and appointed leaders at the national, caucus, and chapter levels of the Medical Library Association. The 149 participants (32%) were presented with 24 cognitive biases often associated with expected decision-making contexts among HIPs.

**Results:** The most frequently observed forms of cognitive bias in decision-making situations were: Status Quo, Sunk Costs, Novelty, Professionology, Authority, Worst-Case Scenario, and Group Think. Four of these overlapped with a previous 2007 study. Results were analyzed by length of years in the profession. Four forms of cognitive bias showed statistically significant differences in frequency by years in the profession: Authority, Naïve Realism, Overconfidence, and Status quo forms of cognitive bias.

**Discussion:** This study identified commonly observed cognitive biases that interrupt decision-making processes. These results provide a first step toward developing solutions. Mitigation strategies for the seven most common forms of identified cognitive bias are explored with more general recommendations for all forms of cognitive bias. This study should guide the profession on the most commonly-perceived forms of cognitive bias occurring in decision-making environments with an eye upon possible mitigation strategies.

**Keywords:** Decision Making; Cognitive Bias; Evidence Based Practice; Leadership; Group Processes; Medical Library Association; Health Sciences Librarianship; Health Information Professionals; Informaticists

See end of article for supplemental content.

## INTRODUCTION

For more than two decades the health professions have used the Evidence Based Practice (EBP) approach to making sound decisions. While EBP has proven itself to a be a durable framework, practitioners sometimes note that as they progress through the EBP steps of question formulation, searching, critical appraisal, and deciding--something towards the end of the process goes awry [1-2]. Since the purpose of EBP hinges on making decisions upon the best available evidence, any investigation to improve this process will be crucial [3]. Cognitive biases appear to interrupt the EBP process between evidence appraisal and the final "mystery decision"[4].

Cognitive biases are well-known interrupters in making decisions. Cognitive biases are everyday human tendencies to either fail to perceive a situation correctly or to think clearly about those situations when making a decision. Evolutionary psychologists, [5-8] biologists, [9] and economists [10] have postulated that cognitive biases were essential for our survival in a time when our species was first emerging during an era when we were not the apex predators. Cognitive biases tend to emerge most often when people are confronted with ambiguous, complex, or large amounts of information [11-12]. To cite only two common examples, when confronted with a long series of complex information, people tend to lock-in on either information provided early in the sequence, known as Primacy Bias, [13] or late in the sequence, known as Recency Bias[14]. Cognitive biases are largely unavoidable and everyone succumbs to them in varying degrees. Most importantly, people typically are unaware of their own cognitive susceptibilities even if they can easily spot others' susceptibilities. [15-17].

Researchers have recognized and studied cognitive biases for the past century, identifying over 170 cognitive biases in decision-making contexts. While many of these

DOI: dx.doi.org/10.5195/jmla.2025.2209

cognitive biases might contribute to precursors to decision-making processes, only an estimated 20-30 cognitive biases directly affect the kinds of contexts of decisions made ordinarily by health information professionals (HIPs). In this study, HIPs are defined as informaticists, health sciences librarians, information scientists, informationists, or archivists.

HIPs make numerous decisions on a daily basis in both individual tasks and in group contexts. One US study on everyday decision-making conducted in 2007 presented health sciences librarians with a list of 21 cognitive biases with definitions and asked respondents to indicate which three (3) they had witnessed most often among their HIP colleagues when engaged in decision-making. **Supplementary Table 1** in the online appendix lists the 135 respondents' most commonly observed cognitive biases [18-19]. A search of the literature since 2007 has not turned up any similar empirical research study on cognitive biases involving HIPs.

The present study updated and aimed to improve upon the methodological rigor found in the 2007 study. The authors began this study with the following hypotheses:

*Hypothesis 1*: HIP leaders would identify only some of the same cognitive biases among fellow HIPs compared to 2007 due to the changeability over time of identified forms of cognitive bias observed in other professionals;

*Hypothesis 2*: HIP leaders with more experience in the field would markedly differ in the forms of cognitive biases that they would observe compared to leaders with fewer years of experience in the profession.

**Methods**

This cross-sectional study measured the prevalence of certain forms of cognitive bias observed by leaders in contexts when other HIPs were making decisions. The online appendix includes a Detailed Methods Description that recounts the lengthy, iterative processes of creating a suitable inventory of cognitive biases and then later testing the survey instrument. This Methods section provides some most immediately relevant details. The authors received IRB approval (HRRC 24-168) from the University of New Mexico Human Research Review Committee on April 11, 2024.

*Leaders List*

Medical Library Association (MLA) leaders on the national level were defined as all elected officials, editors, and all chairs and members appointed to national level committees. At the caucus and chapter level, leaders were defined as all elected officers and appointed committee chairs. Names and email addresses were obtained from rosters to create a list of 499 leaders generated for the MLA Research Agenda [20],

*Deployment*

On Monday May 13, the final REDCap version of the cognitive bias survey was launched to 498 leaders in the Medical Library Association, excluding one as a recusal for the first author. A total of 26 (5%) of the intended recipients could not be reached, mostly due to returned undeliverable messages; some had retired, left their organization for unstated reasons, were on sabbatical, or on parental leave. These undeliverable messages resulted in 472 potential recipients. Reminders were emailed to all 498 leaders May 17, 23, and 27 and on June 16, 2024.

Participants who consented were presented with 24 forms of cognitive bias with definitions for each. The directions in Part 1 stated: "Read and reflect upon each of the forms of cognitive bias below. Recall instances involving fellow health information professionals having their decisions interrupted by their cognitive biases." Each time someone opened the REDCap survey, they were presented with a new randomized sequence of cognitive bias to prevent either primacy, [21] recency bias, [22] or response order bias [23-24] from interfering with survey participants' voting preferences. In Part 2 participants were asked to "Please select up to five (5) forms of cognitive bias that you have observed most often in health information professions colleagues." The survey parameters allowed as few as one yet no more than five choices in Part 2.

Part 3 asked participants: "Your role(s) in MLA (check all that apply)." The results in **Supplementary Table 2** in the online appendix appear to be roughly proportionate to the total numbers of leaders filling these respective roles in MLA. Part 4 asked participants:

> How many years have you been an employed health information professional since receiving your terminal professional degree? A terminal degree might be your masters in information science or MLS degree, or, an informatics certificate; or, it otherwise might be a fellowship beyond the MD or PhD.

Part 5 (Optional open-ended question) asked:

> Do you have any experiences with cognitive biases disrupting decision making that you would like to share? Please list the name of the specific cognitive bias along with your story. Please exclude any and all identifying information.

The statistician co-author analyzed the descriptive results.

## RESULTS

The present study involved a secure, anonymous survey delivered through REDCap to MLA 498 leaders to learn what forms of cognitive bias these leaders perceived to be most responsible for interfering with decisions made by colleagues in our profession. These MLA leaders were likely to have a broad perspective and to have observed decision-making in varied contexts. A total of 149 MLA leaders submitted viable cognitive bias surveys, a response rate of 32%. **Supplementary Table 2** in the

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online appendix indicates that a proportionate number of types of leaders participated in this study. **Figure 1** graphically portrays the ranked order main results while **Table 1** displays them numerically. The top-ranked forms of cognitive bias were: Status Quo, Sunk Costs, Novelty, Professionology, Authority, Worst Case Scenario, and Group Think.

Hypothesis 2 stated that "HIP leaders with more experience in the field would markedly differ in the forms of cognitive biases that they would observe compared to colleagues with less experience as HIPs." **Table 2** presents a nuanced result for Hypothesis 2 regarding number of years as HIPs. Significant differences (p value <= .05) for years in the profession were determined using a chi-square with a Fisher's exact test: Authority, Naïve Realism, Overconfidence, and Status Quo forms of cognitive bias. The two groups did not differ in their frequency in mentioning Novelty bias.

**Table 1**

Most Commonly Observed Cognitive Biases among HIPs in 2007

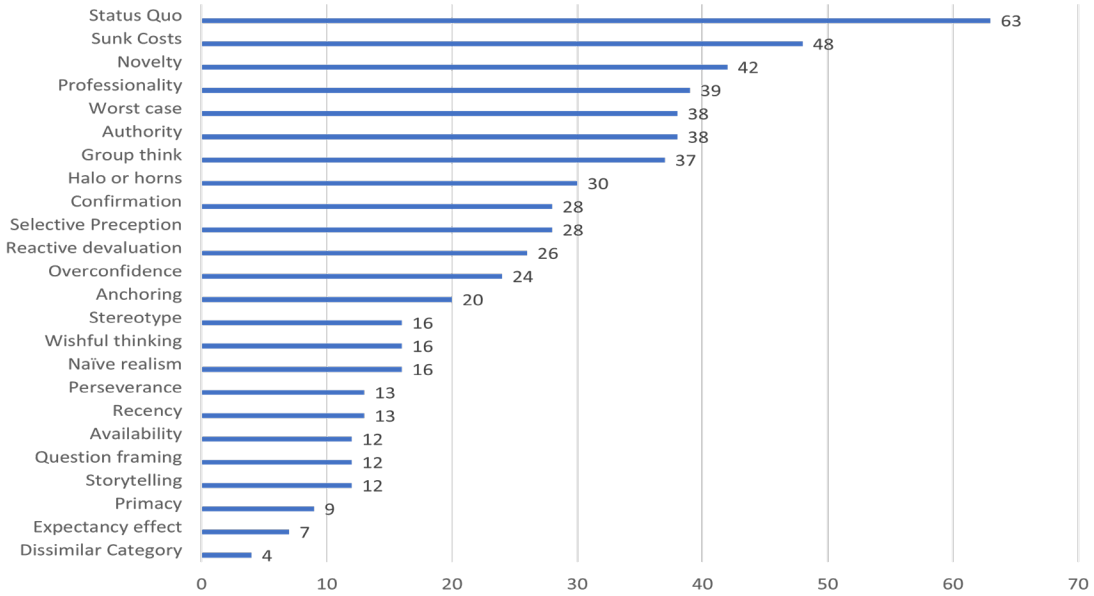
| | Total (N=149 respondants) |
|---|---|
| Status quo, n (%) | 63 (.42.3%) |
| Sunk Costs, n (%) | 48 ( 32.2.%) |
| Novelty, n (%) | 42 (.28.2%) |
| Professionology, n (%) | 39 (.26.2%) |
| Authority, n (%) | 38 (25.5.%) |
| Worst case, n (%) | 38 (2.5.5%) |
| Group think, n (%) | 37 (24.8.%) |
| Halo or horns, n (%) | 30 (20.1.%) |
| Selective Preception, n (%) | 28 (18.8.%) |
| Confirmation, n (%) | 28 (18.8%) |
| Reactive devaluation, n (%) | 26 (.17.4%) |
| Overconfidence, n (%) | 24 (16.1%) |
| Anchoring, n (%) | 20 ( 13.4%) |
| Naïve realism, n (%) | 16 (10.7%) |
| Wishful thinking, n (%) | 16 (.10.7%) |
| Stereotype, n (%) | 16 (10.7%) |
| Recency, n (%) | 13 (8.7.%) |
| Perseverance, n (%) | 13 (8.7.%) |
| Storytelling, n (%) | 12 (8.1.%) |
| Question framing, n (%) | 12 (.8.1%) |
| Availability, n (%) | 12 (8.1.%) |
| Primacy, n (%) | 9 (.6.0%) |
| Expectancy effect, n (%) | 7 (.4.7%) |
| Dissimilar Category, n (%) | 4 ( 2.7%) |

## DISCUSSION

This study sought to identify MLA leaders' most commonly-observed cognitive biases among other Health Information Professionals (HIPs) A comparison of **Table 1** and **Figure 1** with **Supplementary Table 1** in the online appendix that summarizes the 2007 study confirm Hypothesis 1 that four forms of cognitive bias were the same between the 2007 and 2024 studies: Professionology, Status Quo, Authority, and Group Think. Nevertheless, the relative rank orders are different between studies.

These 2024 results suggest several themes. The two highest ranked forms of cognitive bias, Status Quo and Sunk Costs, reflect disapproval in the minds of observers

**Figure 1** Main Results



DOI: dx.doi.org/10.5195/jmla.2025.2209

**Table 2**
**Years in Profession**

| | Years in Profession | |
|---|---|---|
| | **1-14 (N=61)** | **>14 (N=59)** |
| **Status quo**, n (%) | 36 (59.0%) | 24 (40.7%) |
| **Sunk Costs**, n (%) | 23 (37.7%) | 24 (40.7%) |
| **Novelty**, n (%) | 21 (34.4%) | 20 (33.9%) |
| **Professionology** n (%) | 22 (36.0%) | 15 (25.4%) |
| **Authority**, n (%) | 13 (21.3%) | 23 (38.9%) |
| **Worst case**, n (%) | 17 (27.9%) | 20 (33.9%) |
| **Group think**, n (%) | 18 (29.5%) | 19 (32.2%) |
| **Halo or horns**, n (%) | 17 (27.9%) | 12 (20.3%) |
| **Selective Preception**, n (%) | 14 (23.0%) | 14 (23.7%) |
| **Confirmation**, n (%) | 16 (26.2%) | 11 (18.6%) |
| **Reactive devaluation**, n (%) | 15 (24.5%) | 10 (16.9%) |
| **Overconfidence**, n (%) | 8 (13.1%) | 16 (27.1%) |
| **Anchoring** | 8 (13.1%) | 12 (20.3%) |
| **Naïve realism**, n (%) | 12 (19.7%) | 4 ( 6.8%) |
| **Wishful thinking**, n (%) | 9 (14.8%) | 7 (11.9%) |
| **Stereotype**, n (%) | 9 (14.8%) | 7 (11.9%) |
| **Recency**, n (%) | 7 (11.5%) | 6 (10.2%) |
| **Perseverance**, n (%) | 9 (14.8%) | 4 (6.8%) |
| **Storytelling**, n (%) | 6 ( 9.8%) | 5 (8.5%) |
| **Question framing**, n (%) | 4 ( 6.7%) | 8 (13.6%) |
| **Availability**, n (%) | 5 ( 8.2%) | 7 (11.9%) |
| **Primacy**, n (%) | 3 ( 4.9%) | 6 (10.2%) |
| **Expectancy effect**, n (%) | 4 ( 6.7%) | 3 ( 5.1%) |
| **Dissimilar Category**, n (%) | 1 ( 1.6%) | 3 (5.1%) |

with wanting to preserve existing practices. This presents a paradox since HIPs uphold an altruistic mission to preserve an accurate and permanent record as a means to lend integrity to the evidence base. On a more pragmatic level, our profession resembles other professions in having developed time-tested practices through trial and error. The paradox continues when contemplating the third-ranked cognitive bias of Novelty, which seems diametrically opposed to the top two-ranked forms. One is immediately struck by the apparent inconsistency between the two top-ranked Status Quo and Sunk Cost biases with the diametrically-opposed third, Novelty bias. This contradiction might speak to the human condition of experiencing conflict when making choices between established approaches and the need to take possible risks on a new course of action to foster possible progress. HIPs similarly might have to navigate between retaining an accurate record of the past while serving in their frequent expected roles as early adapters of information technology within their organizations. The two years-in-the-profession groups also did not differ statistically in their frequency in mentioning of Novelty bias.

## Mitigation Strategies

Seven forms of cognitive bias emerged from this cross-sectional study as most commonly observed among fellow HIPs. These seven forms of cognitive bias appear below in rank order of most- to less-mentioned forms with suggested strategies for mitigation. **Table 3** summarizes these mitigation strategies concisely.

## Status Quo

*Desiring to keep conditions relatively similar to one's present state and therefore predictable.*

A total of 42% ($n$ = 63) of the respondents selected Status Quo bias. A number of studies have sought to better understand Status Quo bias by analyzing possible psychological or organizational patterns leading to this dysfunction [25-28]. **Table 3** summarizes some concrete methods for countering Status Quo bias based on several studies [29-33]. Status Quo bias presents many in our field with a dilemma in that we are responsible for the integrity and preservation of the information, which might habitually contradict some otherwise reasonable proposed changes.

## Sunk Costs

*To place undue emphasis on retaining an existing resource when making a decision when another unowned resource might be superior.*

Sunk Costs emerged from economics research as an impediment to making sound financial decisions. In the present study 32% of the MLA leader respondents cited Sunk Costs as the second-most selected form of witnessed cognitive bias. In many respects, Sunk Costs resembles Status Quo bias in that both involve resistance to change. While Status Quo bias pertains more to habitual or routine thinking, Sunk Costs relates more to a focus on resources. Sunk costs are expenditures in the past and thereby irrelevant to making a current decision because that expenditures already occurred in the past. The Sunk Cost bias occurs when someone in the present day decides on a matter on the basis of the past expenditure. The resources need not be measurable in literal monetary terms, but can include one's invested time or energy [34].

Several studies have analyzed the likely motivations or external economic forces that lead to Sunk Costs bias [35-39], while one study offers concrete suggestions for mitigation [40].

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**Table 3**

Top-Ranked Cognitive Biases and Their Possible Mitigation

| Rank | Cognitive Bias | Description | Possible Mitigation Strategies |
|---|---|---|---|
| 1 | Status Quo | *Desiring to keep conditions relatively similar to one's present state and therefore predictable.* | Aggressively seek out information that negates any pending decision<br>Compose heterogenous decision making teams with members with diverse backgrounds<br>Assign separate teams with same parallel task of developing their own recommendations<br>Inform decision makers that their decision will be reviewed by an external expert |
| 2 | Sunk Costs | *To place undue emphasis on retaining an existing resource when making a decision when another unowned resource might be superior.* | Query decision makers with their past of current economic hardship that might exaggerate their frugalness in weighing the financial implications of an organizational rather than an individual decision<br>Parent organization delegates reviewing the decision to person(s) with no prior connection to the original decision |
| 3 | Novelty | *The initial fascination and enthusiasm for a new technology or an innovation that does not yet have the needed evidence to support its adoption.* | Recognizing that early glowing reports of new innovations often have not been rigorously or extensively tested to prove their superiority |
| 4 | Professionology | *Viewing a situation through the shared perceptions of one's profession rather than by taking a broader perspective.* | Increase opportunities for interactions or collaborations between members of different professions<br>Encourage networking and friendships between members of different professions<br>Encourage an open-minded engagement with information that runs counter to the profession's attitudes |
| 5 | Authority | *Deferring to an expert or other authority figure disproportionate to the extent of their expertise; or, the range of their authority on the subject.* | Colleagues need to scrutinize any decisions that appear to be outside the range of expertise of any decision makers<br>Pause any decision long enough for others to apply their critical analysis to the pending decision.<br>Encourage those lower in any organizational hierarchy to question any suspect decisions |
| 6 | Worst Case Scenario | *Emphasizing or exaggerating those possible negative outcomes disproportionate to all possible outcomes.* | Encourage colleagues to visualize and articulate their feared worst-case scenario in graphic detail, which paradoxically often changes their perspective<br>List the best case and worst-case scenarios side-by-side to appreciate the full range of possibilities instead of only the worst possible outcome<br>Add more experienced colleagues to the decision-making group to offer a more experienced range of possibilities to the deliberations |
| 7 | Group Think | *Believing in the autonomy of a group, stereotyping of those outside the group, self-censoring, censoring of dissenters, maintaining the illusion of unanimity, and enforcing a group "consensus" viewpoint.* | Appoint 1-2 group members with responsibility to argue against the dominant opinions in the group<br>Leader should embrace minority viewpoints in the group as a counterbalance<br>Leaders explicitly recommend to all group members to scrutinize any pending decision critically<br>Encourage all group members to adhere to a scientific mindset when reviewing possible decisions<br>Assemble decision-making teams with members known to hold different views on the decision |

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### Novelty

*The initial fascination and enthusiasm for a new technology or an innovation that does not yet have the needed evidence to support its adoption.*

Novelty bias poses a likely occupational hazard due to our reliance upon new information technology. A total of 28% of the MLA leaders voted for the frequency of their observing others engaged in Novelty bias. Many of our non-HIP colleagues have come to expect us to engage with new technology as unofficial institutional early adapters [41]. New information technology often involves complex relationships with vendors wanting to make large sales so these decisions can be expensive for an institution. Studies have illustrated how positive early reports on new innovations often are countered or at least tempered by subsequent added studies or by more rigorous studies [42-43]. The top three ranked forms of cognitive bias among HIPs, thus far, probably reflect a larger societal tension between the need to innovate with confronting the practicalities of conserving resources and maintaining efficient operations.

### Professionology

*Viewing a situation through the shared perceptions of one's profession rather than by taking a broader perspective. Sometimes known as "Professional Deformation."*

Professionology might be the oldest forms of cognitive bias recognized by the social sciences, although it has not been extensively studied since its initial identification in 1915. From the outset, it was seen as a distortion that people undergo in the process of their socialization into a specific profession. It derived, in part, from a sense of "exaggerated importance" [Page 31] attached to one's professional roles [44]. Military professionals were portrayed in this study as epitomizing "professional deformation" (as it was once known). Physicians, attorneys, social workers, teachers, nurses, and members of the clergy also were susceptible to Professionology [44]. The implicit sense of a separate if not superior identity seems to reinforce a sense of Professionology in most or possibly all professions [45-55]. Professionology represents a form of the broader and more studied cognitive bias of Ingroup-Outgroup bias [56-60].

The present study revealed that 26% of the MLA leaders identified Professionology as a common form of cognitive bias within our profession. While not much has been researched explicitly on mitigating the bias of Professionology, some limited research has been conducted upon reducing Ingroup Outgroup Bias. One mitigation strategy involves prompting regular interactions between members of the two groups. HIPs have a natural avenue to reduce their Professionology due to their potential for frequent interactions with other health professionals. Framing the two or more groups as members of a broader group can reduce the insularity of any one subgroup within the larger group. Third, encouraging opportunities for friendships or collaborations among members of different groups also might reduce Professionology [61-63]. Explicit efforts to re-classify groups with different categorizations might reduce Ingroup Outgroup Bias [64]. Encouraging members of groups to attempt to be more empathetic toward members of other groups also might help [65-66]. Fostering deeper individual relationships among members of different groups was one promising approach to reducing intergroup bias[67]. One team of researchers has explored the use of 'science curiosity' as a mitigating strategy for reducing intergroup perceptions. They define science curiosity as an open-minded willingness to engage with surprising information that runs counter to their own attitudes [68-69].

### Authority

*Deferring to an expert or other authority figure disproportionate to the extent of their expertise; or, the range of their authority on the subject.*

Most of us work in hierarchal organizations with clear lines of responsibility for making decisions [70]. This hierarchal context might explain the high ranking in this study of this form of cognitive bias. The practical, ethical, and sometimes legal issues related to abuses of authority are well-known [71-74]. While extreme abuses of authority might lead to authoritarianism [75], more often an authority figure's extension beyond one's range expertise leads to annoyance among those lower in the hierarchy; it also can lead to less efficiency of the organization. While difficult to counter Authority bias, several studies [76-78] have suggested strategies to mitigate as summarized in **Table 3**.

### Worst-Case Scenario

*Emphasizing or exaggerating those possible negative outcomes disproportionate to all possible outcomes.*

Worst-Case Scenario bias was a surprise finding in this study, as it rarely rises to this high a ranking with other surveyed professional populations. The present study produced a 25.5% frequency of mention by HIP leaders. Worst-Case Scenario might be thought of as an extreme form of pessimism [79]. Worst-Case Scenario might represent an historical artifact [80] within this study, prompted by lingering psychological trauma in the US population brought on by the worldwide Covid-19 Pandemic.

Worst-Case Scenario bears a close connection to other similar forms of cognitive bias such as patient Catastrophizing [81-83] And Negativity Bias. [84-87]. The close relationship of the Worst-Case Scenario to Catastrophizing and particularly its to Negativity Effect might lend clues to its mitigation. **Table 3** offers

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mitigation strategies to Worst Case Scenario bias based on prior research [88-90]. Two studies have cautioned against an absolute rejection of Worst Case Scenario bias due to the possibility that pessimists might have a more realistic view of the situation than others in the group [91].

### Group Think

*Believing in the autonomy of a group, stereotyping of those outside the group, self-censoring, censoring of dissenters, maintaining the illusion of unanimity, and enforcing a group "consensus" viewpoint.*

The present study leveraged the tendency for people to be able to spot cognitive biases in others. Those same cognitive biases are not at all obvious to those observed colleagues. One of the most-often mentioned antidotes to many cognitive biases relies upon the wisdom of the group to detect flaws in individual decision-making processes. Groups are a great way to generate ideas and to spot individual limitations in reasoning that leads to a decision. Singh and Brinster refer to this evolutionary advantage in humans as 'shared intentionality' (Page 118) in collective action [92].

What happens, though, when the group itself becomes the source of cognitive bias? Group Think was first recognized over 50 years ago when groups of highly intelligent, well-educated US Government officials who were making high-stakes foreign policy decisions succumbed instead to taking dangerous risks [93]. Group Think has been studied in a variety of settings since these early exploratory works. Some of the identified antecedent conditions to Group Think include particular leadership styles, rigid group processes, and certain behaviors [94]. Other factors increasing the likelihood of Group Think include individuals closely aligning their individual identities to the group, attraction to the group itself, and group cohesion. Friendships within a group might exert a mild counterbalance to Group Think [95]. Others seem to have found less supporting evidence for group cohesiveness or certain leadership styles as drivers of Group Think [96]. Several techniques to counter Group Think summarized in **Table 3** have demonstrated some success [97-99]. Group processes oftentimes do not exhibit Group Think. Contexts involving complex variables, emotional competencies, and human relations can generate group processes that definitely can outperform individual efforts [100].

### General Mitigation Strategies

For purposes of efficiency, it might be fruitful to identify general strategies to mitigate our human tendencies to be swayed by all or most of our cognitive biases when making decisions. General mitigation strategies presently are not well-developed and lack sufficient evidence to be much help [101-102]. A few studies offer clues as to how to generally proceed to avoid cognitive biases. Etzioni offers the blunt advice that decision makers should "assume that whatever decisions they render—especially first ones—are wrong and will have to be revised, most likely several times" [103]. Similarly, counterfactual reasoning, the practice of considering one is wrong in a study of 34 nursing students appeared to offset cognitive bias tendencies [104]. Nearly 300 management graduate students reduced their cognitive biases through counterfactual reasoning, provided that these participants were not overconfident of their knowledge of the subject. [105]. One study involved offering a number of plausible outcomes to a decision, rather than just the opposite of what was predicted, to lower cognitive bias scores [106]. Asking decision makers to justify their decisions tended to aid self-reflection to slow any slide into cognitive biases [107]. Skill in scientific reasoning and training in statistics have been found to deter cognitive biases [108-109]. One neuroscientist has suggested that we use a socially-supported environment to make more abstract yet more rational choices more viscerally tangible [110].

### Intergroup Comparisons

It would be interesting to replicate this study involving MLA leaders in several years to compare results. This constellation of cognitive biases resembles and differs from other groups that have taken similar cognitive bias surveys administered by the first author. A seminar of local business leaders in 2008 ranked the following cognitive biases highly: Halo or Horns Effect; Group Think; Anchoring; and, Expectancy Effect. In recent years the first author's second-year medical students have consistently ranked highest Group Think, Confirmation Bias, Authority, and Anchoring forms of cognitive bias.

In recent months the first author has enlisted public health and medical colleagues to replicate this study in their respective professions. Replications could also take place within single HIP workplaces or in different related organizations other than MLA. It would be exciting to use quasi-experimental or randomized controlled trial research designs to test the effectiveness of the aforementioned mitigation strategies.

## LIMITATIONS

Analyzing the representativeness of actual participants in the survey in comparison to the contacted baseline population tends to validate these kinds of surveys. In reference to the peer review process above, these experts will assess representativeness of the participants. For example, if survey respondents only hail from two certain geographic regions of the US, this limitation possibly will modulate the validity of the survey results. Or, as another example, if one type of library is overrepresented, that, too, could modify the interpretation of the results.

On May 15, one participant noticed that the initial list presented to participants did not include the term Group

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Think. Part 2 of the survey, however, included the term Group Think with its definition in this voting phase. This omission was fixed within 15 minutes at 10am on May 15th by the REDCap Administrator. This omission seems unlikely to have made even a marginal difference given the fact that it did appear with a definition when participants voted.

There are two foreseen deliverables from this study. First, HIPs will benefit in their daily decision-making roles by recognizing the most commonly-encountered forms of cognitive biases. Second, EBP is a framework employed by professionals for making informed decisions. Other than the study in 2007, there are no studies on cognitive biases in decision making contexts for HIPs so this will fill a gap in the research evidence base.

## FUNDING

This project was funded by a Seed Grant from University of New Mexico Health Sciences Library and Informatics Center. Statistical services were aided by a grant from the National Center for Advancing Translational Sciences, National Institutes of Health under grant number UL1TR001449.

## ACKNOWLEDGEMENTS

The authors thank colleagues Marie T. Ascher, Heather Holmes, Karen M. Heskett, and Margaret Hoogland for compiling the email addresses of the MLA leaders used in this project, which they compiled for the 2024 MLA Research Agenda. [20] Volunteers who reviewed the content of the survey instrument or tested the functionality of the online survey platform included: Deirdre Caparoso; Martha Earl; Leah Everitt, Robyn Gleasner, Laura Hall; Ingrid Hendrix; George Hernandez; Rachel Howarth; Danielle Maurici-Pollock; Abbie Olivas; Melissa Rethlefsen; Deborah Rhue; and Talicia Tarver. On May 7, 2024, several colleagues volunteered to pilot the actual REDCap survey, mostly for functionality of the interface. Special kudos to Danielle Maurici-Pollock for subjecting the survey in REDCap to an acid test during the first online pilot and for re-testing it two more times as it became ready for launching. Matthew Manicke served ably as the REDCap administrator who aided the first author in implementing the survey.

## APPENDIX

The following supplementary resources can be found via a single link: https://digitalrepository.unm.edu/hslic-publications-papers/98/

- Supplementary Table One: 2007 Cognitive Bias Summary
- Supplementary Table Two: Participation by MLA Leader Categories
- Detailed Methods Description

## DATA AVAILABILITY STATEMENT

The full data set for this anonymous survey are available from the Data Appendix at: https://digitalrepository.unm.edu/hslic-publications-papers/97/.

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## SUPPLEMENTAL FILES

### Appendix A

Note: This appendix document is the *JMLA* supplemental file version of the online appendix referred to in text (see Appendix headline for more information).

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*Received April 2025; accepted July 2025*



ISSN 1558-9439 (Online)

ORIGINAL INVESTIGATION
DOI: dx.doi.org/10.5195/jmla.2025.2034

# Developing and validating PubMed infant hedges for PubMed and Ovid MEDLINE: a Medical Library Association pediatrics librarians caucus initiative

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*See end of article for authors' affiliations.*

**Background:** To support evidence synthesis and clinical searching, a team of librarians developed and validated infant age (birth to 23 months) search hedges for PubMed (National Library of Medicine) and Medline (OVID).

**Methods:** We developed four sensitive hedges by selecting terms that refer to infants. Three of the hedges had identical MeSH terms and keywords but used different field tags, and the fourth was a simple keyword hedge. We compared our hedges to the built-in MeSH-based infant filter. We used relative recall calculations to validate each hedge's performance against a gold standard reference set.

**Results:** In PubMed the similarly structured hedges performed in a range of 83.2%-83.8% sensitivity and 88.2%-89.7% specificity. The simple keyword hedge performed with an 83.5% sensitivity and 89.7% specificity. The filter generated a 70.1% sensitivity and 96.2% specificity. Similarly, in Ovid Medline, the set of similar hedges performed in a range of 82.9%-83.6% sensitivity and 88.1%-89.4% specificity. The simple keyword hedge performed with an 82.9% sensitivity and 90.8% specificity. The filter generated a 69.6% sensitivity and 96.2% specificity.

**Discussion:** The variation in field tags did not provide a significant difference in the areas of sensitivity and specificity. The filter performed as expected with higher specificity rather than sensitivity. The simple keyword hedge performed better than anticipated with comparable sensitivity and specificity of the more complex hedges. When searching for infant population articles, the simple keyword search and filter work well for quick, clinical searching. For evidence synthesis, we recommend using one of the more sensitive infant hedges.

**Keywords:** Age Groups; Bibliographic Databases; Sensitivity and Specificity; Systematic Reviews as Topic; Validation Study

See end of article for supplemental content.

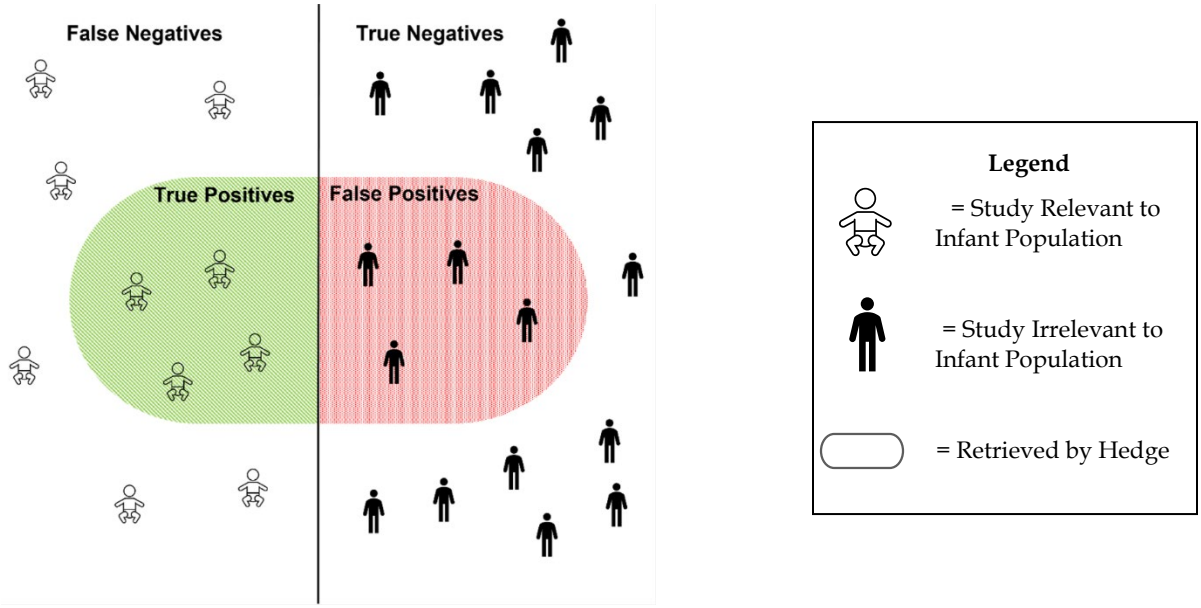
## INTRODUCTION

Search hedges are search strings, validated or unvalidated, on a given topic. The term "hedge" first appeared in the literature in 1978 when Mark Funk described a "hedge" as "terms and explosions were ORed together logically, forming a… horizontally related groups of MeSH terms [1]. Many authors have commented on the nuances of terminology and definitions throughout the years. Dolan distinguished between saved searches (referred to as "saves") and hedges. The searches that Dolan described as "saves" would now be called "filters" [2]. In 2016, Campbell proposed that the expert searcher community could use "filter" to represent the stored searches that are designed to extract articles with specific characteristics, while the term "hedge" could be used to represent stored subject searches [3]. While there is no official consensus on the definitions of these synonyms, for the purposes of this paper, "hedges" will be used as an all-encompassing term.

Search hedges have many benefits. The first one is increased sensitivity (recall), which is the ability of the hedge to correctly identify all relevant citations about a given topic. High sensitivity means that a hedge returns most of the relevant results while irrelevant ones are also returned. Hedges increase sensitivity by expanding the search scope using synonyms, Boolean operators, truncation, wildcards, and alternate word endings and spellings. Simultaneously, hedges aim to make search queries more specific (precise) and decrease the number of irrelevant citations. High specificity means that a hedge returns more relevant results than irrelevant ones. The difference between sensitivity and specificity is visualized in Figure 1.

DOI: dx.doi.org/10.5195/jmla.2025.2034

**Figure 1** Sensitivity and Specificity of an Infant Search Hedge




Librarian collaboration on systematic reviews has increased over the years.[4] By employing appropriate hedges, librarians engaging in evidence synthesis research projects can construct more effective search queries efficiently and consistently, minimizing the need for multiple search attempts. Although existing validated hedges fill an important role, sometimes the ability to revise a search hedge is also important and necessary in order to align with updates to database algorithms or to translate a validated hedge from one database to another.

In March 2021, the Medical Library Association (MLA) announced that two working groups would be "curating an open-access database of known search hedges developed by authoritative sources" and "developing a methodology for validating search hedges." [5] The MLA Pediatric Caucus took on the latter task. The MLA Pediatric Caucus expressed a need for updated pediatric hedges because of librarians' growing collaboration on systematic reviews and the challenge of retrieving relevant pediatric literature [6-8]. Pediatric clinicians and researchers regularly encounter a paucity of relevant literature which can be traced to a lack of funding for research for children and adolescents. As early as the mid-1990s, the US congress acknowledged that inadequate resources and attention were devoted to pediatric research conducted and supported by the NIH. [6] Recent data demonstrates that the static allocation of NIH funding for pediatric research coupled with reductions in the purchasing power of budgetary funding is negatively affecting the advancement of pediatric science. [6-8] Consequently, sensitivity plays a potential role not just in systematic review methodology, but in day-to-day, or bedside, searching as well.

Our team focused on PubMed because it is a freely available and regularly used MEDLINE-based bibliographic database. PubMed also underwent a significant update in May 2020 that affected previously developed search hedges. We included Ovid Medline as it is another commonly used platform for searching MEDLINE. We opted to use the version Ovid Medline ALL for the similar comprehensives to PubMed in that it includes all publications from 1946 to the daily update. Although it requires a subscription, it continues to be a commonly used resource in the health sciences and provides additional features librarians rely on when conducting systematic reviews including adjacency and frequency parameters. Therefore, to create modular hedges based on age groups, the participating members from the MLA Pediatric Caucus started with an initiative to develop and validate five infant search hedges for use in PubMed and then translated them into Ovid Medline.

## MATERIALS AND METHODS

### Infant Search Hedge Development for PubMed

While we were able to locate validated hedges for the pediatric population [9-10], we were unable to locate hedges focused on the infant population. Using the infant terms located in the validated hedge, we relied on our

DOI: dx.doi.org/10.5195/jmla.2025.2034

own infant search strategies and search expertise to collaboratively develop four infant search hedges for PubMed. To create sensitive searches, we selected a wide variety of MeSH vocabulary and keywords that directly and indirectly refer to infants, including terms such as infant, neonate, neonatal, baby, newborn, infancy, preterm, premature, perinatal, postnatal, neonatology, neonatologists, NICU, and nurseries.

The search hedges ranged from what we predicted would be the most sensitive to the most specific. The first three hedges use the same subject headings (MeSH) and keywords but vary based on which keyword field tags were used. The first hedge is the most sensitive. It has no keyword field tags, which means that the keywords would be searched in many fields, and, in the case of PubMed, would be automatically mapped to additional MeSH terms and keywords. The second hedge uses text word field tags [tw], and the third hedge uses title/abstract field tags [tiab]. The fourth hedge is our "simple" search, designed to be taught to clinicians who need a quick bedside search for infants. It contains four keywords for infants with no field tags and relies on automatic term mapping for the pluralization of baby and newborn. Lastly, the fifth hedge is the database-provided infant filter for PubMed and Ovid. For reference, we present complete definitions of the utilized field tags in PubMed [11]:

**Medical Subject Headings [Mesh]:** MeSH (Medical Subject Headings) is the NLM controlled vocabulary thesaurus used for indexing PubMed citations. Use the MeSH database to find MeSH terms, including Subheadings, Publication Types, Supplementary Concepts and Pharmacological Actions, and then build a PubMed search. The MeSH database can be searched by MeSH term, MeSH Entry Term, Subheading, Publication Type, Supplementary Concept, or MeSH Scope Note.

**Title/Abstract [tiab]:** Words and numbers included in a citation's title, collection title, abstract, other abstract and author keywords (Other Term [ot] field). English language abstracts are taken directly from the published article. If an article does not have a published abstract, NLM does not create one.

**Text Words [tw]:** Includes all words and numbers in the title, abstract, other abstract, MeSH terms, MeSH Subheadings, Publication Types, Substance Names, Personal Name as Subject, Corporate Author, Secondary Source, Comment/Correction Notes, and Other Terms typically non-MeSH subject terms (keywords)

### Infant Search Hedge Development for Ovid Medline All

After completing the development and validation of the PubMed infant search hedges, we translated them for the Ovid Medline interface and referred to Ovid's MEDLINE database guide for field tag definitions and functions [12]. To preserve the first hedge as the most sensitive, we opted to use the .af or all fields searchable fields tag. For the second hedge, we translated the PubMed (tiab) field tag to the default .mp or multi-purpose field tag which includes abstract, anatomy supplementary concept, book title, floating sub-heading word, keyword heading word, name of substance word, organism supplementary concept word, original title, population supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, subject heading word, synonyms, title, and unique identifier. For the third hedge, we translated the PubMed text word (tw) to the ab,kf,ti field tags trio which includes the indexed abstract, author-supplied keywords, and title words. With the goal of sensitivity in mind, we chose the keyword heading word-indexed field tag (.kf) rather than keyword heading phrase-indexed field tag (.kw) because .kf allows us to capture any instance of our search terms rather than an exact phrase. We opted for title (.ti) rather than original title (.ot) given that our team's language proficiency is limited to English. To maintain the "simple" nature of the fourth hedge, we chose the multi-purpose field tag as it is the default setting in a basic Ovid search and included babies and newborns as they would not be automatically included as they were in PubMed with automatic term mapping. And lastly, we used the Ovid age group limit for all infants from birth to 23 months which is the equivalent to the PubMed infant age filter. See Table 1 for all infant search hedges for PubMed (see Supplemental Materials for all infant search hedges for both PubMed and Ovid Medline).

### Developing a Gold Standard Reference Set

Next, we developed a gold standard reference set of articles to test our infant hedges. A gold standard reference set would include only articles with a true infant population (birth to 23 months). To create this set, we identified five search topics that retrieve references on adult and infant populations: pulmonary hypertension, hypoglycemia, cerebral palsy, sepsis, and brain hypoxia-ischemia. The search strategies for these topics used a combination of MeSH and keywords (see appendix). No filters were applied but we did include the Cochrane human study hedge to decrease the number of animal studies retrieved [13]. We initially gathered 200 references on each of the five topics, giving us 1000 total. We chose to include a mix of older and newly published articles to capture articles that have been indexed and those that have not yet been indexed to simulate typical searching landscape. Although the National Library of Medicine announced the transition to automated MeSH indexing, [12] there continues to be a greater than 24-hour lag time between when citations are added to PubMed and when those citations are fully indexed to include MeSH terms to increase their discoverability. For each topic, we ran a PubMed search on June 15, 2021, sorted results by publication date and exported the 100 most recent references. Next, we applied the custom date range of

DOI: dx.doi.org/10.5195/jmla.2025.2034

**Table 1**

Infant Search Hedges for PubMed

| |
|---|
| **Search Hedge #1:** ("Infant"[Mesh] OR "Infant Health"[Mesh] OR "Infant Welfare"[Mesh] OR "Infant Death"[Mesh] OR "Sudden Infant Death"[Mesh] OR "Infant Mortality"[Mesh] OR "Infant Behavior"[Mesh] OR "Infant Care"[Mesh] OR "Infant, Newborn"[Mesh] OR "Infant, Low Birth Weight"[Mesh] OR "Infant, Small for Gestational Age"[Mesh] OR "Infant, Very Low Birth Weight"[Mesh] OR "Infant, Extremely Low Birth Weight"[Mesh] OR infant OR infants OR infantile OR infancy OR infantile OR "Infant, Postmature"[Mesh] OR "Infant, Premature"[Mesh] OR "Infant, Extremely Premature"[Mesh] OR "Premature Birth"[Mesh] OR premature OR prematurity OR preterm OR pre-term OR premie OR premies OR perinatal OR peri-natal OR perinat* OR "Perinatal Death"[Mesh] OR "Perinatal Mortality"[Mesh] OR "Perinatal Care"[Mesh] OR "Postnatal Care"[Mesh] OR postnatal OR post-natal OR postnatal* OR newborn OR newborns OR neonate OR neonates OR neonatal OR neonatale OR neonatales OR neonatle OR neonatles OR neonatally OR neonatorum OR "Neonatal Screening"[Mesh] OR "Neonatology"[Mesh] OR "Neonatologists"[Mesh] OR "Neonatal Nursing"[Mesh] OR "Nurses, Neonatal"[Mesh] OR neonatology OR neonatologist OR neonatologists OR "Intensive Care, Neonatal"[Mesh] OR "Intensive Care Units, Neonatal"[Mesh] OR NICU OR NICUs OR "Neonatal Screening"[Mesh] OR "Nurseries, Infant"[Mesh] OR "Nurseries, Hospital"[Mesh] OR nursery OR nurseries OR baby OR babies) |
| **Search Hedge #2:** ("Infant"[Mesh] OR "Infant Health"[Mesh] OR "Infant Welfare"[Mesh] OR "Infant Death"[Mesh] OR "Sudden Infant Death"[Mesh] OR "Infant Mortality"[Mesh] OR "Infant Behavior"[Mesh] OR "Infant Care"[Mesh] OR "Infant, Newborn"[Mesh] OR "Infant, Low Birth Weight"[Mesh] OR "Infant, Small for Gestational Age"[Mesh] OR "Infant, Very Low Birth Weight"[Mesh] OR "Infant, Extremely Low Birth Weight"[Mesh] OR infant[tw] OR infants[tw] OR infantile[tw] OR infancy[tw] OR infantile[tw] OR "Infant, Postmature"[Mesh] OR "Infant, Premature"[Mesh] OR "Infant, Extremely Premature"[Mesh] OR "Premature Birth"[Mesh] OR premature[tw] OR prematurity[tw] OR preterm[tw] OR pre-term[tw] OR premie[tw] OR premies[tw] OR perinatal[tw] OR peri-natal[tw] OR perinat*[tw] OR "Perinatal Death"[Mesh] OR "Perinatal Mortality"[Mesh] OR "Perinatal Care"[Mesh] OR "Postnatal Care"[Mesh] OR postnatal[tw] OR post-natal[tw] OR postnatal*[tw] OR newborn[tw] OR newborns[tw] OR neonate[tw] OR neonates[tw] OR neonatal[tw] OR neonatale[tw] OR neonatales[tw] OR neonatle[tw] OR neonatles[tw] OR neonatally[tw] OR neonatorum[tw] OR "Neonatal Screening"[Mesh] OR "Neonatology"[Mesh] OR "Neonatologists"[Mesh] OR "Neonatal Nursing"[Mesh] OR "Nurses, Neonatal"[Mesh] OR neonatology[tw] OR neonatologist[tw] OR neonatologists[tw] OR "Intensive Care, Neonatal"[Mesh] OR "Intensive Care Units, Neonatal"[Mesh] OR NICU[tw] OR NICUs[tw] OR "Neonatal Screening"[Mesh] OR "Nurseries, Infant"[Mesh] OR "Nurseries, Hospital"[Mesh] OR nursery[tw] OR nurseries[tw] OR baby[tw] OR babies[tw] |
| **Search Hedge #3:** ("Infant"[Mesh] OR "Infant Health"[Mesh] OR "Infant Welfare"[Mesh] OR "Infant Death"[Mesh] OR "Sudden Infant Death"[Mesh] OR "Infant Mortality"[Mesh] OR "Infant Behavior"[Mesh] OR "Infant Care"[Mesh] OR "Infant, Newborn"[Mesh] OR "Infant, Low Birth Weight"[Mesh] OR "Infant, Small for Gestational Age"[Mesh] OR "Infant, Very Low Birth Weight"[Mesh] OR "Infant, Extremely Low Birth Weight"[Mesh] OR infant[tiab] OR infants[tiab] OR infantile[tiab] OR infancy[tiab] OR infantile[tiab] OR "Infant, Postmature"[Mesh] OR "Infant, Premature"[Mesh] OR "Infant, Extremely Premature"[Mesh] OR "Premature Birth"[Mesh] OR premature[tiab] OR prematurity[tiab] OR preterm[tiab] OR pre-term[tiab] OR premie[tiab] OR premies[tiab] OR perinatal[tiab] OR peri-natal[tiab] OR perinat*[tiab] OR "Perinatal Death"[Mesh] OR "Perinatal Mortality"[Mesh] OR "Perinatal Care"[Mesh] OR "Postnatal Care"[Mesh] OR postnatal[tiab] OR post-natal[tiab] OR postnatal*[tiab] OR newborn[tiab] OR newborns[tiab] OR neonate[tiab] OR neonates[tiab] OR neonatal[tiab] OR neonatale[tiab] OR neonatales[tiab] OR neonatle[tiab] OR neonatles[tiab] OR neonatally[tiab] OR neonatorum[tiab] OR "Neonatal Screening"[Mesh] OR "Neonatology"[Mesh] OR "Neonatologists"[Mesh] OR "Neonatal Nursing"[Mesh] OR "Nurses, Neonatal"[Mesh] OR neonatology[tiab] OR neonatologist[tiab] OR neonatologists[tiab] OR "Intensive Care, Neonatal"[Mesh] OR "Intensive Care Units, Neonatal"[Mesh] OR NICU[tiab] OR NICUs[tiab] OR "Neonatal Screening"[Mesh] OR "Nurseries, Infant"[Mesh] OR "Nurseries, Hospital"[Mesh] OR nursery[tiab] OR nurseries[tiab] OR baby[tiab] OR babies[tiab]) |
| **Search Hedge #4:** (infan* OR baby OR neonat* OR newborn) |
| **Search Hedge #5:** Infant[MeSH] |

1/1/16-12/31/16, sorted by publication date, and exported the first 100 references for each of the five topics. References were exported and archived in the citation management software EndNote 20 (Clarivate Analytics, Philadelphia, PA, United States) and then imported into the review management software, Covidence (Covidence systematic review software, Veritas Health Innovation, Melbourne, Australia).

To test the screening process and determine inter-rater reliability, we performed a pilot test on 50 of the 1000 references. In Covidence, we sorted the 1000 references by author's last name (A-Z) and exported the first 50 to Excel. Five reviewers (EB, RB, RH, LK, CW) independently screened each reference and indicated (yes, no, unsure) if the reference included a human infant population aged birth-23 month. All the reviewers met to discuss discrepancies and further refine the eligibility criteria for

DOI: dx.doi.org/10.5195/jmla.2025.2034

what a "true positive" infant article was. We determined that articles would be included if they had an infant population (birth-23 months) or if an infant population was included in the study's inclusion criteria, but the sample did not include infants. We also included articles on family-centered care involving infants, and articles with pediatric or adult outcomes related to neonatal diagnoses. Included articles could be any type of publication or study, including corrections, editorials, and commentaries. We determined that articles would be excluded if they included a population older than 24 months, were bench research articles, were not in English, were animal studies, or discussed maternal outcomes only. Following these criteria, fifteen of the 50 references from the test set were identified as "true positive" infant articles [14].

The reviewers then screened the total set of 1000 references in Covidence. The same five reviewers who conducted the pilot project screening conducted this project screening. The title and abstract of each reference were independently screened by two reviewers (any two). Conflicts were resolved by a third reviewer (not a screener). Following the same process, reviewers then independently screened full-text articles with conflicts being resolved by a third reviewer. After completing a preliminary analysis of the PubMed search hedges, the team reconvened in April 2023 to complete the Ovid Medline analysis. Given the time that had passed, the collection of recently published citations had been indexed to include MeSH terms and the team realized the gold standard had lost its simulation of the everyday searching landscape. To correct this expiration of most recently published studies, on April 7, 2023, we conducted a new search in PubMed on the same five pre-identified topics with the same search strategies and sorted results by publication date and exported the 100 most recent references. The same team of reviewers completed the title and abstract screening process and full-text screening process in Covidence creating a new total set of 1500 references. After screening, we determined that 291 articles included an infant population and 1,209 did not. The set of 291 articles is our true positive gold standard reference set [14].

## Gold Standard Search Hedge Analysis

We generated true positive and false positive values by running each search hedge in both PubMed and Ovid Medline. For true positives, we ran each search hedge in the database and combined it with the collection of pre-identified positive PMIDs using the Boolean operator "and". The resulting number of search results was the number of true positives generated from the hedge (Hedge AND +PMIDs). We then calculated the false negative value by subtracting the number of true positives from the number of pre-identified positive PMIDs. For false positives, we ran each search hedge in the database and combined it with the collection of pre-identified negative PMIDs using the Boolean operator "and". The resulting number of search results was the number of false positives generated from the hedge. We then calculated the true negative value by subtracting the number of false positives from the number of pre-identified negative PMIDs. See Table 2 for a summary of equations used [15].

**Table 2**

Summary of Equations for Gold Standard Search Hedge Analysis

| True Positive | False Positive |
|---|---|
| $Hedge\ AND + PMIDs$ | $Hedge\ AND - PMIDs$ |
| **False Negative** | **True Negative** |
| $\#\ of + PMIDs - (Hedge\ AND + PMIDs)$ | $(\#\ of - PMIDs - (Hedge\ AND - PMIDs)$ |

## Data Analysis

The pilot project produced an inter-rater reliability of .54. However, we learned that four of the group members consulted full-text if needed, and one reviewer did not. This was an issue of miscommunication, and we resolved it so that all group members consulted full text if needed. If we remove that one reviewer from the equation, the inter-rater reliability changes to 0.8.

Specificity, sensitivity, positive predictive value (PPV), negative predictive value (NPV), and overall accuracy were calculated for all five hedges for both PubMed and Ovid Medline utilizing standard formulas. True positive findings were defined as references identified by the hedge as including a human infant population that truly did include a human infant population upon reviewer screening. True negative findings were defined as references not identified by the hedge as including a human infant population that truly did not include a human infant population upon screening. False positive findings were defined as references identified by the hedge as including a human infant population that did not include a human infant population upon screening. False negative findings were defined as references not identified by the hedge as including a human infant population that did include a human infant population upon reviewer screening.

DOI: dx.doi.org/10.5195/jmla.2025.2034

**Table 3**

Sensitivity and Specificity in PubMed

| | Sensitivity | Specificity | Positive Predictive Value (PPV) | Negative Predictive Value (NPV) |
|---|---|---|---|---|
| Hedge 1: No Keyword Field Tags | 83.8% | 88.2% | 63.0% | 95.8% |
| Hedge 2: Text Word Field Tags | 83.2% | 89.3% | 65.2% | 95.7% |
| Hedge 3: Title/Abstract Field Tags | 83.2% | 89.4% | 65.4% | 95.7% |
| Hedge 4: Simple | 83.5% | 89.7% | 66.0% | 95.8% |
| Hedge 5: PubMed Infant Filter | 70.1% | 96.2% | 81.6% | 93.0% |

As such, sensitivity reflects the hedge correctly identifying articles that include human infants, while specificity reflects the hedge correctly excluding articles that do not include human infants. Similarly, PPV reflects the proportion of articles identified by the hedge as including infants that truly included infants, while NPV reflects the proportion of the articles excluded by the hedge that truly did not include infants. Overall accuracy was defined as the proportion of correctly identified (true positive and true negative) articles, out of all screened articles.

When analyzing PubMed findings, calculations were performed utilizing 1,500 unique references, with all articles in PubMed assigned a unique PMID to automatically exclude duplications. As Ovid Medline may not exclude duplications of non-indexed citations through a unique identifier in the case of pre-publications being available concurrently with final versions of the same manuscript, duplications may be present. As this reflects a real-world scenario, the decision was made to analyze Ovid Medline findings using the denominator of 1,506 references, without manual exclusion of 6 duplicates. Hedges' sensitivity and specificity in identifying articles including infants utilizing PubMed and Ovid Medline searches were displayed graphically.

## RESULTS

In PubMed, the search strategies generated sensitivity levels between 83.2%-83.8% and specificity between 88.2%-89.7%. The exception was the built in PubMed filter which generated 70.1% sensitivity and 96.2% specificity (see Table 3). In OVID Medline, the search strategies generated sensitivity levels between 82.9%-83.6% and specificity levels between 88.1%-89.4%. The exception was the built-in filter which generated 69.6% sensitivity and 96.2% specificity (see Supplemental Materials). See Table 3.

## DISCUSSION

Hedge 1 (no keyword field tags) had the highest sensitivity (83.8% in PubMed and 83.6% in Ovid Medline) and therefore it may be best for use in systematic and scoping reviews. However, Hedges 1 through 4 had similar sensitivity. Because these data do not suggest any clear advantages we encourage librarians to explore each of these hedges by testing them with other search concepts and reflect on the role of sensitivity and specificity for their specific information needs. For example, Hedge 5 (the PubMed infant filter) is the most specific, so is most appropriate for bedside searching. Meanwhile, Hedge 4 (the simple search) has high sensitivity and specificity, offering a balance between recall and precision, which makes it applicable for both bedside searches and potentially classroom instruction.

Our reported values for sensitivity and specificity may appear low relative to other hedge validation studies, [16,17]. This may be due to the subject of pediatrics. Studies limited to the adult population do not typically describe their inclusion criteria by age as transparently as pediatric studies, which can have an impact on the overall precision of a search strategy, especially when the indexing with a controlled vocabulary is pending for a citation. An infant hedge poses an additional and similar challenge in that studies are more likely to include caregiver or maternal outcomes rather than infant outcomes, which would not meet the inclusion criteria of our proposed hedges.

The primary intention of this project was to create a transparent search hedge that can be used for systematic or scoping review studies as well as benefit bedside search requests. We selected the subject areas to test based on overlap with a variety of ages in order to confirm both the sensitivity and specificity of the selected infant terms. Testing these search hedges in both PubMed and Ovid Medline databases confirmed that the terms are

DOI: dx.doi.org/10.5195/jmla.2025.2034

**Figure 2** Sensitivity and Specificity of Hedges in Identifying Articles Including Infants in PubMed

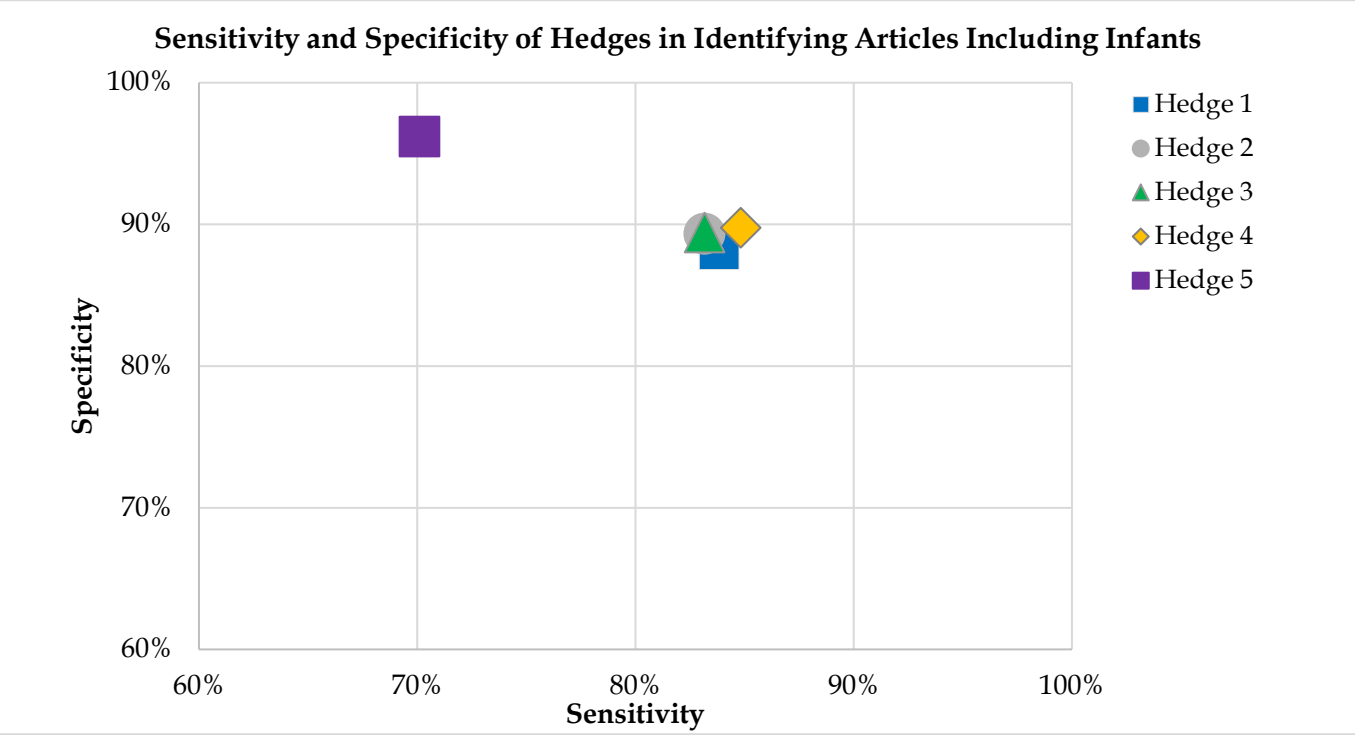
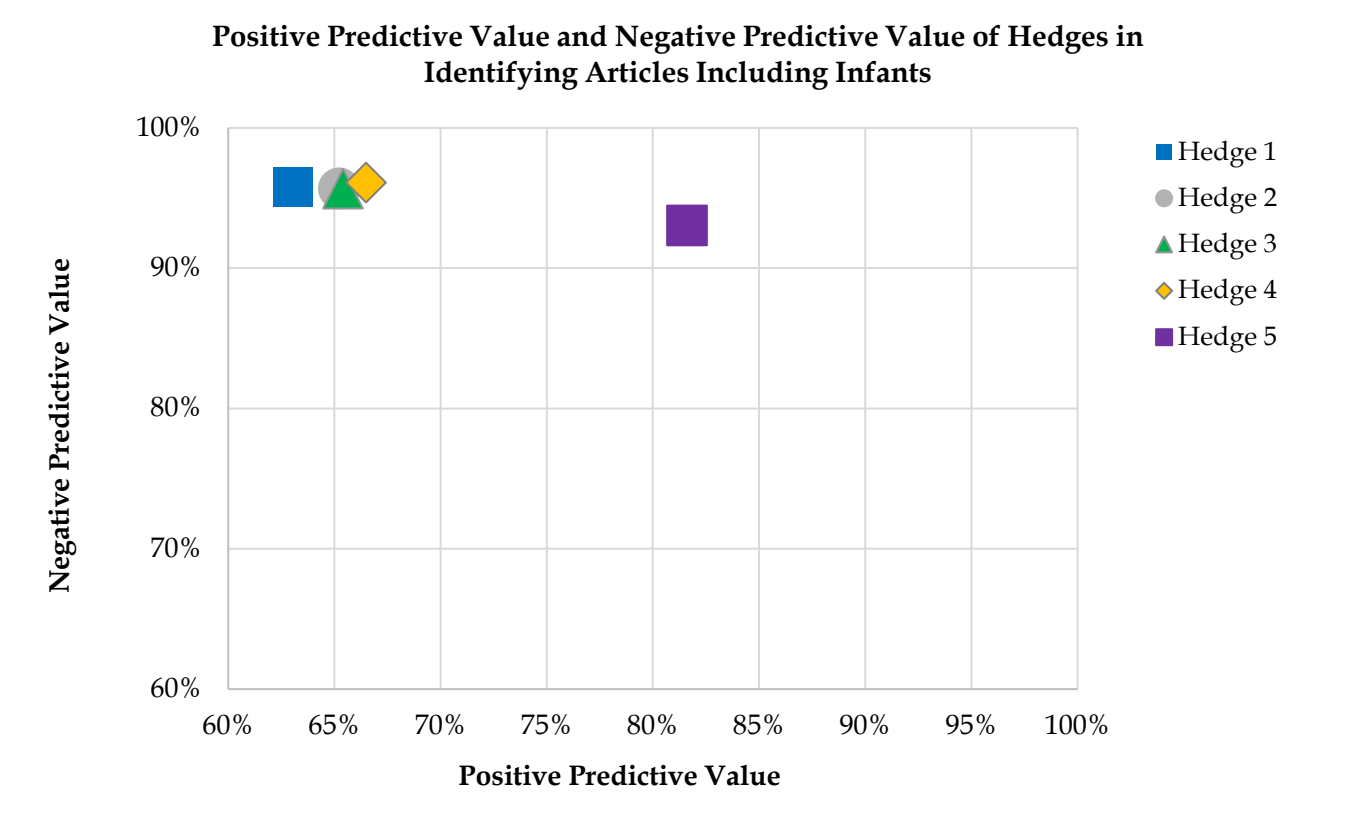



**Figure 3** Positive Predictive Value and Negative Predictive Value of Hedges in Identifying Articles Including Infants in PubMed



DOI: dx.doi.org/10.5195/jmla.2025.2034

transferrable with the appropriate search tags applied. It should be noted that the PubMed infant filter works best with articles that are already indexed as it relies solely on the automated explosion of Infant[Mesh].

## LIMITATIONS

This study has several limitations. These infant hedges were validated in PubMed and Ovid Medline but may not be generalizable to other databases. PubMed utilizes automatic term mapping, which is why the simple search hedge (#4) was so effective [18]. We suspect that this would not be the case in databases with less sophisticated search algorithms. Also, these search hedges were tested and validated in the current version of PubMed, so any changes in PubMed's search algorithm could impact these research findings. The performance of these search hedges could differ between clinical topics versus social topics. Clinical studies are likely to refer to infant populations using keywords such as infant or newborn or neonate. However, studies that are more social sciences leaning, may not refer to the infant population by name. For example, articles about early intervention strategies may not specifically refer to infant populations, although they would be relevant to that population.

Lastly, although the team shares a combined experience of decades of experience in interprofessional collaboration in supporting pediatric clinicians and researchers we acknowledge that this is not equivalent to the formalized education and training necessary to determine every potential clinician's information needs. Consequently, the lack of this described clinical subject expertise by librarian screeners could have affected decision making while screening. For example, sometimes we were unclear if an article was truly basic science research or not, or if a study's inclusion criteria fit our infant age range, but the study itself did not actually enroll patients in our specified age range, there may have been disagreements about whether that particular study should be included or not. Future projects could potentially benefit from the participation of pediatricians and/or pediatric researchers, especially in regard to the screening process.

## CONCLUSIONS

This project focused on the development and validation of sensitive infant search hedges for use in PubMed and Ovid Medline. By providing a transparent and reproducible validation process, this project serves as a valuable framework for others interested in developing and validating search hedges. The methodological details and supporting materials, such as an Excel template for calculating sensitivity and specificity, are housed in Open Science Framework [14]. We recommend that teams taking on a similar project benefit from our lessons learned which include ensuring that you have the appropriate resources of interprofessional expertise and appropriate software including a shared citation management software. Teams interested in conducting a comparison between multiple databases should conduct test searches on the same date to ensure comparability as databases are not stagnant and undergo additions and developments.

The MLA Pediatric Caucus will continue to use this methodology to develop and validate hedges for other pediatric age subsets for PubMed and Ovid Medline. The MLA Pediatric Caucus's larger goal is the development of modular age-based search hedges which will allow librarians and researchers to combine hedges or use them individually. The MLA Pediatric Caucus will also be accountable to maintaining the validity of the developed search hedges by responding to likely algorithmic changes in PubMed and Ovid Medline as well as the less likely social and linguistical changes in how pediatric populations are described.

## DATA AVAILABILITY

Search hedges and citation collections are available under controlled access through the Open Science Framework (OSF): https://osf.io/hbvjm/ under Creative Commons Attribution-Share Alike (CC BY-SA).

## AUTHOR CONTRIBUTIONS

Lynn Kysh: Conceptualization, data curation, formal analysis, investigation, methodology, project administration, visualization, writing – original draft. Zoe Baker: formal analysis, validation, writing – original draft. Roxanne Bogucka: Conceptualization, investigation, methodology, writing – original draft. Emily Brennan: Conceptualization, investigation, methodology, project administration, writing – original draft. Rachel J. Hinrichs: Conceptualization, investigation, methodology, writing – original draft. Christine Willis: Conceptualization, investigation, methodology, writing – original draft.

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## SUPPLEMENTAL FILES

**Appendix A**

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*Received July 2024; accepted July 2025*



ISSN 1558-9439 (Online)

ORIGINAL INVESTIGATION
DOI: dx.doi.org/10.5195/jmla.2025.2170

# Language inclusion intentions in scoping reviews

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**Objective:** Research published in languages other than English (LOTE) is often ignored in evidence syntheses, marginalising diverse knowledge and global perspectives. While the extent of LOTE inclusion and the associated attitudes of LOTE inclusion amongst authors of systematic reviews has been well characterised, LOTE inclusion in other evidence synthesis forms has yet to be explored. Scoping reviews, in comparison to systematic reviews, examine a broader range of sources to build a conceptual summary of a field of inquiry, making LOTE literature an important source of information for scoping review authors. This study therefore aimed to characterise the current state of LOTE inclusion intentions in scoping reviews

**Methods:** Peer-reviewed, PubMed indexed scoping review protocols published from 01-Jan-2024 to 11-Aug-2024 were analysed for LOTE inclusion. Author affiliation, which LOTEs (if any) were included, and what methods authors planned to use to read LOTE literature were recorded.

**Results:** Overall, LOTE inclusion intentions and attitudes were diverse, with just under half of the 249 protocols analysed including a LOTE. Many LOTE-included articles relied on the authorship team's own LOTE proficiency to gather evidence. Machine translation was also intended to be used in one quarter of the LOTE-included protocols. Only 30% of the exclusive protocols planned to exclude LOTEs at the screening stage, allowing for readers to identify the number of LOTE articles.

**Conclusion:** This analysis demonstrates the need for increased LOTE inclusion and reporting guidelines for scoping reviews, as well as the importance of analysing LOTE inclusion for other forms of evidence synthesis.

**Keywords:** Language Bias; Evidence Synthesis; Scoping Review

See end of article for supplemental content.

## INTRODUCTION

Evidence syntheses are widely considered the strongest level of evidence on which to base clinical practice and future research [1]. The reliability of evidence syntheses is built from their meticulous approach to include all relevant literature, including from the large body of research published in languages other than English (LOTE) [2–5]. However, LOTE evidence is often ignored in evidence syntheses [6–11]. The exclusion or neglect of LOTEs in systematic reviews is often due to a perceived lack of time, language expertise within the review team, or financial resources to utilise translation services [6,7].

The difficulty of LOTE inclusion has therefore prompted many scholars to ask: does the inclusion of LOTE literature in research syntheses searches warrant the additional effort required? This question has been indirectly addressed through two approaches. Firstly, comparisons of study quality between English and LOTE literature have been performed, with LOTE articles having either a lower [12,13] or similar [14–17] reporting completeness/study quality compared to English studies. Another group of studies has investigated whether LOTE exclusion influences the outcomes of meta-analyses. Studies found conflicting evidence that LOTE exclusion had no effect [18,19] or a significant effect [20] on the meta-analysis conclusions. Notably, LOTE exclusion consistently impacted meta-analysis findings in complementary/alternate medicine disciplines [17,21]. Overall, these approaches have failed to provide a definitive answer to the worthwhileness of including LOTEs in systematic reviews.

The above question may not be the most appropriate. Instead, the authors suggest approaching this topic with a lens of academic ethics and social justice: what effort should we as researchers make to include LOTE literature in our research syntheses? The development of English as an academic lingua franca is steeped in an Anglocentric past [22]. It continues to this day, where non-native English speakers must endure disadvantage throughout their academic careers [23]. Academics from the Global

DOI: dx.doi.org/10.5195/jmla.2025.2170

South are conditioned to believe that international/Western journals hold prestige unobtainable by local publications [24]. The databases used to assess publication quality exclude LOTE sources [25]. Google scholar relegates LOTE texts to the tail-end of its search results [26]. Meta-analysis conclusions remaining unchanged regardless of LOTE inclusion/exclusion does not demonstrate the futility of LOTE inclusion; it instead reflects the dominant anglophone research environment that non-native English speakers must endure. The authors therefore argue that LOTE inclusion is an ethical, rather than pragmatic imperative for evidence synthesis practitioners. Research continues to be published in LOTEs [27]; this research should be respected and considered.

While LOTE inclusion in systematic reviews has been analysed, the LOTE inclusion of other modes of evidence synthesis has been under-researched. Scoping reviews (ScRs) lay the foundations for other evidence syntheses by providing a broad overview of available research and grey literature related to a research area [28]. It is therefore arguable that ScR authors should be especially interested in LOTE literature which may provide unique approaches or insights that widen the review's findings. In comparison to the highly regulated nature of systematic reviews, ScRs have only recently been subject to some authoritative reporting standards and guidelines [29,30]. Therefore, there is little official guidance for language inclusion in ScRs outside of recommending that authors explain their reasons for any language restrictions [10,30]. To the best of the authors' knowledge, the only measure of ScR LOTE inclusion is from a 2020 editorial in *JBI Evidence Synthesis;* it states that in that particular journal issue, approximately half of the submitted ScR protocols did not exclude LOTEs [31]. Therefore, a more up-to-date and comprehensive analysis of LOTE inclusion in ScRs is needed.

This study aims to characterize the current intentions of ScR authors to include or exclude LOTEs in their reviews. ScRs are large undertakings and can take years to move from conception to publication. Therefore, analysing published ScRs would only provide dated insights into the final LOTE inclusion decisions made by authors. In contrast, examining recent ScR protocols provides a more current, accurate picture of how authors intend to approach language inclusion at the beginning of their studies [32]. Therefore, this study analyses ScR protocols as they are a contemporaneous source of language inclusion intentions. The results of this study can be used to help inform the development of ScR guidelines, promote language inclusion and ultimately diversify the perspectives in evidence syntheses. The specific objectives of this study are to:

1. Measure the proportion of ScR protocols that included at least one LOTE (LOTE-included) and don't include any LOTEs (LOTE-excluded)
2. Examine how language inclusion differs by the geographical affiliation of ScR protocol authors
3. Examine at what stage LOTEs are planned to be excluded in ScR protocols
4. Examine which LOTEs are most commonly included in ScR protocols
5. Determine how LOTE-included ScR protocol authors plan to translate LOTE literature
6. Determine if LOTE inclusion is associated with a multinational authorship team or the global/regional relevance of the ScR topic

## METHODS

### Data searching

ScR protocols cannot be registered in the International Prospective Register of Systematic Reviews, and therefore those that are made publicly available are either deposited to an online repository or published as an academic journal article [33]. For this study, we chose to only analyse ScR protocols published in peer-reviewed journals. Such articles not only represent the current language inclusion plans of ScR researchers, but they also likely represent the minimum language inclusion standards expected by the broader academic community (i.e. peer reviewers).

This paper aims to analyse the current state of language inclusion in peer-reviewed scoping review protocols. Therefore, the PubMed database was searched on the 11th August 2024 for results published in 2024 with the phrase "scoping review protocol" included in the title. Protocols in 2024 were analysed to provide an up-to-date summary of the language inclusion intentions of authors currently conducting scoping reviews. Inclusion of this title phrase as a search term is appropriate as it is an explicit component of scoping review protocol in authoritative guidelines [29]. Protocols published in journals that do not implement pre-publication peer-review, as indicated by the journals' instructions for authors, were excluded from the analysis. The search string used was: *("2024/01/01"[Date - Publication]: "2024/08/11" [Date - Publication]) AND "scoping review protocol" [ti].*

### Data extraction and analysis

A data extraction protocol was initially developed based on existing extraction forms for studies of language inclusion in systematic reviews [6,7]. A copy of the full data extraction is available (Appendix A). Restrictions on LOTEs can be employed at two distinct stages of the scoping review process: as part of the search strategy, or as part of the screening strategy. Excluding LOTE literature at the screening stage is preferred, as it gives a measurement of the number of LOTE articles that are

DOI: dx.doi.org/10.5195/jmla.2025.2170

excluded [34]. Language inclusion was classified within one of five levels:

1. *Language inclusion never mentioned*: the protocol gives no indication of the language/s included in the review (although the protocol itself is written entirely in English)
2. *LOTE excluded at the search stage*: the authors indicated that searches would be performed with a filter to return only English results.
3. *LOTE excluded at the screening stage*: the authors indicated that LOTEs would be excluded at the screening stage. This classification was also chosen if the protocol indicated LOTE exclusion generally and included a full example search string which did not filter the results to English only
4. *Unclear if LOTE excluded at the searching or screening stage*: LOTEs were excluded, but it was unclear at which stage
5. *LOTE included*: literature published in at least one LOTE was planned for inclusion in the scoping review if it was found during screening.

If the protocols did plan to include LOTE materials, then the method the authors planned to use in order to translate this material was also noted. If the protocols excluded LOTE materials, the presence/absence of an acknowledgement of the potential biases/limits this exclusion places on the ScR was recorded.

Multilingual search terms also influence the literature gathered for screening [35]. Therefore, data were also extracted on authors' intentions to use non-English search terms to locate literature. If this intention was present, the presence of multilingual search terms in example search strings was also noted.

Authorship teams with affiliations across multiple countries were more likely to include LOTE evidence in their systematic reviews [7]. Therefore, the countries of author affiliations were also recorded for each included protocol. It was also noted whether each protocol had an authorship team with affiliations from only one country, or from a multinational mix of countries. Hannah et al. [6] also proposes that reviews with a specific geographical scope could influence LOTE inclusion. We therefore examined whether each included protocol aimed to review literature with a specific regional focus.

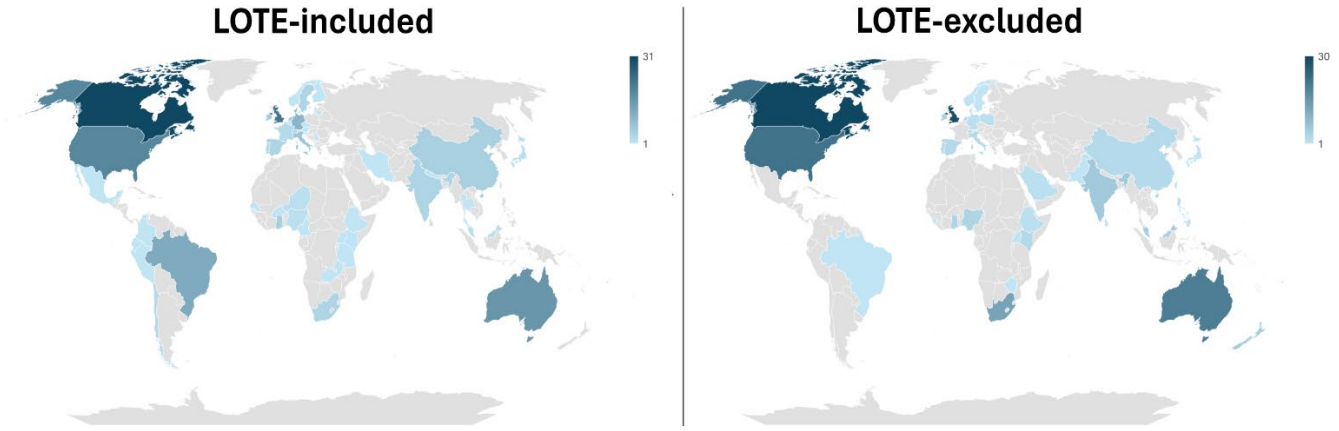
All data extractions were performed manually using Microsoft Excel sheet templates. A random sample of 10 articles were used to pilot the initial data extraction protocol by both authors independently. The protocol was then refined to clarify any subjective aspects of the extraction protocol before data was extracted from all included articles. The completed data extraction sheets were then compared synchronously by both authors. Any discrepancies were resolved through discussion until a consensus was reached. Extracted data were analysed to produce descriptive statistics and graphical summaries. Chi-squared tests were performed using an online calculator [36] to examine the impact of geographical scope and international authorship on LOTE inclusion.

## RESULTS

### Overview of sample

The search string without a publication year restriction returned 1696 PubMed indexed publications with "Scoping Review Protocol" in the title. A total of 262 (15.39%) of these records were published in 2024 and were further screened. One article was excluded as, while labelled a scoping review protocol, the full-text consisted of a fully completed scoping review. Two articles were excluded as they were corrections of previously published ScR protocols. One article was excluded as its full-text

**Figure 1** Geographic distribution of the author affiliations of LOTE-included (left) and LOTE-excluded (right) ScR protocols.



DOI: dx.doi.org/10.5195/jmla.2025.2170

could not be located. Nine articles were excluded as they were published in journals which do not enact pre-publication peer review (Appendix B). Data was therefore extracted from the final 249 included articles (Appendix A). Generally speaking, the most prominent authorship affiliations were from the west, with Canada being the most common country of affiliation for authors (Figure 1; Table 1).

**Table 1**

Proportion of SCR protocols that are LOE-included for all countries affiliated with 10 or more protocols. For data on all countries, see Appendix C.

| Country of Affiliation | Number of protocols | Number (%) of protocols that are LOE- included |
|---|---|---|
| Canada | 61 | 31 (50.8%) |
| UK | 50 | 22 (44.0%) |
| USA | 41 | 19 (46.3%) |
| Australia | 36 | 16 (44.4%) |
| South Africa | 17 | 4 (23.6%) |
| Brazil | 13 | 12 (92.3%) |
| Germany | 12 | 10 (83.3%) |
| Ireland | 11 | 6 (54.5%) |
| Denmark | 10 | 8 (80.0%) |
| India | 10 | 4 (40.0%) |
| Italy | 10 | 7 (70.0%) |

## Language inclusion intent

Of the ScR protocols analysed, 48.59% (n=121) included at least one LOTE (Table 2), while 51.41% (n=128) did not. Of the 128 LOTE-excluded protocols, 7 (2.81%) of the protocols did not mention language at all. Of those that explicitly stated that the scoping review would be limited to English only (n=121), 51 protocols (42.15%) planned to exclude LOTEs during their initial search. 38 protocols (31.40%) planned to include LOTEs in their search, and excluded LOTE literature during screening for inclusion/exclusion. 32 protocols (26.45%) stated that they would exclude LOTEs in their scoping review, but did not specify at what stage the exclusion would occur. No obvious differences between country of authorship affiliation were present between LOTE-included and LOTE-excluded ScR protocols (Figure 1). Of the 121 protocols that are LOTE-included, 13 (10.74%) stated that they would use LOTE search terms. Of these 13 protocols, 3 (23.08%) included LOTE search terms in the example search strategies in the ScR protocols.

**Table 2**

Count of language inclusion intentions

| Intention | Count |
|---|---|
| LOTE included | 121 |
| excluded in initial search | 51 |
| excluded during screening search results | 38 |
| LOTE never addressed | 7 |
| unable to determine exclusion stage | 32 |

## Languages included

Over half of the 121 LOTE-included ScR protocols (n=62, 51.24%) planned to include any/all languages in their review. For the other 59 protocols, specific LOTEs were planned for inclusion. In 43 (72.88%) of the protocols that specified one or more included LOTEs, the LOTEs included are commonly spoken languages in the author(s) affiliated country. Most of the protocols that named specific LOTEs (n=56, 94.91%) included 1-4 LOTEs, with one protocol each specifying 6, 7, and 11 LOTEs for inclusion (Table 3). The most common LOTEs included were French (n=24), Spanish (n=14) and German (n=13; Table 4). The other 128 ScR protocols did not include any LOTEs. Of these, 57 (44.53%) protocols discussed that the exclusion of LOTEs may limit and/or bias the findings of their review.

**Table 3**

Number of LOTEs included in LOTE-included ScR Protocols

| number of LOTEs | Count |
|---|---|
| 1 | 35 |
| 2 | 9 |
| 3 | 8 |
| 4 | 4 |
| 5 | 0 |
| 6 | 1 |
| 7 | 1 |
| 8 | 0 |
| 9 | 0 |
| 10 | 0 |
| 11 | 1 |

DOI: dx.doi.org/10.5195/jmla.2025.2170

**Table 4**

Count of inclusion for each LOTE

| Included LOTE | Count |
|---|---|
| Any language | 62 |
| French | 24 |
| Spanish | 14 |
| German | 13 |
| Portuguese | 10 |
| Swedish | 9 |
| Danish | 8 |
| Norwegian | 8 |
| Chinese/Mandarin | 6 |
| Italian | 5 |
| Other | 20 |

### Translation strategies

Most of the LOTE-included ScR protocols mention how LOTE literature will be screened/read by the reviewer team (n=97, 80.17%). A majority of these ScR protocols (n=72, 74.23%) relied on the authors' LOTE proficiency to include a limited number of LOTEs into the ScR review. Machine translation was also reported as a common strategy (n=30, 30.93%), particularly for studies with an aim to include all LOTEs that appear during the ScR search. A comparatively smaller number of ScR protocols planned to use professional translation services (n=11, 11.34%) or collaborate with other researchers to translate/screen LOTE articles (n=6, 6.19%). A further 22 studies (22.68%) cited a combination of strategies, the most common of which was utilising author LOTE proficiency, followed by machine or professional translation for LOTEs which the review team has no proficiency (Table 5).

**Table 5**

Translation strategies for authors of LOTE-included ScR protocols

| Translation strategy | Count |
|---|---|
| not mentioned | 24 |
| machine translation | 30 |
| collaboration with other researchers | 6 |
| hired translator | 11 |
| authors' ability | 72 |
| multiple strategies | 22 |

### Influence of Geographical Scope and International Collaboration

It was hypothesised that LOTE inclusivity in ScR protocols may be influenced by the geographical scope of the review, or the presence of an international authorship team. Of the 165 protocols affiliated with a single country, 81 (49.09%) were LOTE-included. Of the 84 protocols with an international authorship team, 36 (42.86%) were LOTE-included. No significant relationship was present between the LOTE inclusivity of ScR protocols, and whether the authors had affiliations from multiple countries ($X^2$=0.8684, df=1, p-value=0.351). Of the 66 protocols with a specified geographic scope, 31 (46.97%) were LOTE inclusive. Of the 183 protocols without a specified geographic scope, 90 (49.18%) were LOTE-included. The presence/absence of geographical scope in the ScR protocols has no significant relationship with LOTE inclusivity ($X^2$=0.0949, df=1, p-value=0.758).

## DISCUSSION

This study represents the first broad examination of LOTE inclusion in scoping reviews. Overall, just under half of peer-reviewed ScR protocols published in 2024 and indexed in PubMed planned to include at least one LOTE. This frequency of LOTE inclusion is similar to those reported in analyses of published systematic reviews [6,8,11]. This similarity is surprising given that ScRs, unlike systematic reviews, are aimed at providing a broad overview of a field, often by incorporating grey literature. Furthermore, we anticipated that the rate of planned language inclusion would be higher in ScR protocols compared to published evidence syntheses, given that more language-inclusive strategies may be abandoned during the implementation phase of a review. However, given that over half of the ScR protocols analysed plan to exclude all LOTEs, this study demonstrates an enduring divide in attitudes towards language inclusion in evidence syntheses.

A divide also exists in the depth of reporting LOTE exclusion. Firstly, 32 of the 128 LOTE-excluded protocols planned to exclude LOTEs at the screening stage. This approach allows readers to identify the number of LOTE articles to be excluded, or to enable future translations that may provide additional information to the findings. The remaining 96 protocols (75%) either did not specify when they would exclude LOTEs, or excluded LOTEs as an in-built search filter. Therefore, a majority of evidence synthesis authors are currently not aligning with best-practice language exclusion reporting [34]. Excluding LOTEs at the screening stage allows readers to evaluate the amount of excluded LOTE literature. Transparently reporting the excluded LOTE literature would also allow other researchers to perform additional analyses on this literature. Therefore, scoping review guidelines should more clearly recommend LOTE exclusion at the screening

DOI: dx.doi.org/10.5195/jmla.2025.2170

stage to improve the prevalence of best practice. Additionally, less than half of the LOTE-excluded protocols acknowledged the limitations of their approach in the protocol.

Contradictory to Rasmussen and Montgomery [7], our findings suggest that multinational authorship teams are not, necessarily, more likely to be language inclusive in their ScRs. This result may be due to the large representation of authors from bilingual nations in the sample (e.g. Canada). Hannah et al. [6] found that ecological systematic reviews with a specific geographic scope were associated with greater LOTE inclusion. Our results instead found no significant difference in LOE inclusion when comparing scoping review protocols on global or local issues. The discrepancy between these studies may be due to disciplinary differences, or differences in the determinants of LOE inclusion between systematic and scoping reviews.

Approximately half of the LOTE-included protocols analysed in this study aimed to include any/all LOTEs in their ScR, usually through relying on translation methods external to the authorship team such as machine translation or hiring professional translators. Despite general hesitation towards adopting machine translation and language exchange systems reported by Hannah et al. [6] our findings do demonstrate a willingness to utilise machine translation methods, and collaborative approaches with peers external to the research team in order to include LOTE literature. The high proportion of protocols planning to use machine translation is important to note given that, unlike the highly defined data extraction of systematic reviews, the potential diversity of ScR data extractions may require more nuanced language ability [37]. While machine translation provides a free and accessible alternative to professional translation services, researchers may struggle to correctly interpret translations produced through this software. Future analyses of published LOTE-included scoping reviews that have interpreted LOTE literature using machine translation could determine if they are a viable tool for LOTE-included scoping reviews.

Overall, our analysis demonstrates that the prevalence of language inclusion in ScRs can be improved. Our results suggest that the majority of ScRs only consider English-language sources, and those that plan to examine LOTEs are usually restricted to LOTEs commonly spoken in the author(s)' country. More detailed guidelines on language inclusion in ScRs (beyond justifying language restrictions) may assist researchers in expanding the languages considered in their evidence syntheses. We recommend that ScR guidelines also explicitly state that LOTE-excluded protocols should exclude LOTE literature at the screening stage. More broadly, our analysis reveals that efforts to support LOTE scholarship and scholars should continue and be directed towards other forms of evidence synthesis aside from systematic reviews.

## FUTURE DIRECTIONS

Language inclusion in ScRs and ScR protocols are under researched when compared to other forms of evidence synthesis like systematic reviews. Given that ScRs rely on gathering wide-ranging approaches and findings to inform the design of future research, it is possible that LOTE exclusion in ScRs is more likely to compromise the review findings when compared to LOTE exclusion in systematic reviews. Therefore, in a fashion similar to Nussbaumer-Streit et al. [19] LOTE-excluded ScRs could be re-analysed in the future to include LOTE literature, followed by an analysis of if/how this retroactive LOTE inclusion changes the outcomes of the ScR. Additionally, ScR protocol authors from the existing dataset developed here could be surveyed to better understand their LOTE inclusion intentions and barriers/concerns towards LOTE inclusion [7]. While our study has examined the lack of association between LOTE inclusion and international collaboration, we rarely encountered explicit explanations for the LOTE inclusion/exclusion. Directly surveying or interviewing ScR authors would therefore address why certain LOTE inclusion decisions are made.

Additional unobtrusive data could also be gathered to better understand authors' language inclusion intentions. This could include extracting data on the planned use of predominately non-English databases (e.g. CNKI) in the protocol's proposed search strategy. Additionally, language inclusion could potentially be mandated by research funding sources. Future research in this field could therefore examine if LOTE inclusion is correlated with any particular policies of the research funder/s. More granular analyses of the appropriateness of the LOTE inclusion strategy for addressing the research questions of each of the ScRs could also be performed. Lastly, how ScR authors ultimately enact or abandon the intentions they record in ScR protocols is unknown. Future research should therefore examine how LOTE inclusion shifts between ScR protocols and the completed ScRs that result from them.

## LIMITATIONS

The search strategy utilised may have limited the final dataset gathered. Although it is recommended in authoritative guidelines to label ScR protocols as "Scoping Review Protocols" in the manuscript title [33], some ScR protocols may not have done this and would therefore have been missed during the search. Additionally, only the PubMed database was searched; it is possible that some biomedical journals publishing ScR protocols are not PubMed indexed and therefore would have been missed in the initial search. An expanded search of multiple databases, especially those based outside of the US or those that include predominately non-English texts, would strengthen the generalisability of our findings. Lastly, while peer-reviewed ScR protocols were chosen

DOI: dx.doi.org/10.5195/jmla.2025.2170

since they also reflect peer-reviewer standards/attitudes towards LOTE inclusion, excluding non-peer-reviewed ScR protocols deposited in online repositories likely biases the analysis. Most of the ScR protocols analysed were published in journals that charge article processing charges in excess of $1,000 USD for a scoping review protocol. Given that many marginalised scholars cannot afford this expense [38,39] our dataset is likely skewed towards scholars from more economically privileged environments.

## DATA AVAILABILITY STATEMENT

The raw data associated with this article are available in Appendix A.

## AUTHOR CONTRIBUTIONS STATEMENT

Joshua Wang: conceptualization, data curation, formal analysis, investigation, methodology, project administration, validation, visualization, writing – original draft, writing – review and editing. Hayley Moody: formal analysis, investigation, methodology, validation, writing – review and editing

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Supplemental Files

**Appendix A**
**Appendix B**
**Appendix C**

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*Received January 2025; accepted May 2025*



ISSN 1558-9439 (Online)

ORIGINAL INVESTIGATION
DOI: dx.doi.org/10.5195/jmla.2025.2163

# "Is this professionally correct?": understanding the criteria nurses use to evaluate information

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**Objective:** Nurses must evaluate and sift through large quantities of information of varying quality as part of patient care. This study sought to determine nurses' evaluation criteria when encountering health information, including consumer health information written for the general public and scholarly sources, such as journal articles.

**Methods:** We employed a mixed-methods approach with a survey and follow-up individual interviews. In both the survey and interviews, nurses were asked to evaluate information written for the general public or a scholarly audience. Interviewees were encouraged to think aloud to elucidate their criteria. We analyzed data using descriptive statistics and inductive thematic analysis.

**Results:** Criteria used for both consumer and scholarly information were similar, with accuracy, relevance, authority, purpose, and currency as the most frequently reported. Nurses often relied on easily identifiable characteristics, such as where information came from, funding sources, intended audience, or its concordance with their prior knowledge. Nurses demonstrated awareness of the need to evaluate methodology in studies, especially empirical studies, for accuracy and relevance. However, they were less likely to evaluate methodology in review articles.

**Conclusions:** Nurses value accurate, relevant information; however, their evaluation criteria are often superficial. Educators should encourage nursing students to engage more deeply with the nuances of evaluation. While many nurses pointed to research and peer review as evidence of accuracy, fewer demonstrated a deeper understanding of how to evaluate particular research methodologies, such as systematic reviews.

**Keywords:** Information Literacy; Nurses; Evidence-Based Nursing; Evidence-Based Practice; Evaluation Criteria; Critical Appraisal

See end of article for supplemental content.

## INTRODUCTION

Knowing how to evaluate or assess information to ensure its quality is an essential skill for nurses at all levels. Nurses are expected to use the best available research evidence combined with their clinical expertise to provide the best care for their patients [1]. This is epitomized by a professional framework known as evidence-based practice (EBP), which is considered a core concept by the American Association of Colleges of Nursing (AACN) for both entry-level and advanced practice nursing education. While entry-level nurses are expected to "evaluate appropriateness and strength of the evidence," advanced-level nurses also "lead the transition of evidence into practice" (p. 38) [2]. Evaluation is a key component of EBP, and three of the 24 EBP competencies concern evaluation: evaluation of pre-appraised evidence, evaluation of the strength and applicability of research studies, and evaluating and synthesizing a body of evidence [3]. The literature describes the ability to assess and apply information to guide EBP several different ways: information evaluation [4], critical health literacy [5], research appraisal [6], critical appraisal [3], source evaluation [7], information appraisal [8, 9], information credibility sourcing [10], information validation [11], or health information appraisal [5, 12]. Given there is no consistent understanding of this skill, and to aid the interprofessional dialogue, we refer to this collective suite of EBP skills as evaluation of information, or evaluation hereafter.

Evaluation tools and checklists are commonly used in evidence-based practice to capture the complexity of the appraisal of medical information. Some of the criteria evaluated within critical appraisal checklists include the level of evidence, sample size, and random assignment [13, 14]. These tools provide nurses with a consistent approach to use when evaluating evidence. However,

DOI: dx.doi.org/10.5195/jmla.2025.2163

critical evaluation checklists often lack standardization across tools and are characterized by a general unwieldiness due to the number of evaluative questions incorporated into a single document [15-17]. Many nurses would benefit from simplified evaluation checklists, as well as training on how to use these checklists effectively [13, 18].

Research shows that many nurses are aware of their struggle with evaluating information and express a need for more instruction and practice [7, 19, 20]. Nursing educators, including health science librarians, are likewise aware of these challenges, with the literature describing how to best teach EBP and different methods for educating nurses on how to evaluate their sources [21-27]. CRAAP [28] and SIFT [29] are two well-known evaluation frameworks. CRAAP encourages novice researchers to consider the following criteria when evaluating a source: currency, relevance, authority, accuracy, and purpose. A known limitation of CRAAP is that evaluations from this framework tend towards binary conclusions, where sources are labeled as either good or bad. By comparison, SIFT (Stop, Investigate, Find Better Coverage, and Trace Claims) is a process-based approach, which encourages researchers to compare and contrast multiple sources against one another and follow claims back to their original sources [29]. While these approaches are popular frameworks for teaching information literacy within secondary and baccalaureate settings, they may be insufficient to evaluate medical information in clinical evidence-based settings. For medical information, criteria are typically expanded with indicators specific to research studies, such as the research methodology, including the level of evidence, sample size, and random assignment, among others [13, 14].

Given the limited time most nursing students spend during their clinicals on reading and discussing research, it is not surprising that in-depth evaluations are out of reach for most nurses unless trained in graduate school [21, 30, 31]. A research-to-practice gap exists where the training nurses receive does not translate easily to the job, impacts the evaluation of research articles, and where nurses fail to see the relevance of research to their professional practice [19, 32]. Nurses gravitate to sources of evidence they previously deemed reliable, and have difficulty evaluating the suitability of research found in new and unknown sources [33]. In their evaluation, nurses often utilize only basic or surface-level evaluation criteria, such as publication date and publisher, rather than content-level criteria such as aspects of the research methodology [7, 8].

The purpose of this work is to investigate what criteria nurses apply in evaluation tasks to uncover insights into the realities of the nursing profession that may be used to inform nursing education. This study explores what criteria practicing nurses utilize when assessing the quality of information and whether information is suitable for informing their clinical practice. This study's design emerged from the following research question: "What are the evaluation criteria used by nurses for consumer and scholarly health information?"

## METHODS

To determine what evaluation criteria nurses use, we utilized a mixed-methods research design, combining data from a survey and 18 individual interviews. The methodological approach is based on Seo [34], who combined survey research with interviews to study how respondents perceived information credibility. The interviews follow the survey to gain a more in-depth understanding of the evaluation criteria used. The research was approved by the Institutional Review Boards of the University of Utah (IRB_00145787), Southern Utah University (IRB #09-112021d), and Brigham Young University (IRB2021-349).

The survey (see Appendix A) started with demographic questions, followed by a scenario to evaluate an abbreviated popular source and scholarly source: "Assume you have the following information to make a clinical decision. Please evaluate it." The first source was an excerpt from a website, the second was an abstract of an article, and both excerpts had links to the full text should respondents wish to explore more of the source. Both sources discussed flu vaccination and required nuanced judgments to evaluate. After respondents provided their evaluation of the sources, the survey presented a checklist of potential evaluation criteria. Respondents indicated which criteria they typically use to evaluate information as a nurse. Criteria originated from Seo et al. [34], the CRAAP test [28], SIFT [29], and the ACRL standards for nursing [35]. Given the types of materials the nurses would be evaluating, we included a wide variety of criteria. A list of the evaluation criteria used in the survey and their sources can be found in Appendix B.

We disseminated the survey through the Utah Nursing Association and Utah Nurse Practitioners, to nursing program alumni from around the state (including one private university and three public universities), and one health system associated with an academic medical center. The survey was open from January - April 2022. Respondents had at least an LPN license and were currently working as nurses to be eligible. To incentivize participation, we held a drawing for interested respondents to receive one of twenty $20 gift cards.

For our statistical analysis, we used SPSS to run chi-square tests of independence. Because a separate test had to be run against each possible evaluation response, to reduce the chances of a false positive result, we used the Benjamin-Hochberg critical value to adjust the p-value.

DOI: dx.doi.org/10.5195/jmla.2025.2163

At the end of the survey, respondents could express interest in participating in a follow-up interview; they submitted their email addresses and chose the specialties that most closely aligned with their work. Respondents willing to be interviewed were clustered into similar specialties, and a purposive sample from each specialty cluster was randomly selected. Interviewees received a $25 gift card upon completion of the interview. Funding for all study incentives was provided by two of the researchers' universities.

We conducted 18 semi-structured interviews via Zoom in July and August of 2022. Two investigators were present at each interview, one conducting the interview and the other taking notes. Interviewees were randomly assigned to evaluate a popular source or a journal article, both on the topic of nurse burnout, and both published in 2021. As in the survey, the sources selected required a nuanced judgment. Interviewees were asked to think aloud and describe their process when evaluating the information during the interview. A copy of the interview protocol may be found in Appendix C. Further explanation of the sources used in the scenarios for the survey and interviews may be found in Appendix D.

We used Zoom's auto-transcribe feature to generate initial interview transcripts, then cleaned and checked the transcripts for accuracy. We then followed an inductive coding strategy to identify themes in the interview data to develop a codebook using a sample of two interviews - one where the interviewee evaluated the website and another where the interviewee evaluated a research article. All four researchers examined the sample transcripts for emerging themes, and we came to a consensus codebook consisting of 29 lead codes and 60 granular codes (Appendix E). The remaining transcripts were separately coded by two individual researchers using the codebook. Researchers reconciled any differences in their coding by discussion. A third researcher was brought in to reconcile when a consensus between the two researchers could not be reached. Data associated with this article are available; see the data availability statement at the end of this article.

## RESULTS

The survey had 344 eligible respondents, with many specialties, levels of education, and years of experience represented (Table 1). We asked respondents about their specialties to ensure we collected data from a diverse group of nurses and workplaces. Respondents could select more than one option, so the number of selections exceeds the total number of responses. Each of the 18 listed specialties was selected at least once, with "other" specialties including nursing educator, pain management, and geriatric nurse (see Appendix F). Upon coding and reconciliation, the interviews yielded 423 instances of codes related to evaluation criteria.

### Overview of common evaluation criteria

The most common evaluation criteria used in the survey and those observed in the interview data can be found in Table 2. The criteria labels had to be consolidated because the survey provided a list of criteria for respondents to choose from, while the interview data was coded inductively, allowing criteria to emerge from the data.

In the survey checklists, nurses selected similar criteria for both the website and journal article, with currency and accuracy selected most frequently. Less important was whether the information fit the nurse's prior knowledge (especially for journal articles), bias, and the information's production or dissemination on websites. Figure 1 shows the evaluation criteria prevalence for websites and articles.

Notably, only a few survey respondents clicked the link to see the complete information source and its context. Nearly a quarter of respondents (n=80, 23%) clicked a link to see the full text of either the website (n=79, 23%) or the journal article (n=51, 15%). Most respondents who looked at the full text of one source looked at both (n=47/80, 59%). Similar criteria prevalence were reported in the website and article, as seen in figure 1.

The interviews followed a similar pattern. Of all the criteria codes (n=423) shown in table 3, accuracy was the most frequent code (n=88, 21%). Authority and methodology were the next most frequent, each with 13% of total codes counted (n=66), followed by purpose and relevance, each with 55 (13%). In total, four of the top five codes, representing nearly two-thirds of all criteria codes (n=264, 62%), represent all but one criteria in the CRAAP checklist: relevance, accuracy, authority, and purpose.

After looking at the evaluation criteria in the survey responses and in the coded interview transcripts separately, we looked for overlap between the two. To compare rates in a meaningful way, we report the data as percentages rather than counts because the interview population (n=18) is much smaller than the survey population (N=344). Survey respondents looked at both a website and a research article, but interviewees only evaluated one or the other, so analysis for interviews is split into interviewees who evaluated the website (n=9) and those who evaluated the research article (n=9). First, we aligned the survey checklist criteria with the interview codes. Then, we determined whether the criteria in the survey checklist were present at any point during the interviews. Granular codes used to code the interviews were conflated into their top-level codes to facilitate comparison with the survey evaluation criteria. Further detail is delineated in table 2.

DOI: dx.doi.org/10.5195/jmla.2025.2163

**Table 1**

Respondent demographic data: highest degree of educational attainment, years' experience as a licensed nurse, and areas of clinical specialty

| **Respondents' highest level of educational attainment (N=344)** | | |
|---|---|---|
| **Education Level** | **Frequency** | **Percent of Respondents** |
| LPN | 2 | 0.6% |
| RN | 42 | 12.2% |
| BSN | 209 | 60.8% |
| MSN | 66 | 19.2% |
| DNP | 19 | 5.5% |
| PhD | 6 | 1.7% |
| **Respondents' years working as a licensed nurse (N=344)** | | |
| **Years Worked** | **Frequency** | **Percent of Respondents** |
| 0-5 years | 108 | 31.4% |
| 6-10 years | 57 | 16.6% |
| 11-15 years | 38 | 11.0% |
| 16-20 years | 35 | 10.2% |
| 21-25 years | 27 | 7.8% |
| 26-30 years | 21 | 6.1% |
| 31-35 years | 15 | 4.4% |
| 36-40 years | 22 | 6.4% |
| 41+ years | 21 | 6.1% |
| **Respondents' clinical specialty within nursing. Respondents could select more than one option, so number of selections exceeds total number of responses (N=344).** | | |
| **Clinical Specialty** | **Frequency** | **Percent of Respondents** |
| Medical-surgical | 58 | 16.9% |
| Other | 58 | 16.9% |
| Administration (e.g. charge nurse, case management, nurse manager) | 50 | 14.5% |
| Critical care | 49 | 14.2% |
| Pediatrics | 36 | 10.5% |
| Ambulatory care | 31 | 9.0% |
| Emergency | 31 | 9.0% |
| Neonatal care | 26 | 7.6% |
| Psychiatric/mental health | 26 | 7.6% |

DOI: dx.doi.org/10.5195/jmla.2025.2163

| | | |
|---|---|---|
| Labor & delivery/midwifery | 25 | 7.3% |
| Maternity | 22 | 6.4% |
| Perioperative | 20 | 5.8% |
| Cardiac care | 18 | 5.2% |
| Palliative care/hospice | 17 | 4.9% |
| Oncology/hematology | 15 | 4.4% |
| Public health | 14 | 4.1% |
| School (K-12) | 14 | 4.1% |
| Disease-specific | 8 | 2.3% |
| Wound/ostomy/continence | 6 | 1.7% |

**Table 2**

Most common evaluation criteria from the survey choices and interview codes.

| Consolidated label | Survey choice(s) | Interview code(s) | Description |
|---|---|---|---|
| Accuracy (including prior knowledge) | Accuracy, Fits Prior Knowledge | Accuracy, Accuracy - Fits Prior Knowledge | The correctness of the information (citations present to support claims, possible bias, editorial process/peer review, matches existing research or prior knowledge). |
| Methodology | N/A | Methodology | Details on how the study or research was completed. |
| Currency | Currency | Currency | The age of the information in relation to the information need or research topic. |
| Authority | Author's expertise | Authority | The qualifications/education or reputation of the author(s), journal, publisher, or organization. |
| Relevance | Relevancy | Relevance | Fit between the research question/information need, and the content of the source. |
| Purpose | Purpose, Bias, Financial Backing | Purpose, Purpose - Funding; Purpose - Persuade | References to why the information was created and for which audience. Includes bias and funding. |
| Publisher, production, or dissemination | Production and/or dissemination | Publisher | References to the publisher, how it was produced, or disseminated. |

DOI: dx.doi.org/10.5195/jmla.2025.2163

**Figure 1** Percentage of respondents from the survey reporting evaluation criteria for the website and article (N=344)

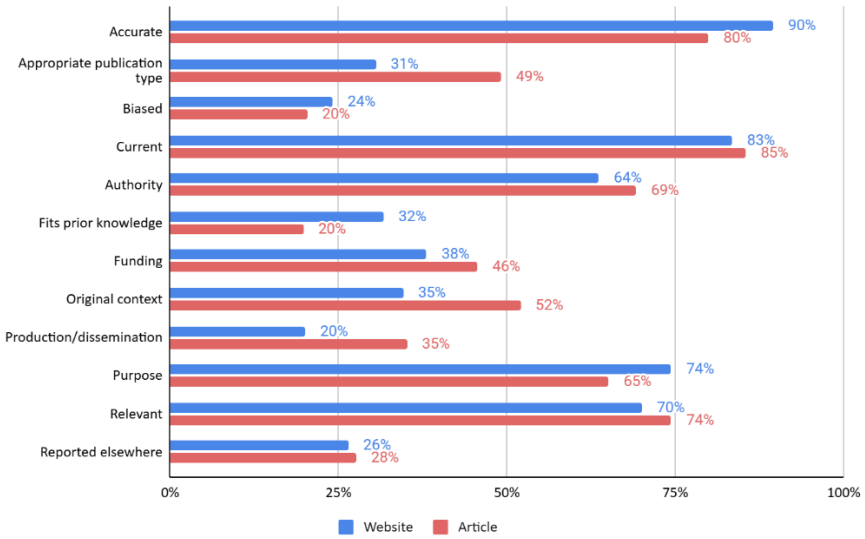



**Figure 2** Website and article evaluation criteria present in surveys and interview responses

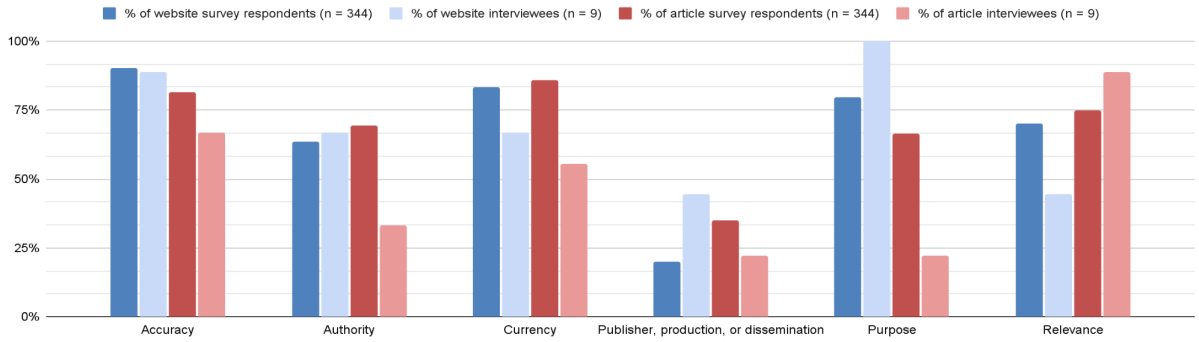
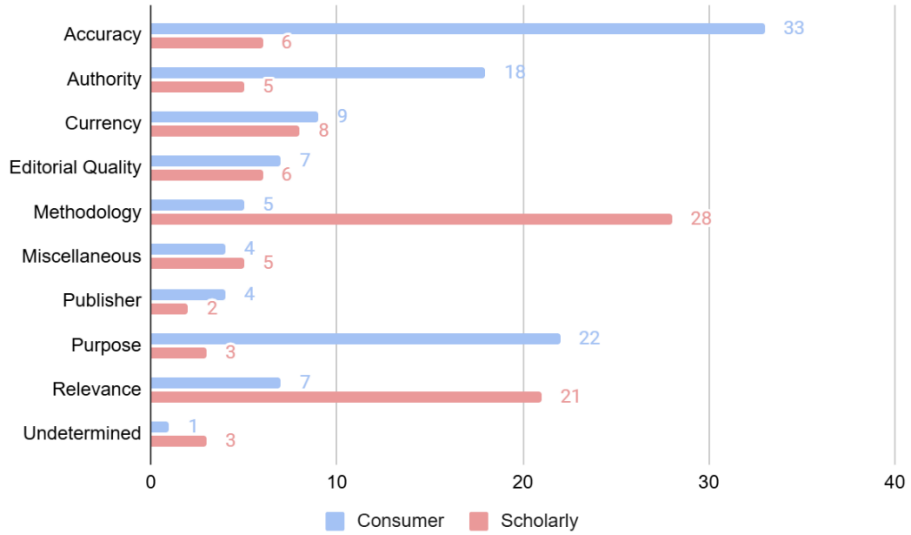



**Figure 3** Consumer vs. scholarly criteria comparison (n=199)



DOI: dx.doi.org/10.5195/jmla.2025.2163

**Table 3**

Criteria codes found in interviews

| Code count of criteria found in interviews (n = 423) | | |
|---|---|---|
| **Code Name** | **Frequency** | **Percent found** |
| Accuracy | 88 | 20.7% |
| Authority | 66 | 15.5% |
| Methodology | 66 | 15.5% |
| Purpose | 55 | 12.9% |
| Relevance | 55 | 12.9% |
| Currency | 33 | 7.8% |
| Miscellaneous | 26 | 6.1% |
| Editorial Quality | 17 | 4.0% |
| Publisher | 11 | 2.6% |
| Undetermined | 8 | 1.9% |

Website evaluation criteria were present at differing rates in the survey and the interviews. Interviewees were more likely to discuss dissemination or publication in interviews than in the survey, and they were far more likely to discuss purpose as a criterion for website evaluation. Interviewees were less likely to discuss currency or relevance than survey respondents. Comparisons between website evaluation criteria of survey respondents or interviewees are found in figure 2.

Journal article evaluation criteria showed more discrepancies between survey responses and interviews. Far fewer interviewees than survey respondents discussed an article's purpose, authority, or currency, and fewer interviewees discussed publisher, production, or dissemination and accuracy. More interviewees discussed relevance than the survey results. Comparisons between journal article evaluation criteria of survey respondents or interviewees are found in figure 2.

To determine if there was a statistically significant difference between nurses' education level, number of years worked, and the criteria the nurses chose for evaluation, we ran chi-square tests of independence for each of these demographics and each criterion that the nurses might have chosen. After adjusting the p-value for false positives, we found that none of these factors were statistically significant (see Appendix G for statistical analysis).

We also wanted to know if entry-level nurses (LPN, RN, BSN) answered differently than advanced practice nurses, nursing faculty, or nurses with otherwise advanced education (MSN, DNP, PhD). We recoded the variables and ran chi-square tests of independence on this vs how the ratings were completed. After adjusting for false positives, there were no statistically significant differences. Finally, we sought to determine if nurses who selected administration as a specialty answered differently. After adjusting the p-value for false positives, we found that there were no significant differences (see Appendix G for statistical analysis).

While the survey provided the preceding insights into nurses and the evaluation criteria they use, the interviews provided richer data, which is highlighted in the following discussion of how nurses conceptualized specific evaluation criteria.

*Accuracy*

Interviewees often established accuracy by checking for the presence of citations and whether the source was peer reviewed. Nurses also used their existing knowledge and clinical experience to judge the reliability of new information. One participant asked, "Did it match up again with my nursing knowledge?" and another referred to evaluating information "on instinct and my own training."

*Methodology*

Respondents typically mentioned this criterion when referring to a scholarly source. Interviewees mentioned some specific aspects of methodology, including sample size, population, and study design, as in this statement: "Is that based on a good study that was…randomized and controlled?" Interviewees also discussed confounding factors and levels of evidence. For example, one stated: "evaluating the levels of evidence, and where those lie in determining how strong the evidence can be." In other cases, nurses mentioned the type of study as a criterion, such as "a lot of them were just case studies."

*Currency*

In interviews, currency was mentioned roughly half as often as relevance, authority, and purpose. The articles shown to all respondents and interviewees were all within two years old, and the topics were such that currency is embedded in the subject's relevance. When bringing up criteria related to currency, nurses often noted the year the article was written, with several writing off information if it was over five years old: "If it was older than five years? I probably wouldn't give it much thought." Some spoke to the field's rapid evolution as a reason to value currency.

*Authority*

In most cases, nurses discussed the authority of the author: "Who is this doctor that's writing this article? What are his credentials?" Several respondents mentioned the reputation of the journal, website, or organization, specifically mentioning the publisher of the content, i.e., the Mayo Clinic. Nurses often equated authority with trust, and, generally, there seemed to be a distrust of news or news agencies, with one interviewee stating, "I trusted

DOI: dx.doi.org/10.5195/jmla.2025.2163

it more than if I would have just read it in a newspaper." Instead, nurses favored reputable national organizations, credentials, or educational backgrounds attached to the author. The option given to respondents of the survey was "author's expertise," which alluded to authority, and no respondent decided to expand upon this in the open-response questions.

*Relevance*

Relevance often included discussions of the information source's population, the nurse's role, and how well the information matched the nurse's circumstances, including their specialization or patient population. One interviewee summarized it well: "Nursing is just such a practical field that if it doesn't help me right here, right now, or it doesn't help me move in a positive direction, then it's not worth my time." As an artifact of the international contexts of the research articles nurses were asked to evaluate in the study, many nurses commented that the article might not be relevant given the differences in healthcare systems between countries.

*Purpose*

When discussing purpose, interviewees often mentioned bias, funding source, and intended audience. One executive discussed medical device or pharmaceutical companies funding research: "A big one, when you talk about surgical [research] is, did a pharmaceutical or a medical device [company] fund it? I start to really question the research if that's the case." Advertisements were seen as a marker for a lower quality or non-scholarly source, and were present in the website that interviewees evaluated. The intended audience was often judged by the way a source was written. While sensationalizing and other methods of getting the reader's attention were often noted, one nurse joked that "if it's boring, it's gotta be true." However, when evaluating information intended for patients, a website's familiar tone was favorably remarked on as, "worded well to help the general public understand the information."

*Other criteria*

Most miscellaneous criteria coded from the interviews were related to the source type or the container of the information, such as a journal article or blog. Overall, nurses were favorable toward research, with several viewing a research study as a criterion or marker of quality rather than taking a more nuanced view. Finally, external factors influenced the evaluation criteria. A need for concise material due to time constraints or organizational guidelines concerning information for patients. Several nurses wanted the information presented to them to contain actionable solutions that they could apply, such as this interviewee who reacted to the website as, "it addresses causes but doesn't really suggest any solutions."

*Differences in criteria in the interviews by type of source: consumer vs. scholarly*

Interviewees evaluated either a website (consumer) or a journal article (scholarly). We compared the evaluation criteria for the two source types. To facilitate this, we examined the 199 codes noted during the narration portion of the interviews (figure 3). The criteria mentioned by interviewees naturally varied depending on what type of source they were evaluating. Interviewees evaluating the article mentioned methodology much more. Interviewees mentioned accuracy, authority, and purpose much more when evaluating the consumer source. One counterintuitive finding is that relevance was mentioned much more by those evaluating the scholarly source. The article we chose, a study completed in China, elicited comments from nurses about its relevance to their populations in the Intermountain West.

## DISCUSSION

We set out to determine what criteria working nurses use to evaluate consumer and scholarly health information and how this might inform nursing education. We found that education level, number of years worked in the field, and clinical specialty had no bearing on differentiating the evaluation skills of nurses. When evaluating information, nurses consider accuracy, authority, currency, methodology, purpose, and relevance most frequently. Nurses mostly use surface-level criteria to evaluate information. The majority of their criteria reflect those in the easily remembered and frequently taught CRAAP test [28]. This echoes the findings of Holliday and Rogers that the way information literacy is framed may impact the way learners engage with it [36].

If we present evaluation as a simple task of engaging with criteria, learners are less likely to move beyond this list to a more sophisticated understanding, which includes critically analyzing the methodology and the implications of the paper's findings. Another important element of this process involves considering what changes might be necessary to the nurses' current knowledge, based on the evidence at hand.

One salient example of surface-level criteria is the general tendency among study participants to believe journal articles over websites. The "container" in which information is housed can provide helpful context clues about the source [17]. Peer review is designed to ensure quality and accuracy, so the preference for the journal article is understandable. However, by relying on external factors like source type, nurses can miss underlying problems with the research study itself. Nurses discussed criteria for evaluating research, such as sample size and methodology, but lacked knowledge about systematic review methodology. Even sample size and methodology type are surface-level characteristics; nurses probably use these criteria because they are easy to see in an article,

DOI: dx.doi.org/10.5195/jmla.2025.2163

instead of a more time-intensive yet essential process that involves complex reading and analysis of study design. In-depth knowledge about research and publishing processes is necessary for nurses to complete a competent evaluation of these resources.

The ways nurses establish accuracy were also superficial and prone to error. For example, the presence of citations alone is not an indicator that the information is accurate. In his SIFT model, Caulfield urges readers to examine the original context as it can be misrepresented [29]. This issue is confounded when current AI technology often fabricates citations to non-existent research studies [37]. Another area of concern was nurses' tendency to accept information that affirms their current knowledge, a practice that leads to confirmation bias. This finding has significant implications for the provision of healthcare and the adoption of new evidence into clinical practice.

Some participants seemed puzzled by our use of the terminology "evaluation of information". One explanation is that critical appraisal, a more detailed process for determining the merit of studies, may seem disconnected from evaluation criteria commonly taught in earlier education. This can be further obfuscated by inconsistent terminology. Evaluation, fact-checking, critical appraisal, judgment, quality, and literacy are all terms in the literature about the criteria used to determine information's usefulness and quality.

From these findings, it is clear that nurses need deeper preparation for evaluating information in today's complex knowledge environment. Through our research, we discovered that education level and years of experience didn't impact the criteria used by nurses to evaluate information, indicating a widespread problem in the profession. Health sciences librarians have a responsibility to make a difference here, both for students at their individual schools and perhaps more broadly as a profession.

Health sciences librarians need to help nursing students and nurses move past the easy criteria they are currently applying to the more challenging realm of critical analysis. Critical appraisal and more complex evaluation techniques should be connected explicitly to and build on previously learned evaluation criteria. Providing examples of unexpected authority or credibility, such as when Wikipedia pages are reliable or journal articles face retraction, may help nurses practice operating in authentically ambiguous situations. Effective methods for fact-checking claims, such as lateral reading proposed by Caulfield's SIFT model [29, 38], can provide additional tools. Spending more time discussing health research may help students and nurses familiarize themselves with research and the process of appraisal, leading them to more readily evaluate the information they encounter [19, 21]. Ideally, this would be accomplished in collaboration with nursing faculty, who can better speak to the authenticity of specific scenarios, building realistic cases. From there, librarians can provide guidance on evaluating the information to solve problems nursing students and nurses face, rather than restricting education about appraisal to an assignment or classroom activity. This may facilitate greater transfer and practice of these necessary skills, which Scott and colleagues recommend should be taught, complementing clinical practice, not in isolation [23].

Sophisticated instruction is more time-consuming than a one-off lecture about the CRAAP acronym, and nurses have expressed that they want and need more practice and instruction with these concepts [7, 19, 20]. Nurses and nursing students can improve their research appraisal skills long term with the right intervention [21, 22]. Clinical librarians may wish to work with continuing education to allow practicing nurses to further refine and refresh their evaluation skills. This is especially important as nursing is the largest healthcare profession in the United States, with an exceptionally wide scope of practice [39]. Nurses' ability to accurately evaluate information impacts their practice, as well as their advice and advocacy to patients.

Health sciences librarians may also have a role in working with accreditation bodies on issues related to information evaluation. It is apparent that nurses are falling below the relevant standards. However, previous studies have found that librarians are not always involved in nursing education [40] and that faculty tend to teach to the disciplinary standards [41]. By continuing conversations with nursing educators, especially those involved in developing accreditation standards, librarians can continue advocating for nurses to develop more sophisticated skills in evaluation. Additionally, advocacy from organizations, such as the Medical Library Association, to promote the role of health sciences librarians as collaborators in instruction for EBP may help advance the conversation more broadly.

## LIMITATIONS AND FUTURE WORK

Our study had several limitations. We recognize that we may have influenced nurses' responses in selecting sources for them to evaluate. The survey sources discussed vaccines, a controversial topic lending itself to strong opinions, which may have impacted the reporting of bias. The interview sources were recent, which may have affected how often interviewees remarked on their currency. Additionally, we intentionally chose a systematic review in the survey because it was considered "good evidence" by its design, which could impact respondents' reporting of methodology as a criterion.

The construction of the criteria checklist on the survey may also have some limitations. Due to the heterogeneity of terminology in the literature to capture the complex phenomenon of evaluation, we considered criteria from

DOI: dx.doi.org/10.5195/jmla.2025.2163

several sources. The conglomeration of multiple concepts could have led to confusion. Also, we used the subject-specific ACRL standards for nursing, instead of the broader, more up-to-date ACRL Framework. We felt the subject-specific nature of the ACRL standards was more relevant to our study but our criteria were missing the concepts present in the Framework.

Our study was broad in scope, and more research is needed to fully understand how nurses evaluate information. Studies on how nurses apply critical appraisal techniques for scholarly sources and how nurses approach consumer health sources specifically would help fill in the details. A comparison between the evaluation criteria nurses use and those found in educational standards and common learning objectives might also contribute to a better understanding of the terminology disconnect and the research-to-practice gap. Also, it is important to understand how the concepts in the ACRL Framework show up in nurses' information evaluation practices, if at all. Further research may seek to better understand the ways different groups of nurses engage with different evaluation tools; for example, determining if nurses use specific critical appraisal tools for scholarly articles, or comparing nurses' practices with educational standards. Additional research into the evaluation practices of groups of nurses by type, such as entry-level nurses or nurse researchers, could also yield more specific insights for those particular groups.

## DATA AVAILABILITY STATEMENT

Data associated with this article are available in the Hive Data Repository at https://doi.org/10.7278/S5d-908e-j35w.

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Brandon Patterson: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Visualization, Writing - original draft, Writing - review & editing. Betsy Hopkins: Conceptualization, Formal analysis, Funding acquisition, Investigation, Methodology, Writing - original draft, Writing - review & editing. Nena Schvaneveldt: Conceptualization, Data curation, formal analysis, Investigation, Methodology, Visualization, Writing - original draft, Writing - review & editing. Duane Wilson: Formal analysis, Methodology, Writing - review & editing. Anne Diekema: Conceptualization, Formal analysis, Funding acquisition, Investigation, Methodology, Writing - original draft, Writing - review & editing.

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DOI: dx.doi.org/10.5195/jmla.2025.2163

## SUPPLEMENTAL FILES

**Appendix A**
**Appendix B**
**Appendix C**
**Appendix D**
**Appendix E**
**Appendix F**
**Appendix G**
**Appendix H**

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*Received January 2025; accepted July 2025*



ISSN 1558-9439 (Online)

ORIGINAL INVESTIGATION
DOI: dx.doi.org/10.5195/jmla.2025.2137

# More than the ABCs: assessing the information needs of school nurses

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**Objectives:** This interview study is a follow-up to a state-wide survey of school nurses' information needs conducted in 2022. Few studies have explored school nurses' information needs, with little focus on searching behaviors or barriers to practice.

**Methods:** The principal investigator interviewed participants online about their thoughts on survey results, how they find information, and challenges within the profession.

**Results:** After interviews with school nurses within rural, suburban, and urban districts in the state, the authors found that school nurses required information on finite topics but had little access to subscription resources, little training in critical analysis, and lacked time for professional development.

**Conclusion:** School nurses within Illinois have routine information needs, most of which can be answered using a series of go-to resources. They are understaffed and overworked, which results in them having little time to do more than surface-level searching for care-related queries. Medical librarians may be able to assist this oft overlooked population with their information needs by providing workshops and resources.

**Keywords:** School nurse; searching behavior; information literacy; Continuing Nursing Education

See end of article for supplemental content.

## INTRODUCTION

School nurses influence student performance, absenteeism, and quality of life. As many as 25% of school-aged children in the United States may have a chronic condition, and students with health risks are more likely to struggle academically. [1]. The broad scope of school nursing and the complexity of issues addressed within a school community setting require advanced knowledge [2]. However, the preparation of school nurses varies widely across the country. For example, within Illinois, nurses fall into four categories (see Table 1): three of them are registered nurses (RNs) and the fourth are licensed practical nurses working under their [3].

This lack of standardization makes it difficult to ensure nurses pursuing a career within school nursing receive equivalent levels of pre-professional education on skills like evidence-based practice and information literacy. The American Association of Colleges of Nursing in 2021 developed The Essentials: Core Competencies for Professional Nursing [4], which requires nursing curricula to address evidence-based practice and integration of evidence into nursing practice. While recent graduates may have benefitted from requirement, the majority of school nurses are not recent graduates who will not have benefitted from this curricula [5]. Moreover, even with the updated curricula, there is little focus within most EBP training programs on publicly available resources or critical appraisal of non-scholarly [6,7]; rather, much of the EBP content within nursing schools focused on licensed resources like CINAHL. These scholarly skills do not prepare school nurses to find publicly available evidence, nor to apply that knowledge pragmatically in the field.

Prior research into the information seeking behaviors of nurses affiliated with K-12 schools is limited; the majority of research on the information needs of nurses focuses on those employed by hospitals and healthcare systems [8–14]. Unlike nurses working in a healthcare system, nurses employed by school districts may have few options for accessing health information and are unlikely to have onsite support onsite from peer nurses or clinical librarians.[15]. In prior work, we found that school nurses generally consult both search engines and peers as sources for information[3]. We also found that while they search for information related to unfamiliar conditions, medications, and symptoms, they rarely use databases nor

DOI: dx.doi.org/10.5195/jmla.2025.2137

consult a librarian. This follow-up study sought to find the reasons and rationales behind the survey responses in order to develop an actionable plan for medical librarians to better support the school nursing population.

**Table 1**

Tiers of School Nursing Practice in Illinois

| Tier | Degree/Qualifications | Description |
|---|---|---|
| 1 | LPN (Licensed Practical Nurse or LVN (Licensed Vocational Nurse | Practice under RN supervision; limited responsibilities based on stipulations in their license.) 1 year program offered through vocational training schools or community colleges. |
| 2 | *RN (Registered Nurse) with ADN<br>*BSN - Bachelors of Science in Nursing<br>* Entry point for many nurses working in the school setting | ADN-RN -Associate degree in nursing – 2-year program licensed to practice per state requirements.<br>BSN – 4-year degree. Additional training in community health, leadership and evidence-based practice |
| 3 | BSN with PEL-School Nurse<br>Or Nationally Certified School Nurse | State certified school nurse - holds a professional educator license with an endorsement in school nursing (PEL-School Nurse) baccalaureate prepared nurses complete a school nurse certification program from an accredited institution of higher education and pass the state school nurse content exam.<br>National Certification - formal recognition of advanced knowledge, competence and commitment to excellence in the specialty of school nursing. |
| 4 | MSN - Masters of Science in Nursing<br>or DNP - Doctorate of Nursing Practice | Advanced degree with expertise in community health, advanced population health and or nursing education. Often working as a health services supervisor or nursing educator. |

## METHODS

### Sample Selection

The previous study began in the fall of 2022 wherein the principal investigator sent out a request for participants through three professional listservs (Illinois Association of School Nurses, Illinois Department of Public Health Certified School Nurses, Illinois School Health Technical Assistance and Training) to recruit school nurses within the state of Illinois to answer questions pertaining to information seeking behaviors on the job. The final survey question asked whether participants would be interested in participating in follow-up studies. Those who indicated yes were contacted in September of 2023 and invited to participate in virtual one-on-one interviews to further examine the information needs of school nurses in the state. The research protocol was approved by the Illinois Institutional Review Board.

Compensation in the form of a $50 gift card was provided for interviewee participation. Due to the anonymity of the survey, prior data was not matched to the interviewees.

### Study Design

The previous survey captured demographic information such as number of years as a nurse as well as years working as a school nurse, education level, certification, school classification, grades served, and student population. The semi-structured interview questions were drawn from an earlier study of school nurses within a single metropolitan [16]. Interviewees were first asked about their thoughts on survey results, the remainder of the questions focused on searching behaviors, professional memberships and support, and challenges. All interviewees were emailed a handout prior to their scheduled interview (Appendix A) which contained the survey questions they previously answered, the results of the survey, and six core questions they would be asked during the interview. A complete list of questions including follow-ups is provided in Appendix B.

### Data Collection

The principal investigator completed all interviews virtually. Each meeting was conducted over Zoom in October of 2023, and each meeting was recorded and transcribed using Zoom features. Informed consent was obtained verbally, and interviewees were asked if they had any questions before each interview. The interviews consisted of the six questions plus additional follow-up questions (Appendix B). The interview lengths ranged from twenty to forty minutes. The investigator who

DOI: dx.doi.org/10.5195/jmla.2025.2137

conducted the interviews anonymized the data before it was reviewed by co-investigators. The audio recordings and anonymized transcripts were saved to a password-protected folder shared by investigators. Video recordings were not saved or shared.

### Data Analysis

Each investigator independently reviewed the transcripts. Inductive content analysis was used to identify keywords and phrases that represented themes across interviews [17]. Bimonthly meetings were held to discuss any differences and reach a consensus. Excel was used to organize the data. Transcriptions were reviewed continuously throughout the process and potential quotations identified as being representative of themes.

## RESULTS

### Overview

Of the forty-four respondents who took the initial survey and indicated an interest in further involvement, nineteen completed interviews. The interviewees represented multiple school districts across the state in rural, urban, and suburban areas. Their answers were categorized according to one of two overarching themes: information need or obstacles (Table 2).

### Reaction to survey results

The first interview question queried whether the given survey results were surprising or contained noteworthy information (included in their handout, Appendix A). Though some noted certain data points that surprised them such as low professional membership levels, interviewees were mostly of the opinion that the results were interesting but not surprising. Several noted that most of the survey respondents had been in the profession for at least ten years (82%). A nurse in an urban district thought the number of LPNs who responded (8 out of 405) was lower than expected. Three of the nurses expressed concern that only 30% of survey respondents were very confident in their awareness of current research in school nursing.

### Thematic Analysis

The interview questions were divided between searching behaviors and obstacles to obtaining information. Answers were categorized according to types of information needed, sources, and how credibility was determined. In addition to misconceptions, when school nurses spoke about barriers and challenges two themes emerged common for nurses in other settings: unforeseen obstacles and workload. Exemplars for each theme can be found in Appendix C.

### Information Needs

*Types of Information*

The majority of care-related questions that school nurses ask have concrete answers. Interviewees listed looking up medications and unfamiliar conditions as the predominant topics of information searching. This was followed by school health policies and procedures. School nurses are tasked with staying on top of immunization compliance, and the public health of the school. They may need to educate teachers on how to best monitor a medically fragile student or connect a new student's family with community resources. Students who undergo hospital

**Table 2**

Themes and Definitions

| | |
|---|---|
| **Information Need** | The information needed by school nurses to answer care-related questions. |
| *Types of Information* | The category of information needed - consumer health, policy, procedures, guidelines, and tertiary resources. |
| *Sources of Information* | The format and source of information - print, electronic, government, state, association, healthcare site, general website. |
| *Determining credibility* | How participants determined the information was credible and relevant to their information need. |
| **Barriers and Challenges** | The obstacles and challenges faced when attempting to answer a care-related question. |
| *Misconceptions* | The assumptions held by non-school nurses that affected the day-to-day work of school nurses. |
| *Workload* | The amount of work versus capacity of school nurses related to student ratios, staffing levels, and the nature of the work itself. |

DOI: dx.doi.org/10.5195/jmla.2025.2137

| | |
|---|---|
| *Unforeseen Obstacles* | Obstacles in the school environment that were not foreseen by the school system such as the pandemic, influx of immigrants, budget cuts, and policy changes outside of the district. |

procedures receive discharge instructions for them and their families. While they often follow up with either a hospital team or primary care, there may be little or no inclusion of the school nurse.

I know what I would do in the hospital, but here it's like I'm looking up after the fact of what else could we do for him while he's here for immediate treatment. He doesn't come with a healthcare plan. We have not been able to get ahold of doctors.

For instance, I had a student who had a new heart procedure done, and I could not find any information on it at all. I ended up contacting the doctor's office to get what information they had on it. So just that I knew what had happened. I mean, I know the outcome, but just to know for Post OP. What to be looking for so definitely, new medical information is hard to find.

*Sources of Information*

The majority of interviewees (14/19) stated they used preferred websites and search engines to find answers to care-related questions. Frequently used sites included the Center for Disease Control (CDC), the state health department, and well-known institutions such as the Mayo and Cleveland Clinics. One interviewee mentioned a text, the American Academy of Pediatrics' *Managing Infectious Diseases in Childcare and* [18]; she always kept it on hand. Many said if they were unsure, they found a way to ask peers or they would call the student's physician in the case of follow-up care. None of the participants considered the library as a potential resource for information. It was additionally mentioned that credible sites such as the National Institute of Health were learned about during graduate studies and never mentioned as part of initial nursing education.

*Evaluation of Information*

When asked about how answers to care-related questions were deemed credible, answers fell into three categories: information was correct based on experience, information was obtained from a site perceived to be credible, and consensus across multiple sites. Resources perceived to be credible were ones from associations, top institutions, and government funded. Once credible sites were identified, they became preferred resources. As one nurse put it, "There's a disconnect. You learn in school that evidence-based practice is king, but you don't learn how to apply it to practice."

## Barriers and Challenges to Information Seeking

*Lack of Understanding*

Interviewees felt that the role of the school nurse is not fully understood by school administrators and staff. This lack of understanding of their role can lead to budget cuts, not being kept in the loop with other student services providers such as the school psychologist and social worker, not being on the Wellness Committee or being involved in decisions that affected student health, and administration not understanding their role or priorities. Interviewees spoke of being thought of only in terms of first aid; that other staff would see them on the phone or on a computer when their office was empty and not realize they were contacting doctors and updating student information.

In advocating for things, you have to fight twice as hard for anything. Right?... So, this year they decided to cut our budget… The counselors still get their money, and the psych still get their money, but we'll take money from the nurses.

Further complicating the issue is the idea that school nurses do not require advanced skills because their work is only surface level.

Because if your perception of someone is that they're handing out, you know, first aid, why would they need access to evidence based practice research? That's not within their scope, if that's your understanding of it.

*Workload*

The nurses spoke of their heavy workloads. While some schools had multiple school nurses or a school nurse and aides working under them, many had a single nurse; there was no one on site for second opinions, no one to fill in if they were absent, and lack of inclusion in staff meetings. The model might work in the ideal situation of the occasional student coming in for a basic first aid and minor illnesses, but it's hardly suitable for when multiple students need care or there's an emergency. Nearly all said they were too busy in the course of the day to do any sort of research; they said they did not have the capacity to devote themselves to an in-depth search of resources because of their workload and potential for interruption. Having a single nurse in the school presents certain dangers;

Biggest challenge is really no one in the school setting understanding your scope of practice and usually being the only medical professional around right now, personally, I have 3 schools that I serve independently. I get there at 7:30 leave at 3:30. I don't get a bathroom break. I don't get a lunch break I'm kind of just everywhere all at once. If I'm in the middle of a procedure, I can't leave the procedure. Then we're having to utilize 911 because I'm in the middle of a urinary cath(eter). I just can't leave the cath in and then run procedure. So, it's a lot of just trying to get them to understand how dangerous that is. So that's my biggest thing right now is fearing for my license.

DOI: dx.doi.org/10.5195/jmla.2025.2137

Other participants noted the lack of time for research. One nurse said: "I mean definitely have convenient access. Don't always have time to look things up and do any research. Mostly we're doing that on our own time. Right?"

> There was no way I could do that during the day. So, if I was looking into things, it was always on my own time or in the evening or on the weekends or I would stay late when it was quiet. Now with my position, I kind of go all over the district.... It's super time consuming and if you are one nurse in a building there's just no way like you have time to do that. You're doing it in the summer when you're not getting paid or you're doing it like after hours.

*Unforeseen Obstacles*

This lack of understanding of the school nurses' responsibilities and their workload, makes unforeseen issues all the worse. For example, schools did not plan for the mental health needs of students during or after the pandemic.

> I think that has really ramped up (student mental health issues). You know, the kids don't know the difference between I don't feel well because I'm sick, and I don't feel well because I'm depressed or I'm scared, or I'm anxious. They just don't know. So, the volume of students we're seeing has just skyrocketed all around our district..... We don't have time to look into things. So, I think that's part of the problem. But, I guess, knowing more about where they're coming from, what they were dealing with would help too.

Nurses have limited ability to influence the system-wide changes needed to fully address these kinds of issues. Yet, it is this kind of community-specific information that cannot be found on general websites or with basic search skills.

## DISCUSSION

The results of this study underline the importance of school nurses and the need for them to have training in answering health-related questions at the point of care using publicly available resources online. School nurses within Illinois are highly educated and invested in the health and wellbeing of their students yet often do not have the resources for in-depth research to support student health. School-aged students in the United States present with increasingly complex care needs, which necessitate an informed nursing workforce. Meeting this challenge is difficult when a single school nurse is the sole healthcare provider at the school or even for the entire district [19].

Challenges unique to school nurses appear to be systemic, related to the education aspect of their role. The information they use to care for students must be "current, accessible, and useful,"[20], but multiple barriers to reliable online medical resources persist, including a lack of time to perform careful searches for information, a lack of knowledge about technology, and a lack of administrative support or understanding of the nurse's role, evident by a lack of access to health science databases [20]. These constraints lead to search engines being used rather than databases, and a deficit in patient education resources in other languages [20–22]. These findings are consistent with studies in Tulsa, [16] and rural Washington [21]. That such similar findings were made in such different environments several years apart speaks to the ongoing severity of the issue.

In an inpatient setting, the work of a nurse is well-defined, and other healthcare practitioners understand the basics of the role and associated responsibilities. This is not the case in schools [23]. The lack of understanding of their role meant budget cuts, not being kept in the loop with other healthcare providers such as the school psychologist and social worker, not being on the Wellness Committee or being involved in decisions that affected student health, and administration not understanding their role or priorities. The interviewees spoke of being thought of only in terms of first aid; other staff would see them on the phone or on a computer when their office was empty and not realize they were contacting doctors and updating student information.

1. There is a vast difference between the educational levels of nurses who practice in the school setting. These differences in education and experience in the specialty influence the nurses' information needs and access to evidence-based resources. It is well documented that nurses across the board do not implement evidence-based practice [24]. School nurses are using search engines to answer care-related questions to determine best practice for taking care of children. More straightforward questions, such as background information about unfamiliar conditions or side effects of medication, can be found on sites such as state health departments, the CDC, and other credible institutions. More alarming is the idea that they lack access to information about current advances in healthcare, such as new methods in disease management. The results point out that there is a need for professional development to enhance their information literacy skills and awareness of freely available resources. School nurses, while generally satisfied with their ability to find information, declare interest in attending workshops to improve their skills. Due to the paucity of research on the information needs of school nurses, it is imperative to understand how they use information before any education or interventions are designed [3,16].

The interviewees identified several barriers to seeking information. Many overlapped with their peers practicing in hospitals – lack of time, not part of the workflow, and

DOI: dx.doi.org/10.5195/jmla.2025.2137

insufficient training [25]. Problems unique to school nursing related to schools' focus on education rather than on healthcare: the needs of teachers prioritized over school nurses, administrators not understanding the scope of practice, practice guidelines not anticipating application outside the inpatient environment, and school policies not being informed by healthcare personnel.

The challenges of staffing and support led to the lack of advocacy for the profession, administration not prioritizing school nurses, and not enough hours in the day to get work done. Regarding specific populations, the wide breadth of knowledge needed to work with students ranging in age from elementary to high school, those working with students of lower socioeconomic status spoke of families needing community support, immigrant students without a translator for healthcare needs, navigating how to best care for transgender students, and lack of support for nontraditional schools such as private or population specific.

Several interviewees lamented that they felt unprepared to navigate caring for refugee students. The complicated matter of refugee children may have been covered at the state or district level, but no plan can cover all the necessary details such as lack of health records or family communication. The nurse went on to explain that there had been an influx of refugee students and only one teacher in the school was able to translate: an inappropriate workaround as far as patient privacy and the teacher's own workload. As the nurse is not the only staff member impacted by language barriers, school administrators should try to identify and implement a cost-effective solution for English-language learners.

## LIMITATIONS AND NEXT STEPS

The initial survey captured the opinions of school nurses who were members of one of three statewide listservs and the interviewees were a subset; sampling was self-selective. Demographic information was captured for the initial survey participants but no data apart from district type and gender were collected from interviewees. Despite the questions' focus on information access and retrieval, the interviewees spoke most vehemently about lack of understanding on their role and challenges to the profession. As with any semi-structured interview, the need for more nuanced information was not discovered until the analysis phase; future research will address these gaps.

This was the second of a three-part study on school nurses. Data analysis of both the survey and interviews revealed gaps in questions and a need for more nuanced information. To that end, a new survey was developed to address these knowledge gaps. In summer 2024 it was distributed nationwide along with a URL for a library guide, created by academic librarians, featuring links to credible health information resources without a paywall. Some of the survey questions aim to gather feedback and opinions about the library guide. Do participants find it relevant and potentially useful to the profession? Ideally this is an initial step towards the current end goal – development of a free, self-paced online continuing education course designed expressly to address the information needs of practicing school nurse in the United States.

**Recommendations**

An obvious resource for any professional is a relevant association for their discipline. The National Association of School Nurses website is robust as it provides open access publication, toolkits, and continuing education. Unfortunately, some of its content is only available to members, leaving school nurses in many districts, whether because the pay is low or because districts will not pay professional dues, at a distinct disadvantage.

Librarians meet patrons at the point of need and pride themselves on getting the right information to the right person at the right time. A public library may be able to help and, depending on the city, may even have access to several databases, but they rarely have training to handle healthcare-related queries [26]. School nurses may feel confident in their searching abilities, but information on the general internet or in print resources may be dated; it may be difficult to find resources to assist a student who underwent a newer procedure or is using a recently developed device such as one used for glucose monitoring.

Medical librarians have the potential to address school nurses' gaps in knowledge. Librarians are often involved in teaching research to nursing students, and more effort could be made to include resources common to public health and the overall development of online search skills. Regarding school nurses already in practice, outreach can be done to local school districts and state school nurse consultants for professional development. The first step is awareness on both fronts; librarians become aware of the unique information needs of school nurses and school nurses, for their part, become aware that help is available.

## CONCLUSION

Like their counterparts in healthcare institutions, school nurses have limited time to

conduct in-depth research as they barely have the time to look up information at all. Due to the autonomous nature of their work, it is imperative they have the training and resources to answer clinical or care-related questions. School nurses do not have a designated information professional to whom they can turn when stuck with a care-related or clinical question.

Medical librarians have the potential to address school nurses' gaps in knowledge. Librarians are often involved

DOI: dx.doi.org/10.5195/jmla.2025.2137

in teaching research to nursing students, and more effort could be made to include resources common to public health and the overall development of online search skills. Regarding school nurses already in practice, outreach can be done to local school districts and state school nurse consultants for professional development. The first step is awareness on both fronts; librarians become aware of the unique information needs of school nurses and school nurses, for their part, become aware that help is available.

## DATA AVAILABILITY STATEMENT

Data associated with this article are available on the authors' institutional repository at the following URL: https://indigo.uic.edu/articles/dataset/Codebook_for_interview_themes/26332339.

## AUTHOR CONTRIBUTIONS

Annie Nickum: Conceptualization, data curation, formal analysis, investigation, methodology, project administration, writing - original draft, writing - review and editing.

Karen Madura: Conceptualization, data curation, formal analysis, writing-original draft, writing review and editing.

Jeanne Link: Data curation, formal analysis, writing – original draft.

## ACKNOWLEDGEMENTS

The authors would like to acknowledge the contributions of Professors Glenda Insua, Rebecca Raszewski, Emily Johson-Barlow, and Brittany Heer for their assistance with reviews and revisions of this manuscript.

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## SUPPLEMENTAL FILES

**Appendix A**
**Appendix B**
**Appendix C**

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*Received December 2024; accepted May 2025*



ISSN 1558-9439 (Online)

ORIGINAL INVESTIGATION
DOI: dx.doi.org/10.5195/jmla.2025.2110

# Sometimes the apple does fall far from the tree: a case study on automatic indexing precision errors in PubMed

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*See end of article for authors' affiliations.*

**Objective:** This case study identifies the presence and prevalence of precision indexing errors in a subset of automatically indexed MEDLINE records in PubMed (specifically, all MEDLINE records automatically indexed with the MeSH term Malus, the genus name for apple trees). In short, how well does automatic indexing compare [figurative] apples to [literal] apples?

**Methods:** 1,705 MEDLINE records automatically indexed with the MeSH term *Malus* underwent title/abstract and full text screening to determine whether they were correctly indexed (i.e., the records were about *Malus*, meaning they discussed the literal fruit or tree) or incorrectly indexed (i.e., they were not about *Malus*, meaning they did not discuss the literal fruit or tree). The context and type of indexing error were documented for each erroneously indexed record.

**Results:** 135 (7.9%) records were incorrectly indexed with the MeSH term *Malus*. The most common indexing error was due to the word "apple" being used in similes, metaphors, and idioms (80, or 59.2%), with the next most common error being due to "apple" being present in a name or term (50, or 37%). Additional indexing errors were attributed to the use of "apple" in acronyms, and, in one case, a reference to Sir Isaac Newton.

**Conclusion:** As indicated by this study's findings, automatic indexing can commit errors when indexing records that have words with non-literal or alternative meanings in their titles or abstracts. Librarians should be mindful of the existence of automatic indexing errors, and instruct authors on how best to ameliorate the effects of them within their own manuscripts.

**Keywords:** Abstract and Indexing; MEDLINE; Medical subject heading; automatic indexing; PubMed

See end of article for supplemental content.

## INTRODUCTION

MEDLINE is a selective, massive, and ever-growing bibliographic database of primarily biomedical citations [1, 2]. As of 2024, MEDLINE had over 32 million citations, with over 912 thousand references having been added in the year 2024, alone [1]. A common method of searching MEDLINE is by using the PubMed database, an openly available database of biomedical literature which includes all MEDLINE citations, PubMed Central, and NCBI's Bookshelf [3]. One means of facilitating the discovery of MEDLINE citations in PubMed is the application of Medical Subject Headings (MeSH). Created in 1954 by the National Library of Medicine (NLM), MeSH is controlled vocabulary used to index, catalog, and search for biomedical and health-related information in NLM databases [4, 5]. Within the context of PubMed, MeSH terms are exclusively applied to MEDLINE citations [6]. MeSH terms help searchers to at least partly ameliorate the effects of alternative phrasings for a concept [5]. For example, if a MEDLINE record discusses "heart attacks" it may be indexed with the MeSH term, *myocardial infarction*. So long as this MeSH term is assigned to the citation, a search of *Myocardial infarction* as a MeSH term should retrieve this citation, even if the citation only ever mentions "heart attacks" and not "myocardial infarction" in the title or abstract. In addition to facilitating citation retrieval, MeSH terms have also been shown to improve the precision of searches in PubMed as compared to text word searching [7-9]. Traditionally, indexing (i.e., in this context, assigning MeSH terms to MEDLINE citations) entailed indexers reviewing citations and their full text and assigning MeSH terms that best reflected the topics represented in the record. [10-12]. While semi-automation had been introduced to the process in 2002, where

DOI: dx.doi.org/10.5195/jmla.2025.2110

indexers were given optional indexing suggestions by the Medical Text Indexer (MTI) algorithm [10, 13-16], indexing was for the most part done manually by indexers at the NLM up until 2011 [17]. As MEDLINE grew, however, the practice of manual indexing became unsustainable, both from workload and financial standpoints, and so the NLM began exploring methods of fully automating the indexing process using algorithms [10-12, 18]. In 2011, NLM experimented with first line indexing using MTI on a selection of 14 journals, wherein MTI automatically assigned MeSH terms to citations from these journals, which were later reviewed by human indexers [10, 14, 16, 17]. Full automated indexing with subsequent versions of MTI-Auto (a.k.a. MTIA, an updated version of MTI) was later applied to citations in OLDMEDLINE in 2015, comments in 2016, and batches of backlogged citations in 2016 [14]. Beginning in April of 2022, fully automated indexing was implemented for all MEDLINE journals using a version of MTIA [17], with a new, machine-learning-based algorithm called Medical Text Indexer-NeXt generation (MTIX) replacing MTIA in 2024 [17, 19]. The precise mechanisms of these algorithms are complex; to simplify, MTI and MTIA algorithms have for the most part relied on keyword frequencies in the title and abstract, keyword locations (e.g., whether the keyword occurred in the title or the abstract, with title receiving greater relevancy ranking), and indexing of PubMed related citations (i.e., MEDLINE records that have similar keywords in their titles or abstracts) to generate their outputs, with a multitude of refinements via a series of rules [10, 14, 16, 17, 19, 20]. MTIX is the first machine learning model of the algorithm, which allows the algorithm to be trained on previously indexed records (specifically the records' title, abstract, publication year, indexing year, and journal name), and, from these data, assign statistically likely MeSH terms to new MEDLINE records added to PubMed [17, 19, 20]. Due to licensing restrictions, none of the existing algorithms have analyzed the full text of MEDLINE articles [10, 17, 19].

The implementation of fully automated indexing has dramatically improved indexing efficiency. Previously, manual indexing had taken a month or more for a single citation (some studies have even shown manual indexing taking several months [21-23]!). With automatic indexing, however, citations can be indexed within a single day [17, 19].

While automatic indexing has been shown to improve efficiency, there have been concerns relating to its accuracy. Many of these concerns stem from the fact that automatic indexing algorithms in PubMed are for the most part limited to only assessing the titles and abstracts of records (unlike manual indexing, which had involved indexers assessing full text records), which can result in the algorithms missing context in the full text that may be absent in the title or abstract of the record [12, 17, 19]. Indeed, reviews have been mixed with regards to automatic indexing's effects on precision and recall (i.e., the relevance and comprehensiveness of the MeSH terms automatic indexing assigns to citations), with some concerning observations including automatic indexing's variable performance between journals and subjects [13, 18, 24, 25], exclusion of relevant MeSH terms [13, 24], and assignment of irrelevant MeSH terms [13, 26].

Most published studies have focused on errors in recall. Chen et al.' s (2023) study of the 2011 version of MTI found that citations from journals from allied health or more specialized domains received fewer MeSH terms from MTI than those from journals from more general or popular biomedical fields, and additionally found that terms associated with non-medical or allied health topics received lower relevancy rankings [13]. Similarly, Llimos et al's (2024) study found that citations from pharmacy practice journals had fewer MeSH terms assigned to them by MTI than those from general medicine journals, and were missing relevant MeSH terms [24]. The findings from Chen and Llimos' studies are concerning, as reducing the number of MeSH terms assigned to a citation can have negative repercussions on the citation's retrievability in PubMed.

A few studies have evaluated the precision of different versions of MTI. Mork et al's (2017) study found that NLM indexers reacted positively to MTI's suggestions, with usage of MTI's suggestions by NLM indexers increasing from 15.75% in 2002 to 62.44% in 2014; and that MTI's precision had steadily improved from .3019 in 2007 to between .6003 and .64 in 2014 [10]. Moore et al.'s (2024) study reported a 53% precision for grants, 73% for patents, and 64% for drug indications [26].

While the aforementioned studies have evaluated precision in the general sense, very few studies have identified specific precision errors, with such errors often being remarked upon in passing, rather than systematically documented. Such precision errors have included MTI misinterpreting counterindications in drug indications text [26] and, in one case, assigning a MeSH term that didn't represent the subject of the citation [13]. There have also been a number of anecdotal observations of these indexing errors, including in a webinar hosted by the NLM, which mentioned MTI's poor performance with metaphors [27]; and in a few librarians' social media and listserv posts, which have pointed out various (and sometimes comical) indexing errors for citations containing words with non-literal or alternative meanings [28]. Such errors can have dramatic impacts on the retrieval of records in PubMed, as incorrect indexing may not only introduce clutter to the results of searches for systematic evidence syntheses, but, in cases where correct index terms are absent, may negatively impact records' discoverability. Despite these risks, few, if any, studies have given special focus on identifying the presence and prevalence of precision errors in records automatically indexed in PubMed.

DOI: dx.doi.org/10.5195/jmla.2025.2110

To fill this gap, this case study investigates whether automated indexing can appropriately and precisely apply MeSH terms in the context of non-literal or alternative meanings. The MeSH term *Malus* (being the genus name for apple tree) was chosen due to the common use of the word "apple" in figurative contexts (e.g., "comparing apples to oranges," "apple of one's eye,"), its capacity to have alternative meanings (e.g., Apple, Inc., apple snails), and the manageable number of citations in the sample.

## METHODS

There are three ways by which MEDLINE citations can be indexed in PubMed: manual (which refers to citations that were indexed solely by human indexers), curated (which refers to citations that were indexed automatically, then were later reviewed by human indexers), and automated (which refers to citations that were automatically indexed, and did not undergo review by human indexers) [29]. The indexing method of a citation in PubMed has been recorded into the XML files of citations since 2018 (with "curated" and "automated" labels being assigned to curated and automatically indexed citations, respectively, and the absence of a label indicating manually indexed citations) [29].

Automatically indexed citations (i.e., citations that were automatically indexed and did *not* undergo review by human indexers) can be retrieved in PubMed by applying the following string to a search strategy: indexingmethod_automated [17]. With this in mind, a search was constructed to retrieve all citations automatically indexed with the MeSH term, *Malus*. The search strategy is provided below. No additional filters were applied to the search.

### Malus[mesh] AND indexingmethod_automated

The search was run on June 26, 2024, with all results being exported from PubMed as an .nbib file and imported into EndNote 21. Title/abstract screening was conducted for individual records in EndNote 21 using the summary tab of the preview pane, during which time records were categorized as being correctly indexed (i.e., they were about *Malus*, meaning they discussed the literal fruit or tree), incorrectly indexed (i.e., they were not about *Malus*), or uncertain (i.e., the reviewer was not sure whether the record was correctly or incorrectly indexed). Each reference was assigned an EndNote 21 tag corresponding with its category (i.e., correct indexing, incorrect indexing, or uncertain). The records were then exported into an Excel sheet.

Records identified as incorrectly indexed or uncertain then underwent full text screening in Excel, during which time the reviewer identified records as being correctly indexed, incorrectly indexed, or where the classification could not be determined (i.e., the full text couldn't be accessed to verify whether the record was correctly or incorrectly indexed).

Records identified as being incorrectly indexed during full text screening then underwent data extraction, during which time the reviewer copied a quotation of the context in which variations of the word "apple" or "*Malus*" were used in the record. These quotations were pasted into the Excel sheet, and, in a separate column, were assigned into categories in accordance with their context (e.g., simile, metaphor, acronym, etc.).

To gain some insight into the performance of NLM's new MTIX algorithm, citations indexed using MTIX were identified and labelled in the Excel sheet. According to the NLM HelpDesk, MTIX was officially implemented in PubMed on 4/23/2024 [30]. With this in mind, to identify citations that were automatically indexed using the MTIX algorithm, a search was run of all the citations' PMIDs from the Excel sheet (regardless of whether they were labeled as being correctly or incorrectly indexed, or if the correctness of indexing could not be determined) combined with a date indexed filter, with the filter starting on 4/23/2024 and ending in the year 3000, using the [mhda] field tag in PubMed. An abridged version of this strategy with only 3 PMIDs is provided below. Records retrieved by this search were labeled as having been indexed by MTIX in the Excel sheet.

**(23862187OR 38729358 OR 38363483) AND (2024/04/23:3000[mhda])**

## RESULTS

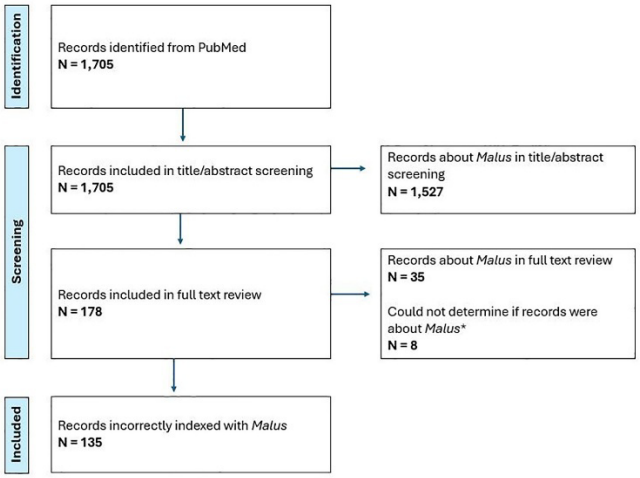
The search retrieved a total of 1,705 records, with just 82 of these records being indexed by MTIX. During title/abstract screening, 1,527 records were identified as being correctly indexed, and were excluded from full text screening. The remaining 178 records then underwent full text screening, during which time 35 records were identified as being correctly indexed, and 8 records were inconclusive (i.e., the full text could not be accessed to verify whether they were correctly or incorrectly indexed). This left 135 records that were identified as incorrectly indexed. In sum, of the 1,705 records retrieved, 1,562 (91.6%) were correctly indexed, 135 (7.9%) were incorrectly indexed, and 8 (0.5%) were inconclusive (see **Figures 1** and **2**).

The majority of records automatically indexed with the MeSH term, *Malus,* were published between 2020 and 2024 (1,475, or 87%) (see **Table 1**). Of these 1,475 records, 94 (6%) were incorrectly indexed. When isolating data from 2022, 2023, and 2024, the percentage of incorrectly indexed records remained fairly consistent, being at 6% (29 of the 479 records), 5% (22 of the 440 records), and 5% (12 of the 263 records), respectively (see **Figure 3**). All 82 MTIX indexed records indexed with the MeSH term *Malus* were correctly indexed.

DOI: dx.doi.org/10.5195/jmla.2025.2110

Interestingly, there were some records published prior to 2022 that were automatically indexed (230, or 13% of the 1,705 records). As the NLM HelpDesk confirmed that MEDLINE citations are not automatically indexed retrospectively [32], these older records are likely attributed to automatic indexing being applied since 2015 to citations in OLDMEDLINE (which includes citations published between 1946 through 1965 [33]), and since 2016 for comments and batches of backlogged citations (the latter of which may have included some citations with publishing dates prior to 2016) [14].

**Figure 1** Flow diagram of MEDLINE records automatically indexed with the MeSH term, *Malus*. Flow diagram adapted from the PRISMA Flow Diagram from Page et al. (2021) [31].




*8 records' full text could not be accessed. They were therefore labeled as "could not determine."

**Figure 2** Pie chart of MEDLINE records automatically indexed with the MeSH term, *Malus*. The categories denote whether the records were indexed correctly, indexed incorrectly, or where the correctness of the indexing could not be verified.

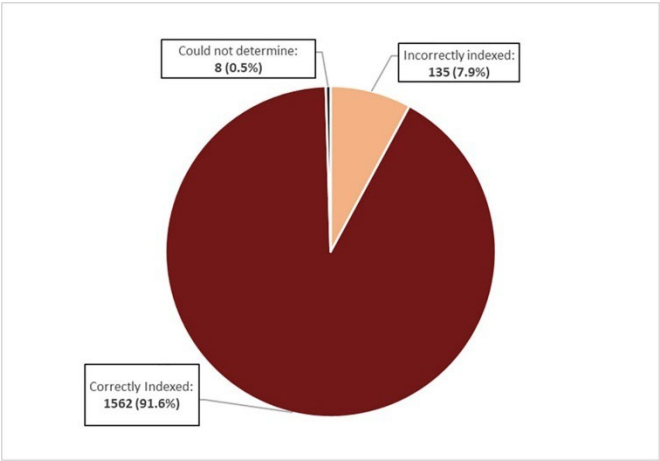
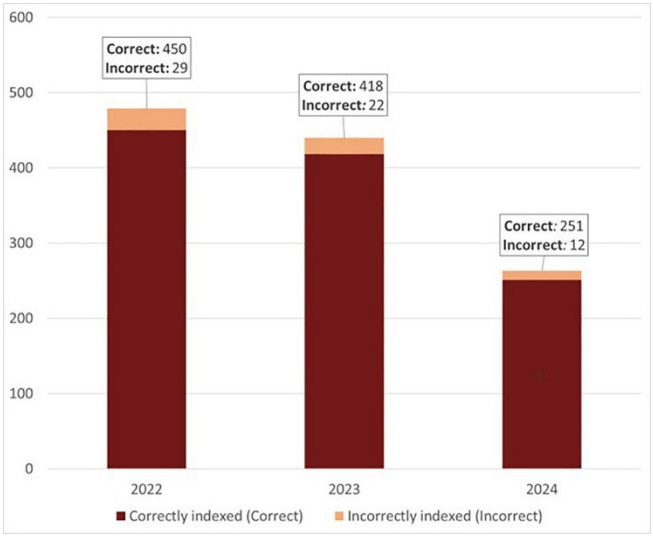



**Table 1**

Table of MEDLINE records automatically indexed with the MeSH term *Malus* by publication year that were indexed correctly, indexed incorrectly, or where the correctness of the indexing could not be verified. A time lapse is present between 1970 and 2004, during which time no records were automatically indexed with the MeSH term *Malus*.

| Years | Correctly indexed | Incorrectly indexed | Could not determine | Totals |
|---|---|---|---|---|
| 1945 - 1949 | 30 | 2 | 1 | 33 |
| 1950 - 1954 | 46 | 1 | 2 | 49 |
| 1955 - 1959 | 37 | 1 | 1 | 39 |
| 1960 - 1964 | 27 | 1 | 3 | 31 |
| 1965 - 1969 | 8 | 0 | 0 | 8 |
| 2005 - 2009 | 1 | 0 | 0 | 1 |
| 2010 - 2014 | 4 | 1 | 1 | 6 |
| 2015 - 2019 | 28 | 35 | 0 | 63 |
| 2020 - 2024 | 1381 | 94 | 0 | 1475 |

**Figure 3** Bar chart of MEDLINE records with publication years between 2022 and 2024 automatically indexed with the MeSH term *Malus* that were indexed correctly, indexed incorrectly, or where the correctness of the indexing could not be verified.




Of the 135 records incorrectly indexed with the MeSH term *Malus* the most common automated indexing error was misinterpreting metaphors, similes, and idioms (80, or 59%). These included variations of phrases such as "like comparing apples to apples", "apples falling far from the tree", "bad apples", “an apple a day keeps the doctor

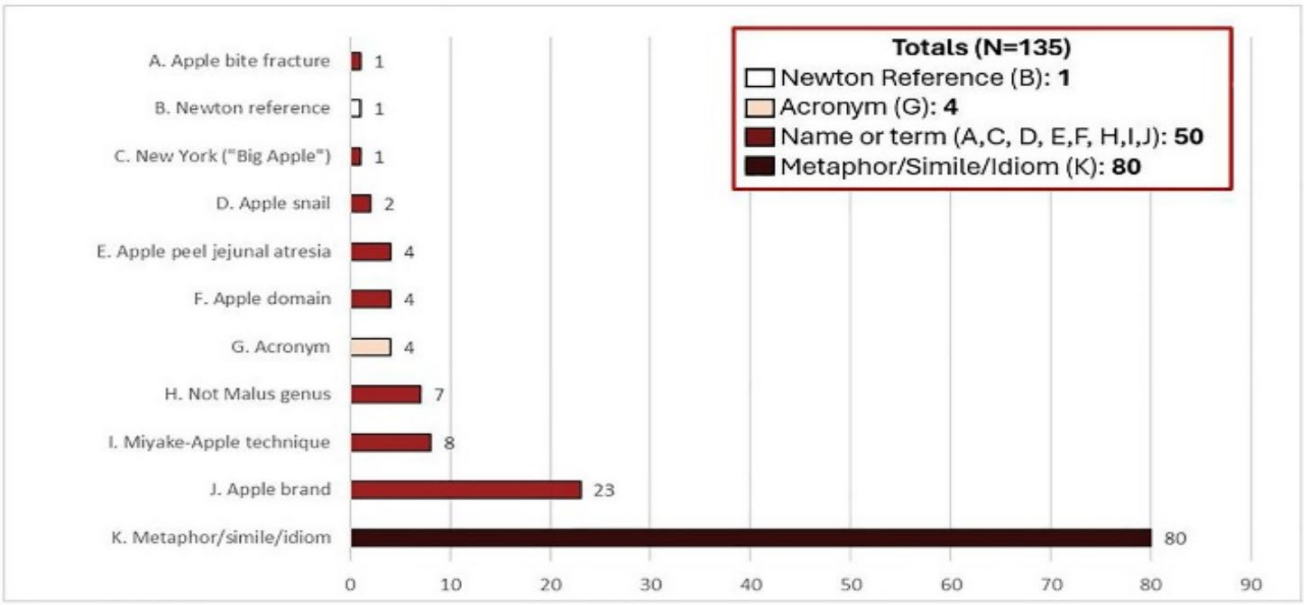
DOI: dx.doi.org/10.5195/jmla.2025.2110

away", and "apple of one's eye." They also included references to things resembling apples (i.e., "apple-shaped" body types and "lymphoid hyperplasia resembling apple tree branches").

Another automated indexing error observed in this sample included references to names or terms that included "apple" (being 50 records, or 37% of the 135 records). Specifically, this included references to the names Apple, Inc. (23, or 17% of the 135 records); the Miyake-Apple Technique (being a photographic/video analysis technique for cataract surgery [34]) (8, or 6% of the 135 records); plants with "apple" in the term that were not from the genus *Malus* (e.g., thorn apples) (7, or 5% of the 135 records); the Apple Domain (being in reference to amino acid domains) (4, or 3% of the 135 records); apple peel jejunal atresia (being a form of jejuna atresia [35]) (4, or 3% of the 135 records); apple snails (2, or 1% of the 135 records); "the Big Apple" (being a reference to New York) (1, or 1% of the 135 records); and apple bite fractures (being a type of fracture in the posterolateral tibia plateau [36]) (1, or 1% of the 135 records).

There were also automated indexing errors when records used acronyms (e.g., "Access to Post Partum LARC in Edinburgh South (APPLES)") (4, or 3% of the 135 records), and, in a single instance (1% of the 135 records), a passing reference to Sir Isaac Newton (see **Figure 4**).

**Figure 4** Bar chart of indexing errors in records automatically indexed incorrectly with the MeSH term, *Malus*.




## DISCUSSION

This case study, although narrow in focus, shows that PubMed's automated indexing algorithms do make errors when indexing records that include words with non-literal or alternative meanings. Within the context of records automatically indexed with the MeSH term *Malus*, these errors comprised approximately 8% of this study's sample, with the majority of errors stemming from the use of the word "apple" in metaphors, similes, and idioms. Additional errors that were noticed were when a variation of the word "apple" was used for names or terms, acronyms, and, in one instance, a reference to Sir Isaac Newton. With approximately 8% of just this limited sample containing automatic indexing errors, and what with the passing observations from previous studies and anecdotes, it's arguably safe to assume citations containing other words with non-literal or alternative meanings may have similar indexing errors. This leads one to wonder at the prevalence of such errors in broader fields, such as public health or nursing. Such errors negatively affect the precision of a search, being one of the very obstacles, ironically, that MeSH had been designed to ameliorate [5, 7].

In addition to increasing the number of irrelevant records to screen in evidence syntheses (which can already be a burdensome feat, a fact of which many librarians are all too aware), these errors can also reduce the retrievability of relevant records. For example, take an editorial in

DOI: dx.doi.org/10.5195/jmla.2025.2110

*Nature Cancer* entitled "Tackling Metastasis" [37]. As of May 20, 2025, the record has been erroneously assigned the MeSH terms, *Football* and *Athletic Performance* with no MeSH terms listed relating to cancer. Not only would such a record add to the clutter retrieved by a search relating to football, but it would also fail to be retrieved if one were to rely on using cancer-related MeSH terms in their search.

The impact of automatic indexing errors will be particularly hard-felt by subjects that have less optimal indexing such as allied health, pharmacy practice, and non-medical journals [13, 24]. If a record from a subject that receives fewer MeSH terms happens to be assigned an incorrect MeSH term by automatic indexing, it will be less likely to have additional, relevant MeSH terms to counterbalance the effects of the erroneous one, as compared to records from more popular biomedical fields. For example, a record about falling risks after fractures was incorrectly indexed (as of May 21, 2025) with the MeSH term *Seasons* [38], but the record has additional, relevant MeSH terms, such as *Aged* and *Fractures, Bone* which may result in the record still being retrieved by a sensitive search about falls. However, our aforementioned "Tackling Metastasis" one does not have any additional, relevant MeSH terms relating to cancer to increase its likelihood of being retrieved by a cancer-specific MeSH search. Automatic indexing's variable recall performance between subjects, paired with the precision errors noted in this study, will only further perpetuate biases within PubMed, as citations from well-indexed subjects will be more likely to be retrieved in PubMed than those from subjects whose indexing is less optimal [13, 24]. Apart from including potential, erroneously-assigned MeSH terms in their searches, and risking the retrieval of even more clutter in their search results, librarians may be forced to rely on keyword searching (i.e., searching in the titles or abstracts) to retrieve such records.

So, what can be done to address precision errors in PubMed's automatic indexing? One means of addressing these errors is to simply bring more attention to them. This can be done by conducting additional, systematic, and larger-scale studies on common automatic indexing errors, being especially important with the recent implementation of MTIX, NLM's newest automated indexing algorithm, in 2024 [19]. While this study did look at a subset of MTIX indexed records (82 total), with, promisingly, all of these records being correctly indexed with the MeSH term *Malus*, a larger sample would be needed to effectively evaluate MTIX's precision. Future studies can additionally focus on the performance of MTIX over time (as this study was conducted less than a year after MTIX's implementation), and whether MTIX missed relevant MeSH terms when indexing records (which was outside the scope of this study). Less formally, PubMed users can report indexing errors they encounter via the NLM HelpDesk [17, 39]. As MTIX operates using a form of artificial intelligence called a neural network, which allows it to use past training data to "learn" how to index new records [19], it's possible that reporting indexing errors may help NLM researchers to further train and refine the algorithm.

Some studies have argued that automatic indexing may be improved if the MTIX algorithm is given access to the full text of records in PubMed [17, 19]. Unlike manual indexing, which had analyzed the full text of records, MTIX is currently limited to analyzing the titles and abstracts of records [12, 17, 19]. In consequence, the algorithm may miss much needed context that may be present in the full text but which is absent in the title or abstract. There have been concerns relating to the use of full text for the purposes of retrieval in databases, including scalability (as full text documents are considerably longer than abstracts, and will therefore require more effort for algorithms to process), variable file types (which can complicate processing), variations in the structure of the article (e.g., labeling "methods" as "methodology" can compromise an algorithm's ability to pinpoint specific sections of text for analysis), and the potential for long texts to negatively impact precision (as more text could amount to more "noise" picked up by an algorithm) [40-42]. In fact, past studies examining indexing using blocks of full text have found that the inclusion of full text can have negative effects on indexing precision [43, 44]. However, there have been noted improvements to automated indexing when full text is processed in sections (e.g., introduction, methods, results, etc.), rather than as intact blocks of text. Both Dai et al.'s (2020) and You et al.'s (2021) studies found that indexing algorithms trained on sectioned full text from PubMed Central (PMC) significantly improved indexing performance as compared to indexing algorithms that relied solely on title and abstract processing (such as MTI) [41, 42]. Similarly, Lin's (2009) study on full text searching in the TREC 2007 genomics track evaluation data found that segmented full text searching added significant value to retrieval as compared to title and abstract searching, alone [40]. While current licensing restrictions prohibit PubMed's indexing algorithms from accessing the full text, the NLM has reported they are investigating the possibility of this option in the future [17].

Finally, librarians can present authors with workarounds to help them mitigate these kinds of indexing errors in their own records. Librarians can do this by advising authors to use more descriptive, and standardized terminology in the titles and abstracts of their manuscripts; for example, by using the very MeSH terms they would like to see assigned to their record [9, 13, 17, 24, 45] and avoiding the use of non-literal language, such as metaphors and similes, in the title and abstract whenever possible [13, 27]. While the use of words with non-literal or alternative meanings cannot be wholly avoided in the title and abstract, the use of descriptive, and standardized terminologies can at least increase the likelihood of correct MeSH terms being applied to the record alongside the erroneous ones. As librarians provide

DOI: dx.doi.org/10.5195/jmla.2025.2110

support for researchers in database searching and frequently assist in the publication process, they are in the optimal position to advise authors on the limitations of automatic indexing and provide tips on how to ensure their manuscripts are more discoverable.

## LIMITATIONS

While this case study provides insight on precision errors in automatic indexing, the sample was extremely limited (being limited to only records indexed under the MeSH term *Malus*). Future studies can be conducted to examine larger samples of specific indexing errors, especially within the context of words with non-literal or alternative meanings. Studies examining precision are especially needed with the recent implementation of MTIX in 2024, as they could provide insight into the new algorithm's performance over time. This study was additionally limited to examining precision errors in automatic indexing, and not recall (i.e., the exclusion of relevant MeSH terms), being a type of error that can have significant impacts on retrieval. Additional studies focusing on recall, especially within the context of MTIX, are warranted. Future studies can also compare the precision of automated indexing with curated and manual indexing.

## CONCLUSIONS

While limited, this case study provides insight into specific precision errors in automatic indexing for MEDLINE records in PubMed. As indicated by this study's findings, automatic indexing generates errors when it encounters records that have words with non-literal or alternative meetings in their titles or abstracts, such as names or terms, similes, metaphors, acronyms, and idioms. If precision errors were noticed in such a limited sample, one wonders at the prevalence of such errors in broader disciplines, such as nursing or public health. While a few "rotten apples" (i.e., precision errors) may not ruin the "batch" (i.e., search functionality in PubMed), compounding precision errors can decrease the utility of MeSH indexing and compromise the discoverability of MEDLINE records in PubMed, especially records deriving from fields with less optimal indexing. Studies such as this (especially at a larger scale) can bring attention to these errors, and inform future modifications to PubMed's automatic indexing algorithm. In the meantime, librarians should be mindful of the existence of automatic indexing errors, and advise future authors on how best to ameliorate their effects within their own manuscripts. Perhaps, through these means, we can kick the apples just a little bit closer to their trees.

## ACKNOWLEDGEMENT

I would like to thank Leslie Christensen for helping to come up with the creative name for this study, and for showing me many, many examples of automatic indexing errors (including ones about accidental falls!). I would also like to thank Susan Vandagriff for showing me the "Tackling Metastasis" indexing error example, which was mentioned in the discussion section of this manuscript. Finally, I would like to thank the editors and peer reviewers at JMLA for their invaluable feedback on this manuscript.

## DATA AVAILABILITY STATEMENT

All data used for this study can be accessed at https://github.com/weepai/Sometimes-the-apple-does-fall-far-from-the-tree

## AUTHOR CONTRIBUTIONS

Paije Wilson conducted every part of this project, including conceptualization, data curation, formal analysis, investigation, methodology, project administration, validation, visualization, and writing, reviewing, and editing of the manuscript.

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## SUPPLEMENTAL FILES

**Appendix A**

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*Received November 2024; accepted June 2025*



ISSN 1558-9439 (Online)

ORIGINAL INVESTIGATION
DOI: dx.doi.org/10.5195/jmla.2025.2024

# Analyzing the citation impact of predatory journals in the health sciences

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*See end of article for authors' affiliations.*

**Objective:** Predatory journal articles do not undergo rigorous peer review and so their quality is potentially lower. Citing them disseminates the unreliable data they may contain and may undermine the integrity of science. Using citation analysis techniques, this study investigates the influence of predatory journals in the health sciences.

**Methods:** The twenty-six journals in the "Medical Sciences" category of a known predatory publisher were selected. The number of articles published by these journals was recorded based on the information from their websites. The "Cited References" search function in Web of Science was used to retrieve citation data for these journals.

**Results:** Of the 3,671 articles published in these predatory journals, 1,151 (31.4%) were cited at least once by 3,613 articles indexed in Web of Science. The number of articles that cited articles published in predatory journals increased significantly from 64 in 2014 to 665 in 2022, an increase of 10-fold in nine years. The citing articles were published by researchers from all over the world (from high-, middle-, and lower-income countries) and in the journals of traditional and open access publishers. Forty-three percent (1,560/3,613) of the citing articles were supported by research funds.

**Conclusions:** The content from articles published in predatory journals has infiltrated reputable health sciences journals to a substantial extent. It is crucial to develop strategies to prevent citing such articles.

**Keywords:** Predatory journals, citation analysis, health sciences, Web of Science

See end of article for supplemental content.

## INTRODUCTION

Predatory journals, which have been defined as "entities that prioritize self-interest at the expense of scholarship and are characterized by false or misleading information, deviation from best editorial and publication practices, a lack of transparency, and/or the use of aggressive and indiscriminate solicitation practices" [1], have become a concern in the health sciences [2]. Their lack of editorial rigour has consequences; articles published by such journals have been shown to be of lower quality than those published in reputable journals. Moher and colleagues found that only a small number of the articles published in predatory biomedical journals reported items such as ethics approval, funding source, blinding procedure, allocation methods, or, for systematic reviews, risk of bias assessment. As the authors state, these articles "consistently failed to report key information necessary for readers to assess, reproduce and build on the findings" [3]. Bianchini et al. found that the scores on PEDro (a critical appraisal tool used in physical therapy) received by randomized controlled trials published in journals on Beall's List (a list of potentially predatory journals) were significantly lower than those received by non-Beall's List journals [4]. And Nieminen and Uribe found that statistical methods were reported significantly less thoroughly by predatory dental journals than by non-predatory dental journals (whether they were open access or subscription-based) [5].

Citing articles published in predatory articles disseminates the unreliable data they may contain and may undermine the integrity of science. Although a significant number of studies have investigated the citation impact of articles published in predatory journals [6–11], relatively few have focused on health sciences. We will discuss these below.

Using data from Google Scholar, Nwagwu and Ojemeni studied 5,601 articles published in 32 Nigerian predatory biomedical journals. They found that, on average, each predatory journal received 394 citations, and each article published in these journals was cited 2.25 times [12]. Shamsi et al. also used Google Scholar data when investigating predatory dermatology journals, and found that of 4,164 articles, 1,146 appeared in Google Scholar, where they received on average, 4.1 citations each [13].

DOI: dx.doi.org/10.5195/jmla.2025.2024

Oermann et al. found a much lower citation rate when they used data from Scopus to examine seven predatory nursing journals [14]. They found that these articles were cited 814 times by 141 non-predatory journals, and that each of the 7 predatory journals received, on average, 116 citations, with each of the non-predatory journals citing a median of two predatory articles. When examining citation data from Dimensions for 591 articles written by German researchers and published in 88 predatory medical journals, Stephen found that these articles were much more highly cited; they received on average 4.6 citations, nearly all from non-predatory journals. She concluded that predatory articles were extensively cited [15]. Dodgson et al. used a different approach; they investigated how many of the 127 manuscripts accepted for publication in the *Journal of Human Lactation* (a legitimate journal) from 2019-2021 cited articles published in predatory journals [16]. They found that 23 (18%) of these articles cited predatory articles.

While the extent to which predatory articles are cited varies from study to study, these studies demonstrate that predatory journal articles in health sciences have been cited, potentially polluting the scholarly record.

Citation of predatory journals by any type of article is problematic, but a concern particular to the health sciences is the inclusion of predatory articles in systematic reviews. Health care practitioners depend on systematic reviews and other knowledge syntheses to make informed clinical decisions. This means that including poor-quality articles in these reviews could threaten patient safety. Again, the extent to which this has occurred has been found to vary depending on the sample used. Ross-White et al. found that of a sample of 6,302 predatory journal articles, 120 were cited by 157 systematic reviews, of which 137 were published in reputable journals [17]. Collom et al. analyzed 78 review articles that cited predatory journals and found that 65.4% used these sources in a substantive way—either by including them in the review or by using them to support or extend the review's findings [18]. Notably, 39.2% of these reviews had a clinical focus. In contrast, Boulos et al. found that, of the 6,750 studies included in the systematic reviews published by two Cochrane networks in 2018 and 2019, only 55 were deemed to have been published in "questionable", "likely predatory" or "presumed predatory" journals [19].

Research has also been done to determine who cites predatory journal articles. Some researchers have found that authors who cited predatory journal articles were primarily inexperienced researchers from Africa and Asia [6,20], although Oermann found that in nursing, most authors who cited predatory journals were American, Australian or Swedish [21].

As can be seen above, previous studies of citations of predatory health sciences journals have focused on particular aspects (such as a particular health sciences discipline, or authors or predatory journals from a particular country) of this topic. This study aims to take a broader approach by studying citations to articles published in a sample of predatory journals from across the health sciences.

Specifically, two questions will be addressed:

1. How often are articles published in predatory health sciences journals cited by articles published in legitimate journals?
2. What are the characteristics of legitimate articles and journals that cite predatory health sciences journals?

## METHODS

### Identification of Predatory Journals

To identify potential predatory journals, we went to the home page (https://www.omicsonline.org) of a publisher recognized as predatory by the US Federal Trade Commission [22]. From the "Journals" drop-down menu at the top of the page, we chose "Browse by Subject" and then in the "Journals by Subject" box, clicked the "Medical Sciences" category, which led to this web page: www.omicsonline.org/medical-sciences-journals.php. This page listed 26 journals in the Medical Sciences category; these were selected as the study objects for this research. To confirm that these journals were indeed predatory, we examined the website of each journal for common characteristics of predatory journals, such as false Journal Impact Factors or Cite Scores, misleading metrics (e.g., Index Copernicus), promotion of rapid publication, or obvious errors.

We recorded the first publication year and the most recent publication year for each journal. We manually counted the number of articles published by each journal, including only the document types (as identified by the journals) in which research was formally reported (research article/research, review, mini review, case report/study/series, brief report, market analysis, survey report, clinical investigation, and investigating article). We therefore excluded document types such as editorial, commentary, short communication, abstract only, book review, non-citable items (e.g., conference and award announcements), and articles that were no longer available on the website. A complete list of the journal titles can be found in the Appendix.

### Searching for Citations of Articles Published in Predatory Journals

The predatory journals we investigated were not indexed by Web of Science. Therefore, we searched the "Cited Work" (i.e., journal title) field using the "Cited References" search function in the Web of Science Core Collection; this allowed us to identify cited articles from

DOI: dx.doi.org/10.5195/jmla.2025.2024

the predatory journals, even though these articles were not indexed in this database.

Because journal titles are often abbreviated in Web of Science citation records, we used two methods to search for each title. First, we searched the truncated form of the journal title. For example, for the *Journal of Palliative Care & Medicine*, we searched "j* pall* care med*" in the Cited Work field. However, for journals that contained words commonly used in titles of health sciences journals (e.g., *Archives of Medicine*), searches using truncation retrieved too many results, making it unfeasible to review all the results. Therefore, we decided that if the truncated journal title search produced more than 5,000 results, we would search the exact journal title with quotation marks. Web of Science allows a maximum of 5,000 records to be downloaded when using the Cited References search function, making this a useful upper limit.

Because the Cited Work field in Web of Science retrieves articles from similar journal titles (e.g., *Journal of Preventative Medicine* vs. *Journal of Preventative Medicine and Hygiene*), we reviewed the result list and selected only the articles from the journals we were interested in. Then we downloaded the records for the articles published in predatory journals (subsequently referred to as "Predatory Articles") and the records for the articles that cited the predatory articles (subsequently referred to as "Citing Articles") for each journal.

The downloaded records of the predatory articles from Web of Science included many duplicate articles because if the original article was cited slightly differently (e.g., uppercase vs. lower case used in title, different version of author name, full journal title vs. abbreviation) by two different articles, it would show up in Web of Science as two different original articles. Therefore, we manually examined various fields in the downloaded records including article title, journal title, author, volume, issue, and page numbers for matches and, when necessary, consulted the website of the journal to confirm that the cited articles were the same. We merged the duplicates and their associated citation counts to obtain an accurate number of unique predatory articles. Data collection was completed in July 2023.

To identify the document types of citing articles, we searched the article titles for the words "systematic review", "scoping review," "meta analysis", "meta-analysis", "metaanalysis", "realist review", "randomized", "randomised", "guideline" and "guidelines". We also scanned the titles to ensure that the results were actually publications of the desired types, rather than merely articles that discussed these document types.

## RESULTS

Of the 26 journals categorized as "Medical Sciences" on the predatory publisher website, 25 were published in English while 1 was published in Spanish. One journal (*Journal of Liver: Disease & Transplantation*) was subscription-based from 2012 to 2018 and only became fully open access from 2019, therefore, we excluded this journal. Thus, 25 journals were included in this study.

Of the 25 journals, most began publishing between 2015-2017, with the earliest started in 2005 (*Archives of Medicine*). At the time of data collection, 5 journals were inactive, while 20 were still publishing.

All 25 journal websites possessed characteristics of predatory journals. Most displayed a false journal impact factor and/or a false CiteScore. Some also indicated that they had a fast publication process or provided misleading information such as the Index Copernicus value or an incorrect definition of the *h-index*.

### Number of Predatory Articles

Through manual counting, we identified 3,671 articles published in the 25 predatory journals. The average number of articles per journal was 147, though this ranged from 17 to 548. Fifteen journals published fewer than 100 articles (Figure 1). The total number of articles published per year in these journals began to increase in 2012 (when 127 were published), reached a peak in 2016 (when 544 articles were published), and then started to decline gradually with only 298 articles published in 2022 (Figure 2).

### Number of Predatory Articles Cited

The initial search of the full or truncated title of the 25 predatory journals in the "Cited Work" field within Web of Science found that 3,109 predatory articles were cited by Web of Science-indexed journals. As described in the Methods section, this set of articles included many duplicates. After merging the duplicates, we found that there were 1,151 unique predatory articles. Thus, out of the citable pool of 3,671 predatory articles, 31.4% (n=1,151/3671) were cited by Web of Science-indexed journals. On average, 27% of the articles in each of the 25 journals were cited in Web of Science, but this ranged from 1% (n=1/76 citable articles in *Journal of Preventive Medicine*) to 55.5% (n=15/27 citable articles in *Evidence Based Medicine and Practice*).

While the number of predatory articles cited remained fairly low from 2005 to 2010, it started to grow in 2011 and reached its peak in 2016 (Figure 2). About half (n=574/1,151; 49.9%) of the cited articles were cited once and about half (n=577/1,151; 50.1%) more than once. Seven (0.6%) articles were cited more than 30 times (Table 1).

DOI: dx.doi.org/10.5195/jmla.2025.2024

**Figure 1** Distribution of number of papers published in predatory journals.

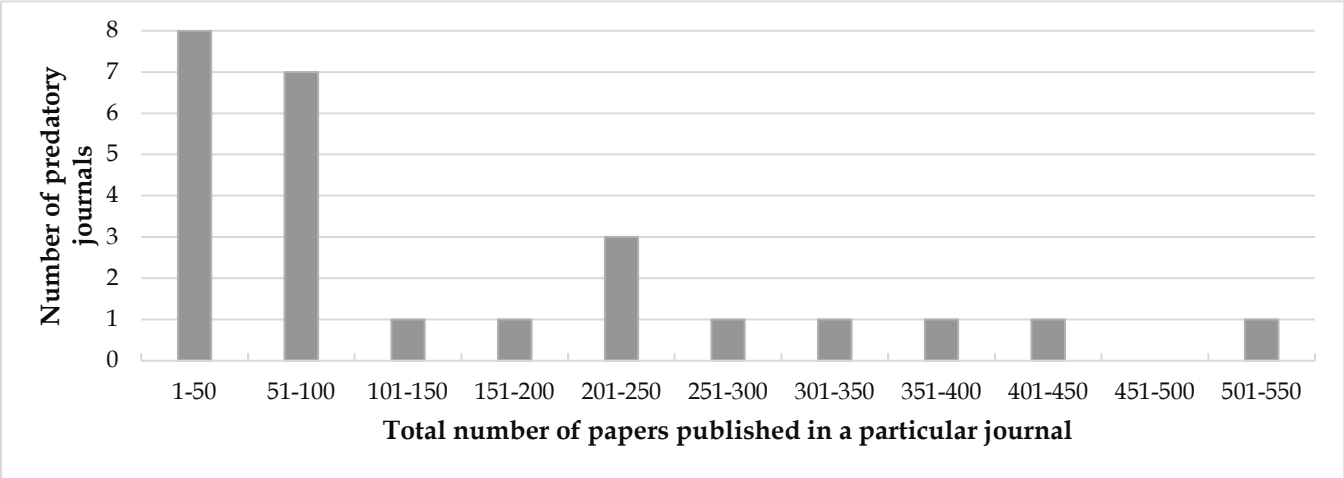



**Figure 2** Trends in the number of predatory articles published, predatory articles cited, and citing articles.

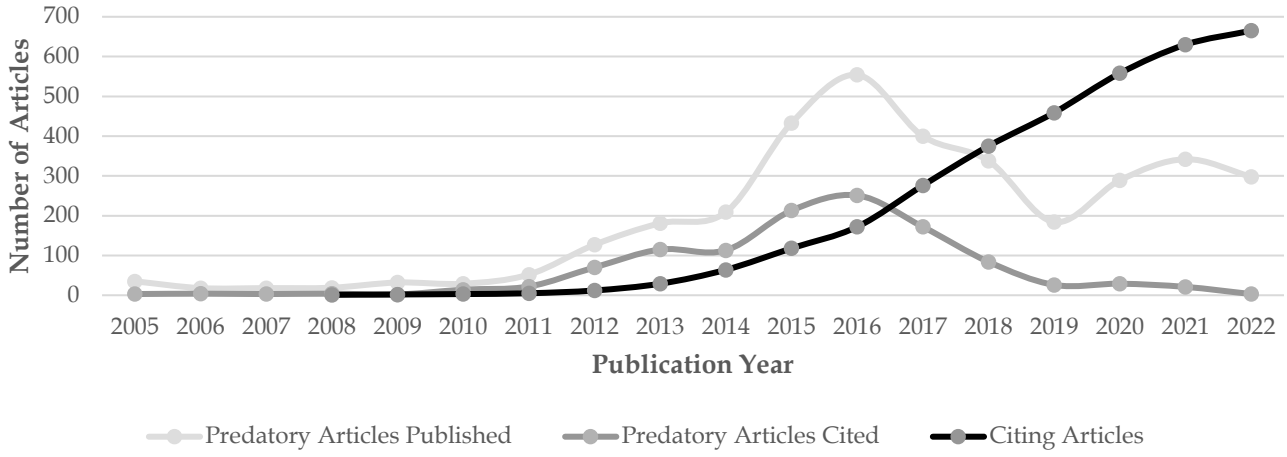



**Table 1**

Number of predatory articles by times cited.

| Times cited | Number of articles |
|---|---|
| 1 | 574 |
| 2 | 234 |
| 3 | 108 |
| 4 | 61 |
| 5 | 45 |
| 6-9 | 70 |
| 10-19 | 43 |
| 20-29 | 9 |
| ≥30 | 7 |

### Number of Citing Articles

We identified 3,613 articles that cited 1,151 predatory articles, so each article was cited on average 3.14 times.

Figure 2 also shows a comparison of the number of predatory articles published to the number of citing articles each year. From 2014 on, the number of citing articles increased steadily. There were 64 citing articles in 2014 and 665 citing articles in 2022, an increase of 10-fold in 9 years. The Mann-Kendall trend test and Sen's slope test were performed in R, and the results showed that the increasing trend in Citing Articles is significant from 2008 to 2022 ($z=5.1467$, p-value<0.00001, Sen's slope =53.5).

Predatory journal articles were cited by researchers from high-income countries such as the United States and the United Kingdom, as well as by researchers from middle-income and lower-income countries (Figure 3).

DOI: dx.doi.org/10.5195/jmla.2025.2024

## Characteristics of Citing Articles

The 3,613 citing articles appeared in journals published by both traditional commercial publishers such as Elsevier and Springer, and newer, open access publishers such as MDPI (Table 2). These three publishers contributed 543 (15%), 323 (8.9%), and 254 (7.0%) citing articles respectively.

The majority of the 3,613 citing articles were categorized by Web of Science as being on the broad topic of Life Sciences & Biomedicine (n=2,921, 81%). Articles in other Categories (Technology, Social Sciences, Physical Sciences, and Arts & Humanities) composed only 19% (n=692) of the total 3,613 citing articles.

Detailed characteristics of citing articles can be found in Table 3. Sixty-nine percent (n=2,492/3,613) of the citing articles were published in journals indexed in Science Citation Index (SCI), and 17% (n=604/3,613) in Social Sciences Citation Index (SSCI), two of the most-used sources for journal quality assessment. When combining the two indexes, we found that 2,619/3,613 (72%) of the citing articles were published in journals indexed in either or both. We also noted that 37 (1%) of the 3,613 citing articles were considered by Web of Science to be "highly cited" (or in the top 1% of papers in their field by citation).

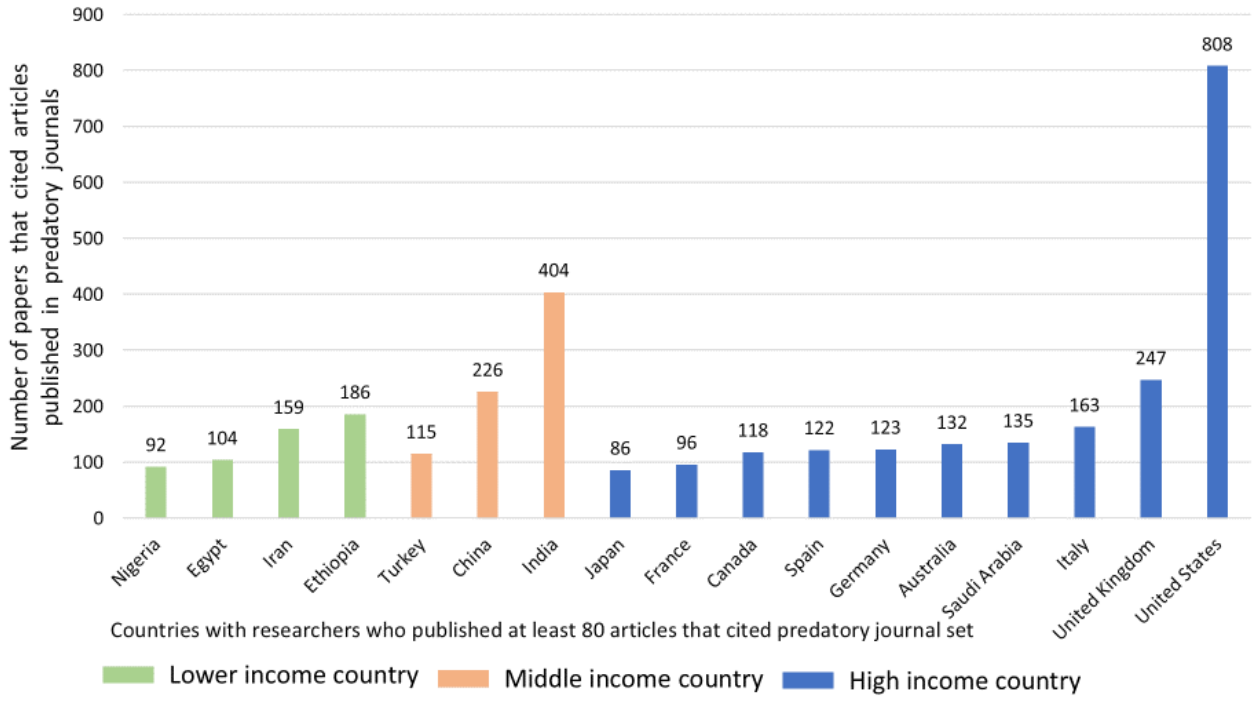
**Table 2**

Publishers with at least 50 citing articles

| Publisher[1] | Number of Citing Articles |
|---|---|
| Elsevier | 543 |
| Springer | 323 |
| MDPI | 254 |
| Wiley | 229 |
| Taylor & Francis | 163 |
| Biomed Central | 162 |
| Sage Publications | 134 |
| Lippincott Williams and Wilkins | 112 |
| Hindawi | 91 |
| Wolters Kluwers Medknow | 78 |
| Oxford University Press | 72 |
| Frontiers Media | 67 |
| Total | 2,228 |

Note: [1] Publisher names shown in this table are as reported by Web of Science. We did not include citing articles published by subsidiary publishers when reporting the numbers published by the parent company.

**Figure 3** Citing articles by country income level for countries with at least 80 citing articles.




Note: Country classification by income level provided by World Bank.

DOI: dx.doi.org/10.5195/jmla.2025.2024

**Table 3**

Characteristics of citing articles.

| | Indexed in | | | | Has ORCID?[5] | | Funded research? | | Document Type | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | SCI[1] | SSCI[2] | ESCI[3] | Other[4] | Yes | No | Yes | No | Review | Article | Other Types |
| Number of citing articles* | 2,492 | 604 | 885 | 140 | 2,606 | 1,007 | 1,560 | 2,053 | 767 | 2,624 | 222 |
| Percentage* | 69% | 17% | 24% | 4% | 72% | 28% | 43% | 57% | 21% | 73% | 6% |

Notes: [1] Science Citation Index; [2] Social Sciences Citation Index; [3] Emerging Sources Citation Index; [4] Other includes Arts & Humanities Citation Index, Book Citation Index, and Conference Proceedings Citation Index; [5] At least one author provided an ORCID ID. * In Web of Science, a journal may be included in multiple citation indexes. As a result, the total number of citing articles across all citation index categories exceeds the actual number of citing articles (3,613). This also means that the sum of percentages for all indexes is greater than 100%.

Of the 3,613 citing articles, 1,560 (43%) listed a funding source. Of this funded research, 310 (19.9%) studies were funded by 11 major funding bodies for health research (National Institutes of Health, Wellcome Trust, European Commission, European Research Council, U.K. Medical Research Council, France's Institut national de la santé, U.S. Department of Defense, Canadian Institutes of Health Research, Australian National Health and Medical Research Council, Howard Hughes Medical Institute and Deutsche Forschungsgemeinschaft).

In terms of publication types, of the 3,613 citing articles, 767 (21.2%) were review articles. The vast majority (n=2,624; 72.6%) were non-review journal articles (and were not letters or editorial material). There were 7 (0.2%) practice guidelines, 137 (3.8%) systematic reviews, 83 (2.3%) meta-analyses (of which 61 (1.7%) were also labelled as systematic reviews), 32 (0.9%) scoping reviews, and 1 (0.03%) realist review among the citing articles. There were also 40 (1%) randomized controlled trials.

## DISCUSSION

In this study, we analyzed the characteristics of articles published in 25 predatory journals and the articles that cited them. We found that the number of articles published per year by the predatory journals in our sample grew from 2011 until 2016, and then began to decline. This was likely due to increased awareness of predatory journals among researchers in the health sciences. Oermann et al. found that by 2021, 631 articles on predatory publishing in health care had been published, many of which warned researchers about the hazards of publishing in predatory journals [2].

The number of predatory articles cited began to increase in 2010 and peaked in 2016. There are two likely reasons for the decrease after 2016. First, as noted above, the number of articles published in this predatory journal article sample started to decline in 2016, so the number of articles available to be cited is smaller, which could have led to a smaller number of citations. Second, articles are often not cited for three to five years after being published, and so it is possible that the articles in our sample that were published in more recent years have just not had enough time to be cited [23]. While the decline in citations could be the result of researchers' increased awareness of predatory journals (and their decision not to cite them), this seems unlikely given that the number of citing articles increased steadily from 2014 to 2022 (Figure 2).

Aside from the alarming finding that the number of citing articles soared 10-fold from 2014 to 2022, there are several other indications that the influence of predatory articles on scholarship in the health sciences has increased over time. First, we found that 31.4% of the predatory articles were cited by articles in journals indexed in Web of Science. This number is considerably higher than the rate of 6-13% reported in other studies which also used Web of Science citation data [8,20]. The previous studies looked at Turkish predatory journals (from a variety of disciplines) and predatory journals in the social sciences. Our much higher citation rate may indicate that in the health sciences, content from predatory journals has infiltrated reputable journals more extensively than has occurred in other fields. Further, about 72% of the citing articles in our study were published in journals indexed in the Science Citation Index or the Social Sciences Citation Index (rather than the Emerging Sources Citation Index, an index used mainly for newer journals, or other Clarivate Citation Indexes), showing that most of these citations came from important, established journals, which may have a higher potential to spread the unreliable information contained in predatory articles. In addition, because Web of Science is known to be selective when choosing journals for indexing, if citations from all journals were included, the total number and average number of citations received by our sample would likely be higher than what we reported here.

DOI: dx.doi.org/10.5195/jmla.2025.2024

An additional item of concern is the continued evidence of incorporation of predatory articles into not just knowledge syntheses, but practice guidelines. Our study found that 7 practice guidelines, and 137 systematic reviews of which 61 were meta-analyses, and a further 22 meta-analyses not also described as systematic reviews, cited the predatory article sample.

While Akça et al., Frandsen, and Oermann et al. found that most of those who cited predatory journals were based in particular regions [6,20,21], our study's results were somewhat different. We found that the citing articles were authored by researchers all over the world, though those from the U.S., India, and the U.K. were the most likely to cite predatory articles. In addition, our results show that 43% of the research was funded (with 19.9% funded by 11 major funding bodies for health research) and that most papers were associated with at least one ORCID ID, showing that, contrary to what was found by Akça et al. and Frandsen, at least some authors of citing articles are experienced researchers. The largest number of citations of our sample came from journals published by the large, established publishers Elsevier and Springer, followed by MDPI, a major open access publisher. Citing predatory research, then is not something done only by inexperienced researchers or by small publishers.

Predatory journals are often unstable; they lack long-term archiving or preservation mandates, and their websites can be shut down or changed at any time. This instability poses challenges for those studying the effects of predatory journals. For instance, at the time of writing this manuscript, the URL for the *Journal of Gastrointestinal Cancer and Stromal Tumors*, one of the 25 predatory journals selected for our study, was redirecting to the site of another predatory journal, the *Journal of Cancer Science and Research*. However, when we searched Web of Science, we found citations for articles published under the title *Journal of Gastrointestinal Cancer and Stromal Tumors*. When we examined the full-text PDFs of the cited predatory articles, we found that some PDFs displayed the OMICS logo and the title *Journal of Gastrointestinal Cancer and Stromal Tumors*, while others showed both the titles *Journal of Gastrointestinal Cancer and Stromal Tumors* and *Journal of Cancer Science and Research*. This suggests that both journal titles might have been used for the same journal at some point to attract more submissions. We suggest that in future, those studying the citation impact of predatory journals save or take screenshots of their websites to allow readers to verify and reproduce the results.

Our study has a few limitations. First, as has been noted by others, citation of an article does not necessarily mean that the citing author agrees with, or approves of, the research done by the cited author. So, while it is possible that some of the predatory articles in our sample were cited for the purpose of criticizing them, it has been found that authors only rarely cite articles for negative reasons, so it seems likely that that would be the case in our sample as well [24]. Second, as indicated in the methods, some of the predatory journals had titles that made doing a comprehensive search for them very difficult. It is therefore possible that the number of citations received by articles published in these journals was even higher than indicated here. Conversely, following the practice of Web of Science [25], we counted only the number of citable items (e.g., research articles) published in the predatory journals but we did not check that the citations to these journals were always to the citable items that we had counted instead of to non-citable items such as editorials or other publication types. So, the number of citations per article reported in this study may be slightly inflated. Finally, similar to many other bibliometric analyses, our results rely on citation data from Web of Science. The accuracy of our findings depends on the precision of the data provided by this database. However, several studies have shown that citation database data can sometimes be inaccurate due to citation errors by authors or mistakes made by databases during data entry or within their internal citation matching algorithms [26,27]. Nevertheless, our study provides a snapshot of how articles published in predatory health sciences journals have been cited by other works.

Citing predatory articles lends them an air of legitimacy and respectability, thus making them an even more attractive place to publish [28]. If authors continue to cite predatory articles, what is the solution?

The International Committee of Medical Journal Editors (ICMJE), in its "Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly work in Medical Journals", advises (and has done so since 2019) that "Authors should avoid citing articles in predatory or pseudo-journals" [29]. Similarly, the Committee on Publication Ethics (COPE) states in its discussion document on predatory publishing that authors, professional societies and institutions should "avoid citing predatory journal articles and beware when performing systematic and meta-analyses" and that reviewers and editors, journals and publishers, funders and institutions should all "discourage" citations of articles from predatory journals [30]. So, it is not for lack of guidance that authors are citing predatory articles.

During the last decade, there have been considerable efforts to promote the awareness of characteristics of predatory journals among researchers and provide them with strategies to avoid publishing in these venues. While these strategies seem to have been successful (as shown in our study by the declining number of predatory articles), it is time to develop strategies to prevent citation of predatory journals. Authors, editors, publishers, and peer-reviewers all have a role to play in curbing the influence of predatory journals and in protecting the integrity of science [31]. Part of the solution may lie in non-predatory journals changing their own policies. If such journals adopt open peer review and institute data sharing

DOI: dx.doi.org/10.5195/jmla.2025.2024

policies, require trial registration and adherence to reporting standards, and for systematic reviews, require risk of bias assessment, it will make it easier for researchers to identify and avoid citing predatory journals, which presumably, would not have such policies [28]. Publishers and/or editors could also ask authors to confirm, when submitting a manuscript, that they have not cited predatory journals [10]). As the ICMJE has stated, we must "avoid engaging these charlatans….to strengthen and preserve the trust that is central to science and medicine" [32].

## DATA AVAILABILITY STATEMENT

Data associated with this article are available in the Federated Research Data Repository at: DOI: https://doi.org/10.20383/103.0998

## AUTHOR CONTRIBUTIONS

Erin Watson: conceptualization; formal analysis; investigation; methodology; writing -original draft; writing -review and editing. Li Zhang: conceptualization; data curation; formal analysis; investigation; methodology; visualization; writing -original draft; writing -review and editing

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## SUPPLEMENTAL FILES

**Appendix A**

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*Received June 2024; accepted June 2025*



ISSN 1558-9439 (Online)

CASE REPORT
DOI: dx.doi.org/10.5195/jmla.2025.2071

# Developing the professional knowledge of librarians through a webinar series

Katie Pierce Farrier; Sandra Desjardins; Laura Haygood

*See end of article for authors' affiliations.*

**Background:** The Early Career Librarians Initiative of the South Central Chapter of the Medical Library Association (ECLI) offered a webinar series that addressed topics of interest to new professionals such as networking, goal setting, and salary negotiation. Additionally, the ECLI assessed participant feedback on the series through a program evaluation survey.

**Case Presentation:** ECLI partnered with the Network of the National Library of Medicine (NNLM), Region 3, to offer six webinars over the course of two years. Attendees were asked to complete a survey. Quantitative results were analyzed, and qualitative free-text responses were thematically coded. A total of 567 people attended the webinars, and 154 completed the survey. Four major themes emerged as the most useful aspects of the webinar series: practical tips, encouragement, and real-life experience.

**Conclusion:** Early career librarians often feel overwhelmed and are interested in guidance on career planning and building professional soft skills. This highly attended webinar series and positive evaluation feedback, demonstrates the value of providing accessible online professional development opportunities for early career and transitioning librarians, offering valuable information and support in key areas of need.

**Keywords:** Career development; continuing education; early career librarian; ECLI; emerging librarian; health science librarian; information overload; library professional; medical librarian; onboarding overload; professional development; sense of community; transitioning librarian

See end of article for supplemental content.

## ACRONYMS

Continuing Education **(CE)**; Curricula Vitae **(CVs)**; Early Career Librarians Initiative of the South Central Chapter of the Medical Library Association **(ECLI)**; Library and Information Science **(LIS)**; Network of the National Library of Medicine **(NNLM)**; Research Electronic Data Capture **(REDCap)**; South Central Chapter of the Medical Library Association **(SCC MLA)**.

## BACKGROUND

The onboarding process presents a significant investment of resources for organizations seeking to effectively integrate new members. In their article on identifying best employee onboarding practices in ACRL libraries, Graybill et al. [1] found that onboarding programs could vary between one week to six months. Novice health science librarians have more expansive onboarding needs. In addition to typical organizational training and office logistics, these librarians may need support with navigating health information resources, tenure and promotion procedures, and understanding the complex world of academia. Within this time frame, employers strive to equip new hires with a comprehensive knowledge base and essential job-related skills. This can necessitate the introduction of a substantial volume of information and the completion of tasks with established deadlines. Consequently, a recent study by Allen et al. [2] about utilizing lived experiences to improve onboarding in an academic library documented a phenomenon of "information overload," where new employees felt overwhelmed due to the multifaceted demands placed upon them during this introductory period.

Despite an organization's efforts to optimize the volume and nature of disseminated information, often, a gap remains. This situation is especially true for early-career professionals, who not only lack institutional knowledge but are also unsure of ways to organize obtained information or how to discover resources that can help them fill those gaps. This challenge is particularly acute in specialized fields like health sciences librarianship.

DOI: dx.doi.org/10.5195/jmla.2025.2171

Frequently, library school is not enough to adequately prepare new graduates to take on the nuanced professional roles within health sciences librarianship. "I didn't learn that in library school" is an unfortunate common refrain among new or early career librarians. In a 2023 survey conducted by the Association of Academic Health Sciences Libraries (AAHSL), 17.8% of library staff had less than five years of experience [3]. Additionally, there are so many paths and variables in librarianship that it's impossible to learn it all, and health science information tracks aren't available in every Library and Information Science (LIS) program [4]. More experienced professionals with diverse backgrounds, such as public, school, or academic librarianship, also notice a steep learning curve during their initial forays into biomedical sciences.

Myers and Rodriguez [5] surveyed health science librarians with less than five years of experience and asked them about their self-perceived career preparedness and professional competencies, and how they acquired that knowledge. The results of that survey indicated that early career professionals rely heavily on Medical Library Association (MLA) and Continuing Education (CE) opportunities to obtain professional competencies [5]. MLA offers a plethora of training opportunities and specialization tracks, such as Consumer Health Information, Systematic Reviews, and Data Services [6], but not every librarian has access to the funding needed to participate. Regardless, early career librarians still lack sufficient guidance to navigate the many training and education opportunities available.

While academic universities may have hundreds of employees, health sciences libraries typically have smaller staff, often only employing an average of 12 full-time librarians [3]. When looking for a peer with similar professional interests, goals, and career trajectories, it may be hard for early professionals to find role models or colleagues encountering similar obstacles. Connecting with other librarians across institutions, or even states, can help build people's professional networks and gives them insight into experiences they might not have access to otherwise.

Recognizing the need for a general space where resources could be shared and where early career professionals can engage and grow, Laura Wright and Laura N. Haygood co-founded the Early Career Librarians Initiative (ECLI) [7], a group geared toward providing information and opportunities for health sciences library students and early-career librarians. This group was initially formed within the South Central Chapter of the Medical Library Association (SCC MLA) but quickly grew to include groups in other chapters. Beyond its initial focus on providing information and opportunities, ECLI fosters professional networking and creates a shared space for librarians to build community, explore, and grow their careers.

While traditional learning opportunities like library school and continuing education programs address essential competencies, they often do not adequately prepare librarians for the practical realities, or "soft skills" necessary to navigate their careers. Cultivating a network of peers, as advocated by Bartley, Simuel, and Williams [8], can be crucial for professional success, as many of these interactions offer a space for colleagues to offer guidance and best practices for soft skills, like managing one's time, organizing information, and understanding the important, unspoken nuances of workplace wellness [9]. ECLI recognizes these needs by fostering a community where early career professionals can connect with colleagues who share similar interests and aspirations. This sense of community is further enhanced through their webinar series, which offers guidance and instruction from experienced professionals on topics specifically requested by ECLI members.

Formal and informal mentoring, continuing education, and self-teaching are all ways that health science librarians build competencies and skills [4]. The ECLI webinar series seeks to combine these facets of professional development by gathering feedback from ECLI members about topics of interest, offering guidance and instruction from experienced professionals, and then sharing the information widely. This article analyzes survey feedback collected from the webinar series.

## CASE PRESENTATION

ECLI aims to create more opportunities for new and early-career librarians and to grow as health information professionals. To address the identified shortage of professional development resources tailored to LIS students and early career health sciences librarians, the ECLI undertook a collaborative initiative to develop a webinar series. A rigorous planning process ensued, with biweekly meetings held to determine the schedule, roles, and responsibilities for the webinar series. Key considerations included topic selection aligned with identified knowledge gaps, speaker recruitment strategies, and developing a robust evaluation framework.

ECLI formed a collaborative relationship with the Network of the National Library of Medicine (NNLM). The partnership aligned with NNLM''s goals of expanding outreach and engaging the next generation of health science librarians [10]. NNLM Region 3 provided the platform to host the webinars, the infrastructure to create a registration page and track registration and attendance, and standardized surveys to solicit feedback from attendees. ECLI was responsible for finding and recruiting speakers, coordinating and marketing the events, and facilitating the webinars.

Participants were encouraged to complete a short evaluation survey at the end of each webinar (see Appendix B). The survey was a part of a quality

DOI: dx.doi.org/10.5195/jmla.2025.2071

assurance/improvement and program evaluation project from the NNLM. The Extramural Program of the National Library of Medicine approved it for this use and deemed it exempt from IRB approval. NNLM National Evaluation Center located at the Galter Health Sciences Library and Learning Center, Northwestern University, Feinberg School of Medicine in Chicago created the survey using Research Electronic Data Capture (REDCap) [11]. The survey questions were based on a 5-point Likert scale, and respondents were asked if they agree or disagree with each statement. Aggregated data were exported from Redcap into an Excel file to be analyzed.

An inductive thematic analysis (Braun and Clarke) [12] was done on the free-text responses. Responses to the question "What was the most useful aspect of this training and why?" and "Please tell us more about how you plan to use the information gained in this training" were reviewed and coded. Codes were grouped into four main themes: practical tips, resources, encouragement, and real-life experience were reviewed and refined through an iterative process.

## RESULTS

ECLI has offered a series of six webinars, featuring twelve guest speakers. All webinars were free and open to anyone interested in attending. Each webinar lasted an hour and a half, with speakers encouraged to reserve the last thirty minutes for questions, creating ample time and space for attendees to ask in-depth questions and learn from the perspective of more experienced, impartial professionals. At the end of each session, attendees were asked to complete a feedback survey. A total of 981 people registered for the webinars, with 567 attending at least one session. Among these, there were 446 unique attendees. In the first year of the webinar series, 240 people registered, and 212 attended; in the second year, 741 registered, and 355 attended. All webinars were recorded and shared on NNLM's YouTube page. As of January 27, 2025, the webinar recordings have been viewed 2,149 times. Please see Appendix A for full webinar details and attendance.

The webinar 2.1 "Integrating Research, Publishing, and Presenting Into Your Career," had the highest engagement, with 143 attendees. The webinar 1.2 "Goal Setting (And Success in Achieving Them!) had the lowest engagement, with only 48 attendees.

The ECLI and NNLM Region 3 are both regional chapters of larger organizations with overlapping coverage areas. Together, they cover eight states (AR, LA, KS, MO, NE, NM, OK, and TX). The first year of the webinar series reached 35 states, including D.C., with the most attendees from Texas (24), Louisiana (13), and Arkansas (10); the second year reached 43 states, plus Puerto Rico and Washington, D.C., with the most attendees from Texas (51), California (29), and New York (13).

**Figure 1** Attendance and registration for both years of the webinar series.

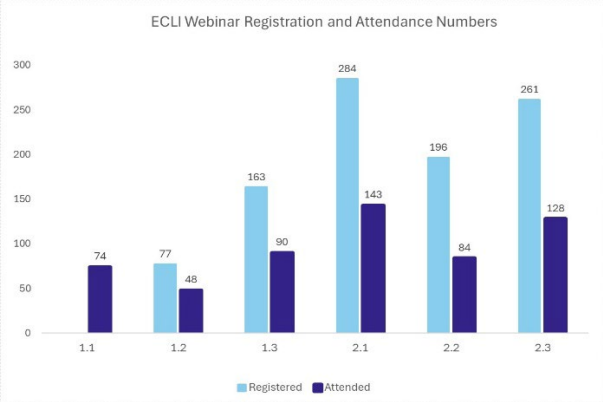



**Figure 2** Geographic map of attendance.

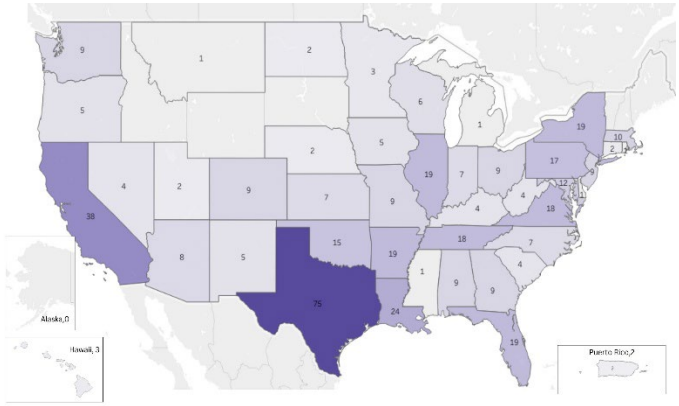
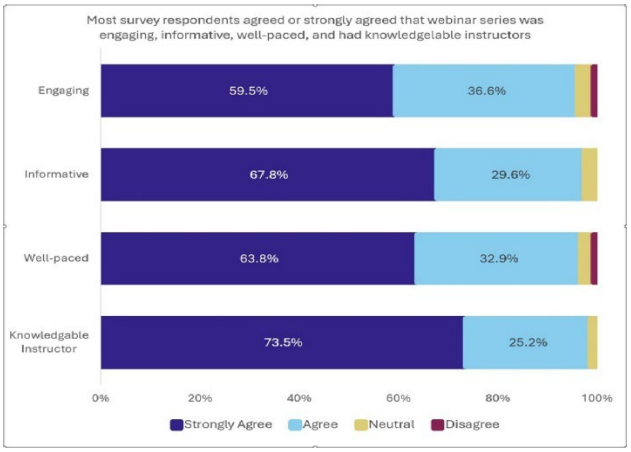


**Figure 3** Survey Responses.




Note: There were no "strongly disagree" responses.

An evaluation survey link was shared by the session hosts at the end of each webinar. The overall survey response rate was 28.73% with 154 completed surveys, with 64 completed in the first year and 90 completed in the second. We combined data from all surveys for analysis.

DOI: dx.doi.org/10.5195/jmla.2025.2171

No demographic information was collected from attendees, but the series was shared through targeted marketing to LIS schools and faculty, medical library directors, and groups aimed at serving early career librarians.

Most survey respondents agreed or strongly agreed that the webinars were engaging, informative, well-paced, and led by a knowledgeable instructor.

### Themes

Overall, four themes were identified as most substantive from the open-ended questions "What was the most useful aspect of this training and why?" and "Please tell us more about how you plan to use the information gained in this training." These themes align with the mission of ECLI to engage new library professionals and help them grow professionally.

### Practical Tips

Practical tips focused on quick, actionable advice or guidance that attendees could readily implement in their own professional lives. Such tips often included basic information that more seasoned professionals take for common knowledge, like how long a cover letter should be, layout of a research poster, and how to get involved with professional organizations.

*"The session provided great suggestions and advice about how to engage him/herself and connect with others in MLA."*

In the library profession, collaborations, mentorships, and colleagues often span multiple institutions. People benefit from guidance on how to seek out and foster those relationships as well as more practical tips for dealing with day-to-day job responsibilities. Connecting with coworkers and colleagues at other institutions can help combat burnout and feelings of being overwhelmed [13].

### Resources

Attendees benefited from sharing resources with each other through the chat and the speaker presentations. People said that the shared links, recommended books, speaker slides, job postings and salary databases were useful.

### Encouragement

*"The most useful aspect of this webinar was hearing about all of the opportunities we have to grow in our careers as health science librarians and knowing that we are supported."*

Starting a new career can be daunting. Librarians often face imposter syndrome, especially in the first few years of their career [13, 14]. Imposter syndrome can affect confidence and willingness to try new things [14, 15, 16]. Reaching out to people and building a supportive network are ways to combat imposter syndrome [15].

*"I am attempting to start a new program within my library and this presentation helped me stay encouraged for the task at hand"*

Sometimes all people really need is a little encouragement. Library leadership can support new librarians to participate in groups such as ECLI as a way to expand professional networks and mature professionally.

### Real-Life Experience

Respondents appreciated the opportunity to see "real life" examples of other people's Curricula Vitae (CVs), their work processes, and methods for publishing and presenting. This behind-the-scenes look doesn't take the place of mentorship or formal guidance, but it shows early career professionals' different ways to approach problems and opportunities. Hearing other people's success stories and how they built their careers can light the way for others to follow in their footsteps.

*"LIS research can be so unique in the way we conduct, perform, and present as compared to "hard" sciences that I really appreciated hearing straight from peers."*

Libraries often have smaller staff sizes [3]. When looking for a peer with similar professional interests, goals, and career trajectories, it may be hard for early professionals to find role models or comrades encountering similar obstacles.

## DISCUSSION

The webinar series was well-attended and quickly attracted an audience. While the webinar series was offered by SCC's ECLI and NNLM Region 3, the need for interprofessional support, advice, and guidance is not limited to early career professionals in their regional states. People across the nation attended the webinars, and ECLI continues to form and grow across other MLA chapter organizations.

Attendance dipped in April, possibly because of co-occurring academic and conference events such as MLA, ACRL, TLA, and final exams. When asked informally during regular ECLI meetings, members agreed that April was a busy month and made it challenging to attend webinars.

The ECLI selected topics relevant to its members, focusing on career beginnings and early success. These topics differed from other professional development opportunities by focusing on soft skills, hiring and promotion processes, and professional reputation building rather than hard skills like literature searching, evidence synthesis, collection development, or other library-specific skills. At 90 minutes long, the sessions were longer than a traditional webinar to allow more time for discussion and questions. This format allowed participants to ask more anecdotal questions and solicit advice. One participant

DOI: dx.doi.org/10.5195/jmla.2025.2071

summed it up nicely when they said, "It was nice to almost be in conversation with the two speakers as they shared information but also personal examples and advice."

These more informal conversations were a crucial part of the webinars and provided a learning opportunity that might not otherwise be available to early career librarians.

## CONCLUSION

Onboarding is a resource-intensive process, especially when it involves introducing large amounts of information to employees new to specialized fields. New and transitioning health sciences librarians, for example, are particularly susceptible to "onboarding overload." This phenomenon encompasses learning how to handle all the relevant information pertaining to their job. Nuanced soft skills that allow them to function more effectively and fulfill all the requirements of becoming an essential liaison to their respective school or hospital. Unfortunately, most library school programs do not fully equip graduates with the tools and knowledge necessary to be successful in all these endeavors, which may lead to librarians feeling overwhelmed, stressed, anxious, and underprepared.

Moreover, experienced librarians may not always recall the challenges they faced early in their careers, especially as information and resources continue to evolve. Novices learn differently than experts and approach problems differently. [17]. Hence, it's crucial to encourage new and transitioning librarians to build networks of peers with shared interests and similar experience levels through groups like the ECLI, which offer a space for resource sharing and professional development.

Mentorship, continuing education, and self-teaching are all valuable resources that can help enhance soft skills and deepen understanding of core competencies. This webinar series aimed to combine these elements by offering guidance and instruction from experienced professionals, and it successfully reached a large audience and interest in both the series and initiatives like the ECLI. Results from the survey support the conclusion that the webinar series is helpful and addresses a topic of need and interest. To meet the strong demand for career development and professional skills among new LIS professionals, ECLI will continue its commitment to providing this valuable service for years to come.

The NNLM National Evaluation Center created the feedback survey and its use was required as part of the partnership with NNLM. The survey could not be altered, but it had some inherent limitations. The survey did not capture demographic data such as years of experience, library type, or job titles. This limited our ability to verify if the people attending the webinar series reflected the intended audience.

The survey was designed for educational offerings aimed at evaluating and using biomedical resources. As a result, several survey questions were unrelated to the webinar series content. Over half the respondents put "not applicable" or left the question blank for questions related to an increase in skills for finding, using, and evaluating health information resources and datasets.

Participants self-selected to attend the webinar series, which could lead to a bias of more positive results. Respondents reported that the webinar helped advance their careers, but we lack a reliable way of measuring that outcome. Evaluating the long-term impact of informal training was beyond the current scope of the project.

## IMPLICATIONS FOR FUTURE PRACTICE & POLICY

Library managers and directors should encourage early career librarians to participate in groups, such as ECLI, which help new professionals establish wide support networks. Mentors and leaders should be aware that in addition to training focused on technical skills, early career professionals can also benefit from guidance on soft skills, career planning, and hiring practices.

## ACKNOWLEDGEMENTS

The authors would like to extend their sincerest gratitude to the webinar speakers: Julie Bolin, Katie Prentice, Brenda Linares, Lindsey Blake, Rachel R. Helbing, Susan C.Steelman, Adela V. Justice, Tara Malone, Shannon D. Jones, Brian D. Leaf, Melissa De Santis, and Emily Vardell. They would also like to thank each of the ECLI members who made this webinar series possible.

This work was supported by the National Library of Medicine, National Institutes of Health, under Cooperative Agreement number UG4LM01234-09 with the University of North Texas Health Science Center in Ft. Worth, TX. The content is solely the responsibility of the author and does not necessarily represent the official views of the National Institutes of Health.

## AUTHORSHIP CONTRIBUTIONS

Laura Haygood: Conceptualization; validation; writing- review & editing. Sandra Desjardins: Conceptualization; formal analysis; validation; writing - original draft; writing - review & editing. Katie Pierce Farrier: formal analysis; methodology; data curation; visualization; writing- original draft; writing - review & editing.

## DATA AVAILABILITY STATEMENT

Data associated with this article cannot be made publicly available because they contain personally identifiable information. Access to the data can be requested from the NNLM National Evaluation Center located at Galter

DOI: dx.doi.org/10.5195/jmla.2025.2171

Health Sciences Library and Learning Center, Northwestern University, Feinberg School of Medicine in Chicago which facilitates the survey and corresponding data. https://www.nnlm.gov/about/centers/nec. Email nec@northwestern.edu.

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## SUPPLEMENTAL FILES

**Appendix A**
**Appendix B**

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*Received January 2025; accepted July 2025*



ISSN 1558-9439 (Online)

CASE REPORT
DOI: dx.doi.org/10.5195/jmla.2025.2167

# Evaluation of an online systematic review escape room for early career clinicians and doctoral students

Paul Cannon; Tracey McKee

*See end of article for authors' affiliations.*

**Background:** Systematic reviews are increasingly appearing in doctoral theses and being supported by librarians. There is, however, evidence that students struggle to undertake systematic reviews.

**Case Presentation:** We sought to understand the perspectives of, and confidence utilising systematic review search methods following an online escape room teaching intervention as part of our in-person orientation session for Doctorate in Clinical Psychology trainees. Following the session, trainees were invited to participate in an online survey to which we received a 90% response rate (n=35). The escape room was enjoyed by most trainees with many using the words "fun" and "engaging" to describe the intervention, this despite more participants finding the escape room difficult. The average scores for confidence in utilising search syntax were positive, but there was a wide range of scores. Many of the comments that trainees made centred on time pressure to escape. We believe that allowing the trainees more time would increase their enjoyment of the game and aid their learning.

**Conclusion:** Our systematic review escape room demonstrates that key methodological concepts and search skills can be taught in an active, fun, and engaging way that helps introduce and scaffold learning for latter in-depth teaching.

**Keywords:** Escape Rooms; Active learning; Systematic reviews; Search skills; Research students

See end of article for supplemental content.

## BACKGROUND

Systematic reviews (SRs) are an emerging role for academic libraries [1], resulting in many implementing dedicated SR services [2-4]. In addition, SRs have become an expected part of doctoral study [5], with some authors calling for SR methodologies to be a mandatory component of doctoral training [6]. Indeed, in the context of this case report, SRs appear in all theses.

Undertaking any type of literature review can be a novel task for many graduate students, who often encounter difficulties comprehending different review methodologies, data management requirements, and writing methods [7]. It is perhaps no surprise that SRs can be "a daunting task" for PhD students [5, p.535].

To support these students, many academic health libraries have implemented dedicated SR services for collaboration and training (for example McKeown and Ross-White [2], Yang et al. [3], and Demetres et al. [4]). Where teaching practices of librarians have been explored, didactic teaching methods dominate, with far fewer librarians engaging in active learning techniques such as collaborative group work, think-pair-share, and gamification of learning [8]. This lack of active learning utilisation is despite a growing body of literature demonstrating that students learn more when actively engaged within the classroom [9].

As a way of engaging students, escape rooms have been used in many disciplines [10-12]. Within libraries, escape rooms have also been used for library orientations and literature searching [13], fact checking and fake news [14], and searching PubMed [15]. These library-focused escape rooms were not sufficiently evaluated to show increased learning or knowledge retention but do show intended learning outcomes were met and that participants enjoyed playing them.

Whilst there is a paucity of literature on clinical psychology within health librarianship, clinical psychology meta-analyses show better, but similarly low levels of search strategy reporting as other health disciplines [16]. In an effort to improve trainee confidence in searching and reporting for SRs, we have embraced active learning, utilising approaches that enable trainees to apply knowledge from teaching [17].

In this study, we investigated whether an additional active learning intervention in the form of an online escape room during our orientation with trainees in the Doctorate in

DOI: dx.doi.org/10.5195/jmla.2025.2167

Clinical Psychology (DClinPsy) programme would be an effective way to introduce SR methods and search skills earlier in the curriculum and help scaffold future learning.

## CASE PRESENTATION

We are two librarians working in a research-intensive university and a health service within the same geographic region. We support DClinPsy trainees on a programme that is collaboratively funded by both organisations. The trainees are also both health service workers and enrolled students during the three-year programme. Whilst the two organisations are separate, with access to both libraries, trainees often conflate our services. We therefore began joint orientation sessions to help define our services and direct trainees to the appropriate support for academic and clinical enquiries. Further conflation existed with a requirement for trainees to undertake a SR for their academic theses, which is linked to a research project undertaken in a clinical setting. Our collaboration, therefore, quickly extended to co-design and delivery of SR teaching.

We have three teaching interventions embedded within the DClinPsy curriculum that enable us to scaffold learning across the first two years of study. These are all timetabled and mandatory to attend. Our interventions start in the first weeks of year one with an hour in-person orientation session. This is followed by a 1.5-hour online lecture at the end of the first semester where SR methodologies and search methods are explained. This lecture aligns with the submission of their research project proposals, which influences their SR topic. The outline of their SR is due at the end of semester two in year one.

Our final timetabled session is a full day online SR search and reporting workshop midway through the first semester of year two. By the end of the workshop, we aim for trainees to have a first draft of a search strategy on one database consisting of subject headings and text words, with appropriate utilisation of syntax and search fields. This workshop marks the start of their SR, with trainees expected to write their reviews over the next year, submitting them as part of their theses mid-way through their third and final year.

Despite our teaching interventions, optional appointments, and online support resources, we encounter some trainees with low confidence towards their SRs. Specifically, we have noticed that many questions could be answered by handbooks (for example, from The Cochrane Collaboration [18] and JBI Manual for Evidence Synthesis [19]), that trainees struggled to differentiate systematic and scoping review research questions, and with nesting, proximity searching, and wildcards.

To further support trainees in these areas, we decided to experiment by utilising an escape room in our year one orientation session. To the best of our knowledge, our escape room is the first to focus on methodological issues and search skills in SRs. Our escape room can be downloaded and played from https://osf.io/jwf6t/.

### Escape room development

Our online escape room was created using Microsoft OneNote following an instructional case study [20] and video tutorial [21]. The short video tutorial shows how to create pages within OneNote for each puzzle and password protect answer pages. All our puzzles are in the form of multiple-choice questions; the correct answer is the password to unlock the next section of the escape room. Each correctly answered section reveals a character which, when unscrambled, reveals the code to complete the escape room. The questions focus on methodological guidance, Boolean logic, and search syntax. The escape room navigation and question development are discussed in Appendix A.

### Using the escape room in class

For our orientation in academic year 2024/25, the trainees were randomly divided into two sets of 19 and 20 people by the programme administration team due to room capacity. When entering the room, trainees were free to choose their seats around one of four active learning tables. This meant that there were eight groups of approximately five people across both repeated orientations.

Each session lasted one hour. The first 20 minutes of the orientation included a presentation on library services and group information retrieval exercises from our library catalogue. We then introduced the escape room and navigation for five minutes, gave the trainees 15 minutes to complete the escape room, and spent the final ten minutes providing context to the questions and explaining the answers. We allowed ourselves ten minutes for a welcome and closing of the orientation and questions from the trainees. During the escape room exercise we checked in with each table, answering any technical questions and providing prompts as required.

When closing the session, we introduced our study and invited trainees to undertake an anonymous online survey. A further email with details of the survey was sent to trainees immediately after the session by the DClinPsy admin team on our behalf, with a reminder sent one week later. The survey closed after four weeks.

### Survey development

Our survey was modified from Offord et al. [20] and PRESS guidelines [22] to be suitable to the trainees and search methods. The survey employed five-point Likert scales and free-text open-ended responses. Quantitative questions were analysed using simple descriptive statistics, with free-text questions using the constant

DOI: dx.doi.org/10.5195/jmla.2025.2167

comparison method [23], allowing us to quickly generate broad codes and themes based on similarities and differences in the data. As an example of our coding, one response to whether there were parts of the game participants found difficult was, "The time pressure of the activity and reaching group consensus on some questions was difficult. However it was helpful to discuss and reach concensus (sic) while building our understanding". This response was coded as "Teamworking" and "Time pressure", and added to the theme, "Game experience". The raw survey data and our coding structure are available on the Open Science Framework [24].

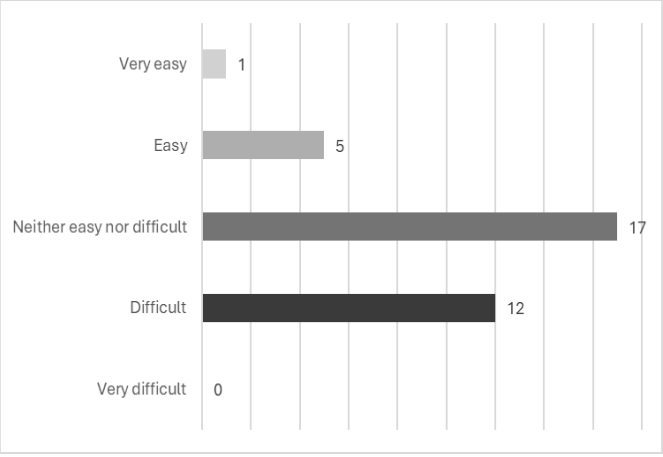
We received a 90% response rate (35 from 39 potential participants). We believe the high response rate corresponds with our valued input and trainee enjoyment of the escape room. The survey was also short, taking a mean average of 3 minutes 36 seconds to complete, and all questions were optional.

## RESULTS

### Escape room gameplay

The initial questions in our survey used a five-point Likert scale to assess whether the trainees enjoyed playing the escape room and whether they found the game easy or difficult. The options ranged from 'Really enjoyed it' to 'Did not enjoy it at all' and 'Very easy' to 'Very difficult', respectively. The escape room was near universally enjoyed by all participants with 60% (n=21) 'really enjoying' and 34% (n=12) 'enjoying' it. 6% (n=2) felt 'neutral'. Trainees' enjoyment of the intervention came despite a larger percentage finding the escape room 'difficult' or 'neither easy nor difficult' (Figure 1).

**Figure 1** Responses to the question, "How easy or difficult did you find the game?"




The reasons for people finding the escape room difficult were elicited in responses to the question, "Were there particular parts of the game that you found difficult?". Time pressure was coded on a quarter of responses (n=9/33). A similar number (n=6) mentioned difficulties with search skills, particularly with questions on wildcards and proximity searching. A further five comments were coded with team working. These responses centred on group organisation and lack of assigned roles, resulting in individuals working at a different pace, "Doing it in a big group meant we all couldn't read at the same pace, so ended up not all being on the same wavelength". Several comments were coded to cognitive load, which may be partly related to time pressure and lack of group working when compared to our pilot of the escape room with the previous 2023/24 cohort. One person related cognitive load to their neurodivergence. We reflect on these factors in the discussion section. Five responses noted no difficulties with the escape room, but one person said "all of it" was difficult.

### Development of search skills

In response to, "What did you learn from the game?", participants answers were coded to syntax (n=6/35), Boolean logic (n=4), and general comments on search skills (n=9). Most responses were assigned a broad methodology theme (n=18), which included codes for the general steps in a SR (n=14), with five of these specifically mentioning, and coded to, guidelines and handbooks. Five responses were also coded under previous SR experience, which highlights the range of experience within this cohort.

Trainees were then asked how confident they felt utilising search techniques (figure 2). Across all four measured search techniques, more people were slightly or very confident utilising these search methods than very or slightly unsure. However, the data shows a wide variation in confidence levels indicating that some trainees require further support with search techniques (table 1). We reflect on these responses in the discussion.

### Overall perceptions of the escape room

We asked participants, "Would you recommend this game to other students undertaking a systematic review?". Of the 35 responses, 32 replied "yes" and 3 people "maybe". When asked to explain their answer, of the 29 free-text responses, 16 were coded as fun and ten as engaging, with these exact words often used. Nine responses were coded with bite-sized learning, with participants observing the escape room as, "a nice way to explain the knowledge concisely with easy to understand examples" and that, "It really helped get me thinking about the different aspects of a SR". Two of these trainees bookmarked the escape room to review later. Two people mentioned positive

DOI: dx.doi.org/10.5195/jmla.2025.2167

**Figure 2** Responses on a five-point Likert scale to the question, "Following the escape room, how confident do you feel utilising the following techniques as part of a systematic review search strategy?"

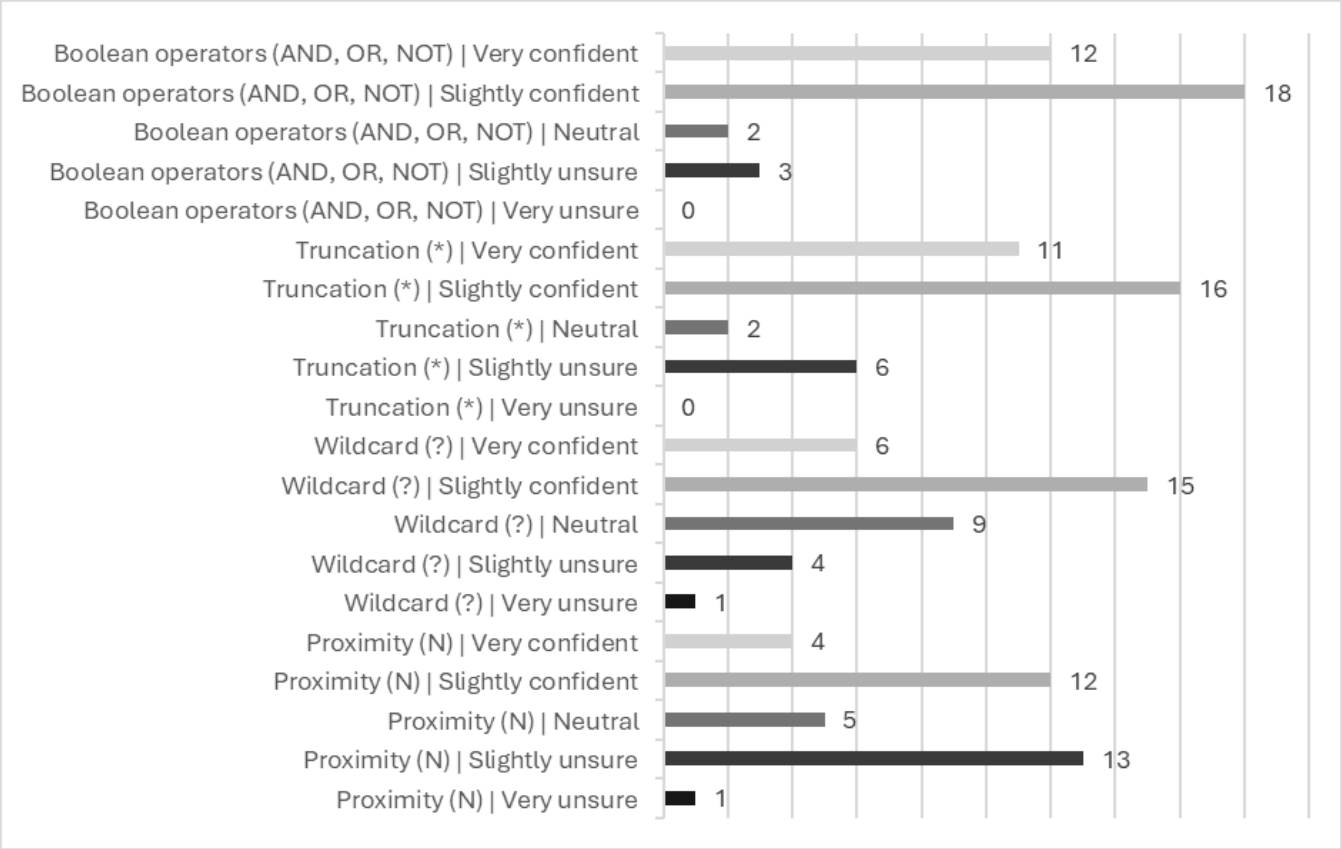



**Table 1**

Range and average scores for responses to the question, "Following the escape room, how confident do you feel utilising the following techniques as part of a systematic review search strategy?" (where 1=very unsure, 2=slightly unsure, 3=neutral, 4=slightly confident, 5=very confident)

| Search technique | Minimum | Maximum | Mean | Count |
|---|---|---|---|---|
| **Boolean operators (AND, OR, NOT)** | 2 | 5 | 4.11 | 35 |
| **Truncation (*)** | 2 | 5 | 3.91 | 35 |
| **Wildcard (?)** | 1 | 5 | 3.60 | 35 |
| **Proximity (N)** | 1 | 5 | 3.14 | 35 |

aspects of team working through knowledge sharing, and that it "encouraged conversation". Of the three people that said they would "maybe" recommend the game, one person noted that it was fun but that they did not learn anything new, and the other person said, noting their neurodivergence, that they required more time and repeated self-directed attempts for the learning to "stick". The third person left the open response blank.

We concluded by asking, "Is there anything else you would like to tell us about the game?". From the 23 responses most noted the fun (n=8) aspect of the escape room, praising its novelty (n=8). We were also thanked for trying something different (n=6), "It was a great way to itroduce (sic) these skills in an accessible way". Two people noted teamwork, one enjoying the "positive bonding elements", and the other offering that if they were able to play the escape room alone, "I think [it] would be more useful, and could be longer or more complex!".

DOI: dx.doi.org/10.5195/jmla.2025.2167

## DISCUSSION

Overall, our escape room can be considered a success by the measures of enjoyment, engagement, and beginning to scaffold learning. With many doctoral theses requiring SRs, and more libraries supporting SRs, escape rooms may be "a helpful engaging way of learning more about a dry topic", as one of our participants noted. There are, however, some areas where refinement of how the escape room is introduced and managed would benefit future cohorts and libraries seeking to develop similar interventions.

### Pressure to escape rather than develop knowledge

One of the most common codes in the analysis was time pressure. The orientation timetable necessitates a short time for the escape room. Trainees also noted positive and negative aspects of the time limit; some feeling that it improved engagement and gameplay, whilst others felt pressure to escape rather than reflect on their learning. We based the 15-minute escape time on our experience with the previous cohort, and whilst all groups escaped within 15-minutes, many responses on the difficulty with the game stemmed from time pressure. One participant commented, "Obviously a time crunch is part of the game but it was a little hard to process some of the instructions in such a short pace of time. Maybe make it 20?". Other participants noted there was not sufficient time to work collegiately within their groups. We observed that there was less team working within this cohort compared to the last. To what extent this was due to the time limit or group dynamics is difficult to tell. Nonetheless, we feel 15-minutes was appropriate for escaping, but greater team working and learning could be achieved with an additional 5-10 minutes to escape. We will add this time into future orientations.

As noted, group dynamics were different between cohorts of trainees. The 2023/24 cohort were more self-organising – one person read the escape room instructions and questions, and the other team members worked in groups of two, sharing laptops, to investigate each possible answer to the questions. These trainees discussed their findings as they progressed, helping the groups share learning, collaboratively decide upon the answer, and escape quicker. This appeared an effective way of learning, sharing knowledge, and developing team bonds, which seemed especially useful to trainees newer to SRs. We will suggest this as a method of working when introducing the escape room in future.

### Individual differences and contextualisation

A further point of reflection comes from a participant mentioning their neurodivergence. In future, we will add additional time to escape, which should reduce the pressure on trainees. We will also provide information on the orientation in advance so that trainees know what to expect. However, it is also important to note that active learning interventions should not be considered as a one-off event. Across our DClinPsy teaching, we provide a range of self-directed learning, and individual, small, and large group active learning activities that offer trainees a framework to develop and reflect upon their learning. This range of activities and learning materials help account for individual differences.

Relatedly, we find that contextualising the escape room questions and answers at the end of the activity allows trainees to review and reflect upon their learning. One person commented that it was, "Really helpful generally to see the mistakes people tend to make, and have Paul talk us through it afterwards". This point supports our decision to add questions on SR guidelines and discuss methodological issues rather than focus solely on search skills. We have found in the past that issues we help resolve are caused by a lack of methodological knowledge or poor practices learnt from abridged SRs undertaken in undergraduate or taught post-graduate study. One trainee summarised this by saying, "I think it highlighted some elements of a systematic review I had skimmed or even avoided when doing one before."

Despite trainees feeling they developed their understanding of different search techniques, and mean scores for confidence in utilising search techniques ranging between 'neutral' to 'slightly confident', some trainees were still 'slightly unsure' or 'very unsure' in these skills (table 1), especially with proximity syntax. This is not surprising given that this is our first orientation with the trainees, and confidence can potentially be attributed to prior experience with SRs instead of, or in addition to, the intervention. The escape room has, however, helped us introduce these concepts at an earlier stage with this cohort, and the responses will help us scaffold future teaching and develop support resources.

Our escape room took three days to develop. This timescale is relatively short compared to creating didactic teaching materials and can therefore be a useful starting point for librarians looking to develop active learning techniques.

## CONCLUSIONS

We have demonstrated that active learning can be challenging to implement effectively, and structured guidance needs to be provided to participants ahead of and during teaching. By evaluating and reflecting on our escape room, we have illustrated how these challenges can be minimised in future.

Our SR escape room does, however, demonstrate that key methodological concepts and search skills can be taught in a fun and engaging manner, and help scaffold learning for latter in-depth teaching. As described in the appendix, the questions we chose were based on our unpublished

DOI: dx.doi.org/10.5195/jmla.2025.2167

research and the SR thesis requirement. We believe the escape room questions could equally be adapted to other forms of knowledge synthesis. Our future research will focus on a pre- and post-test to assess whether confidence to undertake SRs improves after active learning.

We would encourage librarians looking to develop innovative teaching methods to learn from our findings and utilise escape rooms as part of a suite of active learning interventions.

## CONFLICT OF INTEREST

The authors have no conflict of interest to declare.

## FUNDING

This study received no funding.

## ACKNOWLEDGEMENTS

The authors wish to thank Jennifer McGhie for helping to run the escape room activity, and Dr Matt Offord for sharing their escape room survey with us.

## DATA AVAILABILITY STATEMENT

All data supporting this study are available at https://osf.io/jwf6t/.

## AUTHOR CONTRIBUTIONS

Paul Cannon: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Visualisation, Writing – original draft. Tracey McKee: Conceptualization, Investigation, Validation, Writing – reviewing & editing.

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## SUPPLEMENTAL FILES

**Appendix A**

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*Received January 2025; accepted June 2025*



ISSN 1558-9439 (Online)

CASE REPORT
DOI: dx.doi.org/10.5195/jmla.2025.2132

# Partnering with rural libraries to increase telehealth utilization in New York state

**Abdi T. Gudina; Sarah Merritt; Rohan Dhawan; Milena E. Insalaco; Joanne Kochanek; Mitzi Sackett; Stacey Wicksall; Lynae Wyckoff; Diana Huussen; Francisco Cartujano-Barrera; Ana Paula Cupertino; Michele Foster; Jason Coleman; Charles S. Kamen**

*See end of article for authors' affiliations.*

**Background:** New York State (NYS) residents living in rural communities experience multiple barriers to accessing healthcare. Telehealth, or remote provision of healthcare services, could address these barriers. However, telehealth remains underutilized in rural communities due to limited access to broadband and lack of provider/patient awareness. Rural libraries could serve as telehealth hubs and thereby increase telehealth uptake.

**Case Presentation:** A community-academic partnership was formed between the University of Rochester Wilmot Cancer Institute and the Community Cancer Action Council, a group of 29 community stakeholders. The partnership surveyed libraries across NYS to assess telehealth capacity. After identifying a library to pilot a telehealth hub, surveys were sent to that library's patrons and staff to assess perspectives on telehealth. Fifty-three libraries (19.4%) responded to the initial survey, 92.2% of whom felt libraries could beneficially host telehealth hubs. The Macedon Public Library was chosen as the pilot location as they had constructed a private telehealth booth. 60% of 48 Macedon community members surveyed indicated they would utilize telehealth in the library, while 89% of 9 Macedon library staff agreed they were committed to implementing telehealth services.

**Conclusions:** We found high community interest in establishing a community telehealth hub in a library. In the next phase of the project, the community-academic partnership will promote use of telehealth to oncology providers.

**Keywords:** Telehealth; Community Engagement; Libraries; Rural; Disparities

See end of article for supplemental content.

## BACKGROUND

Geographic access to healthcare is a barrier experienced by many New York State residents, as 86.6% of New York State land is considered rural [1]. Individuals living in rural communities may need to travel long distances to access specialty healthcare services, and may incur additional financial and practical costs in doing so [1]. Telemedicine is a potential solution to overcome these barriers. The World Health Organization defines telemedicine as the delivery of healthcare services using technological means to overcome access barriers related to distance, with the goal of diagnosing, treating, preventing, educating about, and researching disease and injuries [2]. Telehealth appointments, a form of telemedicine, became especially popular during the COVID-19 pandemic in 2020. With mandatory isolation, telehealth healthcare visits became an essential way to deliver care without the risk of spreading COVID-19, and were reimbursed at the same level as in-person visits [3, 4].

Even as mandatory isolation policies eased, many healthcare systems have found that telehealth has the potential to improve access to healthcare services, reduce healthcare costs, and increase patient satisfaction [5-8]. Using telehealth, providers can deliver remote healthcare services, such as virtual consultations and health literacy programs, to geographically remote rural communities [9]. In this manuscript, we use the US Census Bureau definition of "rural," meaning areas that are neither urbanized (with more than 50,000 residents) nor urban clusters (with between 50,000 and 2,500 residents). Despite its benefits, the implementation of telehealth in rural areas faces several challenges, including limited access to broadband infrastructure and technological resources, lack of knowledge and acceptance of telehealth services [10-13]. To fully harness the potential of telehealth in rural settings, it will be necessary to address these challenges through the development of appropriate technological infrastructure, increasing awareness and acceptance of telehealth services among healthcare providers and

DOI: dx.doi.org/10.5195/jmla.2025.2132

patients, and developing sustainable reimbursement models [14, 15].

Prior research has examined potential solutions to the issue of telehealth infrastructure in rural areas [16, 17]. Libraries, often considered trusted community centers, can be ideal locations to deploy telehealth services [18]. By establishing such community sites, rural residents can access reliable high-speed internet connectivity and technological resources necessary for telehealth services like private telehealth booths, computers, webcams, and even telehealth-related software. Libraries can also play an essential role in promoting awareness, accessibility, and acceptance of telehealth services by providing education, training, and advertising to patients and providers [19, 20]. Given that many vulnerable communities find libraries to be accessible and trustworthy, researchers and community partners have called on practitioners and policy makers to implement more public health services in libraries [21-24]. Librarians and library partners have already implemented a variety of programs to increase access to their communities for a variety of direct healthcare services, health resources, and linkage to services [22, 24, 25]. Some of these programs include supplying Narcan to manage opioid overdose in their community or staffing a COVID-19 help hotline [24, 25]. With many libraries already offering other healthcare services, this positions them well to effectively provide telehealth services. One recent study queried whether public libraries could be a potential access point for telehealth visits [19]. Fifteen librarians from nine states participated in semi-structured interviews that asked about the communities where the libraries were located, the types of patrons typically frequenting the libraries, and the librarians' views on barriers and benefits of public libraries as access locations for telehealth. This study indicated that librarians support libraries as telehealth access locations, that libraries face financial barriers to telehealth implementation, and that rural public health nurses can be a key component in collaborative efforts between regional libraries and healthcare networks. These results indicate the need for further research focused specifically on telehealth implementation in rural public libraries.

## CASE PRESENTATION

We sought to understand the perspectives of rural library staff and rural community members on implementing a telehealth hub in a library. To that end, we conducted a survey of staff at public libraries across the University of Rochester Wilmot Cancer Institute (WCI)'s catchment area to assess the knowledge, interest, and capacity of these libraries to provide access to telehealth services. We then chose a rural library in Macedon, NY from among the survey respondents to serve as a pilot location for providing telehealth access. We surveyed library staff and patrons about their perspectives on telehealth and what next steps would be needed to implement a telehealth hub at the selected library.

### Study Design and Procedure

This study was led by a community-academic partnership between the University of Rochester WCI and the Community Cancer Action Council (CCAC), a group of 29 community stakeholders. The partnership identified the need for increased access to healthcare in rural areas within WCI's catchment area. The WCI's catchment area consists of a 27-county area of Western and Central New York that includes more than 3 million people in the Finger Lakes, Southern Tier, Central, and Mohawk Valley regions. The study aimed to provide a holistic understanding of the possibility of providing telehealth access within a public library. A series of surveys were developed and disseminated in four phases. Phases were completed between August 2021 and December 2022. There were no incentives for completing any of the surveys across phases. The University of Rochester Research Subjects Review Board approved all phases.

***Phase 1***: *NYS libraries & telehealth survey (library survey)*

The community-academic team developed the survey and circulated it to libraries within the WCI's catchment area to identify telehealth capacity and determine a pilot location for this project. The survey was sent to the libraries through email addresses available on the New York State Public Library System email directory listserv, and direct outreach via email addresses available on the library website. All libraries within the WCI's catchment area received an email from the study team explaining the purpose of the study and including a link to the REDCap survey. These emails were sent directly from the REDCap system. A total of 273 libraries were invited to participate in the survey, with 53 completing the survey (a 19.4% response rate).

***Phase 2***: *Community patron survey (community survey)*:

Three respondents to the library survey indicated that they were in the process of implementing a telehealth hub using grant funding from New York State. A member of the study team contacted the director of each of these libraries to determine whether any would be willing to conduct additional surveys to assess their telehealth implementation process. The director of the Macedon Public Library expressed interest in participating as a pilot site for telehealth hub implementation. Macedon is a rural town in Wayne County, New York, with a population of approximately 9,000 people. The Macedon Public Library had recently constructed a "digital equity booth" with grant funding from New York State (see Figure 1 and Supplemental Materials). This booth was located in the foyer of the library; it included a computer, headset, and camera; it had space for two people to sit comfortably; and it was soundproof and opaque from the outside, ensuring privacy. In partnership with the library director, the study

DOI: dx.doi.org/10.5195/jmla.2025.2132

**Figure 1** Digital equity booth at the Macedon Public Library, including materials from the community-academic partnership with University of Rochester.


team developed a community survey to assess Macedon community members' and Macedon Public Library patrons' perspectives on telehealth and the use of the digital equity booth to enhance access to telehealth.

To disseminate the community survey, the study team attended two community events in collaboration with the Macedon Public Library: the *Macedon Heritage Festival* and the *Macedon Senior Luncheon*. Participants at each event were residents of Macedon and the surrounding area who are either existing or potential Macedon Public Library patrons. Participants completed a paper version of the survey, which the study team entered into REDCap. A total of 48 community participants completed the survey.

***Phase 3***: *Library staff survey (library staff survey)*

The community-academic team developed the third survey using the ORIC Readiness for Implementing Change (ORIC) scale [26]. This survey targeted Macedon Public Library staff to assess their readiness to implement a telehealth hub. Participants were recruited at an employee meeting by the study team. Participants completed a paper version of the survey, and the survey team entered the data into REDCap. All three full-time library staff and six of the nine part-time library staff completed the survey. All responding staff were responsible for scheduling visits at the hub, answering patron questions about the hub, and participating in promotion of the hub, and so were able to respond to the ORIC questions.

***Phase 4***: *Vendor feedback survey (vendor survey)*

The study team organized a health fair at the Macedon library to improve awareness of the telehealth hub. The study team invited local community organizations that utilize telehealth or digital health services within their work to join the event and display their services. The study team also developed a vendor feedback survey to assess the event's effectiveness at promoting telehealth at the library. The vendor survey included three closed-ended, multiple choice (YES or NO) questions. Thirteen community organization vendors attended the event, and seven completed the survey.

## Participants

As surveys were anonymous and multi-level, sociodemographic characteristics of each participant were not collected for this study. Participants eligible to participate in this study were required to be at least 18 years old, possess English language proficiency, and either live, work or volunteer within the WCI's catchment area. Specifically, the library survey required participants to volunteer or be employed at a NYS library within the WCI's catchment area. The library staff survey required participants to volunteer or be employed at Macedon Public Library. The vendor survey required attendance at the Macedon Public Library health fair event.

Participants for all surveys were given an information sheet outlining research objectives, study procedures and contact information for both the principal investigator and the study coordinator if questions arose. Those willing to participate in the library and vendor surveys selected "Accept" at the conclusion of the information sheet on REDCap, before being redirected to complete the survey. Those willing to participate in the community and library staff surveys completed paper versions of these surveys after receiving the information sheet.

**Capability and infrastructure of libraries to host telehealth** *(Phase 1)*

From the library survey, data on the utilization of telehealth sites, existing infrastructure, and possibilities of community engagement with telehealth services was compiled in **Table 1**. Notably, while the vast majority of responding libraries reported that a telehealth site in a community setting would be beneficial and that they would be willing to promote health initiatives and digital health services through the library, a much smaller percentage reported that they would be interested in leading the implementation of a telehealth site in their organization, and a small minority of respondents stated that they had an established partnership with a local health system or doctors (see **Table 1**).

DOI: dx.doi.org/10.5195/jmla.2025.2132

**Table 1**

Assessing capability and infrastructure of libraries to host telehealth

| | |
|---|---|
| Do you think a telehealth site in a community location would be beneficial? | Total n=53 (100%) |
| Yes | 49 (92.5) |
| No | 4 (7.5) |
| Would you personally feel comfortable using a telehealth site in a community location? | Total n=53 (100%) |
| Yes | 39 (73.6) |
| No | 14 (26.4) |
| Would people in your community use a telehealth site in a community location? | Total n=51 (100%) |
| Yes | 45 (88.2) |
| No | 6 (11.8) |
| Would your organization be interested in hosting a telehealth site? | Total n=53 (100%) |
| Yes | 43 (81.1) |
| No | 10 (18.9) |
| Do you have a private space in your facility that could be used to host a community telehealth site? | Total n=43 (100%) |
| Yes | 34 (79.1) |
| No | 9 (20.9) |
| Is there anyone who would be interested in being a point person/lead/champion for setting up a telehealth site in your organization? | Total n=41 (100%) |
| Yes | 29 (70.7) |
| No | 12 (29.3) |
| Do you feel there would be participation among local doctors to provide services through a telehealth site in a community location? | Total n=43 (100%) |
| Yes | 36 (88.7) |
| No | 7 (16.3) |
| Do you have a current working relationship with a local health system or local doctors? | Total n=51 (100%) |
| Yes | 9 (17.6) |
| No | 42 (82.4) |
| Is there a place at your facility where a training for community members about using telehealth could be held (e.g., classroom, conference room)? | Total n=54 (100%) |
| Yes | 47(87.0) |
| No | 7 (13.0) |
| Would you be willing to promote other health initiatives and digital health services if they were offered (cancer screenings, wellness workshops, cooking demonstrations, etc.)? | Total n=52 (100%) |
| Yes | 50 (96.2) |
| No | 2 (3.8) |

* As the number of respondents vary by survey items, the denominator used for percentage calculation also varies by survey item (range: 41-54)

**Community members' perspectives on telehealth utilization at the Macedon Public Library** (*Phase 2*)

From the community survey, community members' prior experiences with telehealth, comfort levels in utilizing the booth, potential concerns and overall satisfaction with the booth were measured by a Likert scale and compiled in **Table 2**. Existing experience with telehealth was limited, with the minority of respondents stating that they had a telehealth appointment via computer or phone, and nearly half (45.8%) stating that they never used telehealth before. However, the majority of patients stated that they would feel comfortable going to the Macedon Public Library for a telehealth appointment and that they had no concerns about using a telehealth booth in the Macedon library (see **Table 2**).

DOI: dx.doi.org/10.5195/jmla.2025.2132

**Table 2**

Assessing patrons' perspectives on telehealth utilization at the Macedon Library (n*)

| | |
|---|---|
| Have you ever had a telehealth appointment? | Total n = 48 (100%) |
| Yes, on the computer | 13 (27.1) |
| Yes, on the phone | 13 (27.1) |
| No | 22 (45.8) |
| Would you feel comfortable going to a telehealth appointment at the Macedon library? | Total n = 47 (100%) |
| Yes | 29 (61.7) |
| No | 18 (38.3) |
| Do you have concerns about using a telehealth booth in the Macedon library? | Total n = 45 (100%) |
| Yes | 8 (17.8) |
| No | 37 (82.2) |
| How satisfied are you with the telehealth booth at the Macedon library? | Total n = 19 (100%) |
| Very Dissatisfied | 0 (0.0) |
| Somewhat Dissatisfied | 0 (0.0) |
| Neither Satisfied nor Dissatisfied | 5 (26.3) |
| Somewhat Satisfied | 1 (5.3) |
| Very Satisfied | 13 (68.4) |

**Readiness to implement a telehealth booth** *(Phase 3)*

Macedon Public Library staff (n=9) were given the *library staff survey* during their routine shifts to assess their readiness to implement a telehealth booth at the library (see **Table 3**). In total, 55.5% agreed or somewhat agreed that the organization could get people invested in implementing a telehealth booth; 88.9% agreed or somewhat agreed that they want to implement telehealth booth; 88.9% agreed or somewhat agreed that they were committed to implementing a telehealth booth; and 66.6% agreed or somewhat agreed that they could handle the challenges that might arise in implementing a telehealth booth. Moreover, the vast majority (88.9%) of the participants agreed or somewhat agreed that they could coordinate tasks so that implementation goes smoothly and 77.7% agreed or somewhat agreed that they were motivated to implement a telehealth booth.

**Library as a venue for promoting telehealth** (*Phase 4)*

Of the 13 vendors at the Macedon Public Library health fair, 7 completed the vendor survey. In total, 71% of vendors reported that the fair was successful in promoting telehealth, 43% received referrals to their programs or services, and 100% of vendors would attend another community event at the Macedon Public Library, signifying the event was constructive and beneficial.

## DISCUSSION

Our study assessed the capability of libraries in the WCI's catchment area and the perspectives and readiness of library staff and the local community to implement telehealth at a pilot library, Macedon Public Library. Among the libraries that participated in the survey, the majority of them reported that they have the capacity and infrastructure to host telehealth within their respective libraries. Local community residents (who are potential users of the telehealth) surrounding the Macedon Library reported that they support the idea of implementing telehealth within the library. Moreover, the staff at Macedon Library (who oversee the library) expressed their readiness to implement a telehealth booth within Macedon Public Library.

Infrastructure is a critical component of implementing telehealth hubs in rural communities. Assessing the availability and robustness of community infrastructure is crucial for the successful implementation and delivery of telehealth services, as the lack of infrastructure is a global challenge that healthcare organizations are facing as they attempt to integrate telehealth into their workflows [27]. Most libraries in the WCI's catchment area, however, have critical components of telehealth infrastructure that could enable them to implement telehealth hubs within their libraries. Specifically, in addition to broadband internet, availability of private space and presence of a staff champion are essential components of infrastructure for telehealth [28]. The pilot library chosen, Macedon Public Library, reported these important infrastructure features, including a private telehealth booth and a conference room where training for library staff and community members about utilization of telehealth could be held. In addition, two other libraries in the WCI's catchment area reported the capacity to construct a private booth to serve as a telehealth hub, indicating that this infrastructure exists across multiple libraries. Healthcare organizations could leverage the immense potential of public libraries to extend their service delivery coverage to a wider range of communities, particularly to rural communities who may experience limited access to healthcare facilities, barriers to transportation, and lack of broadband internet at their homes.

Various stakeholders are involved in telehealth implementation and utilization including patients, medical providers, insurance payors, and policymakers [29]. Although each of these stakeholders plays their respective role, the perspectives of the local communities (i.e., the ultimate users of the services) are the prime determinant of telehealth uptake. Hence, assessing the

DOI: dx.doi.org/10.5195/jmla.2025.2132

**Table 3**

Organizational Readiness for Implementing a Telehealth booth at Macedon library(n=9)

| | Disagree, N = 9 (100%) | Somewhat Disagree, N = 9 (100%) | Neither Agree nor Disagree, N = 9 (100%) | Somewhat Agree, n N = 9 (100%) | Agree, N = 9 (100%) |
|---|---|---|---|---|---|
| I feel confident that the organization can get people invested in implementing a telehealth booth. | 0 (0.0) | 0 (0.0) | 4 (44.4) | 3 (33.3) | 2 (22.2) |
| **I am committed to implementing a telehealth booth.** | **0 (0.0)** | **0 (0.0)** | **1 (11.1)** | **5 (55.6)** | **3 (33.3)** |
| I feel confident that we can keep track of progress in implementing a telehealth booth. | 0 (0.0) | 0 (0.0) | 1 (11.1) | 5 (55.6) | 3 (33.3) |
| I will do whatever it takes to implement a telehealth booth. | 0 (0.0) | 0 (0.0) | 2 (22.2) | 3 (33.3) | 4 (44.4) |
| I feel confident that the organization can support people as they adjust to using a telehealth booth. | 0 (0.0) | 0 (0.0) | 2 (22.2) | 4 (44.4) | 3 (33.3) |
| **I want to implement a telehealth booth.** | **0 (0.0)** | **0 (0.0)** | **1 (11.1)** | **6 (66.7)** | **2 (22.2)** |
| I feel confident that we can keep the momentum going in implementing a telehealth booth. | 0 (0.0) | 0 (0.0) | 0 (0.0) | 5 (55.6) | 4 (44.4) |
| **I feel confident that we can handle the challenges that might arise in implementing a telehealth booth.** | **0 (0.0)** | **0 (0.0)** | **3 (33.3)** | **2 (22.2)** | **4 (44.4)** |
| I am determined to implement a telehealth booth. | 0 (0.0) | 0 (0.0) | 4 (44.4) | 4 (44.4) | 1 (11.1) |
| **I feel confident that we can coordinate tasks so that implementation goes smoothly.** | **0 (0.0)** | **0 (0.0)** | **1 (11.1)** | **5 (55.6)** | **3 (33.3)** |
| **I am motivated to implement a telehealth booth.** | **0 (0.0)** | **0 (0.0)** | **2 (22.2)** | **4 (44.4)** | **3 (33.3)** |
| I feel confident that we can manage the politics of implementing a telehealth booth. | 0 (0.0) | 0 (0.0) | 5 (55.6) | 2 (22.2) | 2 (22.2) |

perspectives of the local community regarding implementing telehealth hubs is crucial before starting the services. Among the local community participants surrounding the Macedon Public Library who participated in the survey, close to three-quarters of them reported their interest in using telehealth at Macedon Library. They also reported that they felt comfortable having a telehealth appointment at Macedon library. Finally, successful implementation of telehealth hubs within public libraries requires sustained engagement of library staff. The library staff members at the Macedon Public Library expressed a strong commitment and readiness to implement telehealth hub within the library. Again, this indicates that healthcare organizations could leverage the readiness of these communities and staff members when strategizing around telehealth implementation.

Integrating telehealth into public libraries requires cooperation between multiple stakeholders, including health systems, community-based organizations, and libraries, to provide culturally tailored and holistic care [20, 28]. It is notable from our results that while 87% of libraries reported that they had space to host a telehealth hub, 82% did not have an existing relationship with healthcare organizations or providers. Developing these relationships may further enhance telehealth referral pipelines into community-based hubs. Offering targeted telehealth training within libraries, using locally-familiar doctors, and marketing the presence of library-based telehealth hubs to both doctors and patients could bolster utilization of these hubs. Other ways to engage diverse stakeholders in implementing telehealth could include focusing on particular segments of the population (ex: economically disadvantaged, elderly, chronically ill) to ensure they are aware of and able to access community telehealth hubs, and training patients and community members on the use of online healthcare accounts (e.g., patient portals). As a community-academic partnership hosted by a cancer center, the CCAC was particularly interested in the potential for rural telehealth hub to

DOI: dx.doi.org/10.5195/jmla.2025.2132

promote access to cancer care. Promoting telehealth access to cancer care would involve developing specific relationships with oncology providers and specific education for the community about use of telehealth across the continuum of cancer care services.

Our study, while providing insight into the feasibility and perspectives of rural libraries as telehealth hubs, is not without limitations. The response rate from the initial statewide library survey was low, with only 51 out of 274 libraries responding. Though this matches rates in other online surveys, it potentially introduces a selection bias where libraries with either a pre-existing inclination or familiarity towards telehealth might have been overrepresented. The use of self-reported data raises the risk of either recall bias or social desirability biases, especially when highlighting the potential benefits of telehealth. Further, individual respondents may have been more interested in the idea of telehealth than those who opted not to respond. Though our community survey included a definition of telehealth, individuals with low health literacy may not have fully understood the uses of telehealth. The sample from the Macedon Public Library, which included both patrons and staff, was relatively small, potentially not capturing all of the perspectives in the larger community and limiting the generalizability of the results. To expand on this point, it is unclear whether the results from a single pilot location at the Macedon Library can be applied to other rural libraries, both within and outside New York State. This study did not thoroughly assess the telehealth hub's long-term feasibility and sustainability. Additionally, for certain measures, we encountered limited responses, and notably, the vendor feedback from the health far did not yield many substantive insights for our analysis. We did not collect demographics from respondents to preserve their anonymity, thus further limiting our ability to assess generalizability of results. In order to ensure a long-lasting and successful integration of telehealth hub's in rural libraries, future initiatives should aim for more comprehensive study of these factors. Despite these limitations, our sampling of libraries was robust, our response rate was acceptable, and our community-academic partnership proved both feasible and effective in conducting the project.

In conclusion, public libraries have the capacity (i.e., private rooms and other important infrastructure factors) to serve as telehealth sites. Moreover, the local community and the staff members at our pilot public library, Macedon Public Library, support telehealth implementation within the library. Healthcare organizations should harness such great resources of public libraries (particularly in rural areas) to address disparities in healthcare service coverage.

## CONFLICT OF INTEREST

All authors report that they have no conflicts of interest to disclose.

## DATA AVAILABILITY STATEMENT

All data from surveys conducted as part of this article are available in the Open Science Framework at DOI 10.17605/OSF.IO/TD3GA.

## ACKNOWLEDGEMENTS AND FUNDING

This research was supported by NIH grants UG1 CA189961.

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## SUPPLEMENTAL FILES

**Appendix A**
**Appendix B**

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DOI: dx.doi.org/10.5195/jmla.2025.2132

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*Received December 2024; accepted April 2025*



ISSN 1558-9439 (Online)

CASE REPORT
DOI: dx.doi.org/10.5195/jmla.2025.2106

# Academic librarian support for patient-centred and inclusive medical education curricula: a case report

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*See end of article for authors' affiliations.*

**Background:** Medical educators are increasingly aware of the need for patient-centred and inclusive curricula. Collaboration paired with sound evidence can facilitate efforts in this area. Librarians are well-equipped to help move this work forward, as their skills and expertise can support educators through the process of revising learning materials that will incorporate timely and socially accountable information.

**Case Presentation:** This case report describes an initiative at one Canadian medical school, whereby a health sciences librarian joined an interdisciplinary working group to support the updating of case-based learning materials for the undergraduate medical curriculum. These materials were revised with an anti-oppressive and patient-centred lens, and as an embedded member of the working group the librarian provided on-demand literature searches, participated in conversations regarding the importance of critical appraisal skills, and consulted on sustainable access to electronic materials used in the cases. From this experience and close collaboration, lessons which enhanced their practice and stronger relationships emerged for the librarian.

**Conclusions:** Involving librarians' expertise in updating learning materials provides many benefits to curriculum developers and presents opportunities for liaison librarians to engage with their faculties more closely. Promoting patient-centredness and inclusivity is an ongoing process, and academic health sciences librarians can apply their expertise to curricular initiatives such as the one described here, while librarians working in clinical settings can support these efforts through specialized forms of teaching and outreach.

**Keywords:** Medical education; Academic librarianship; Case-Based Learning; EDIA; Patient-Centred Care

## BACKGROUND

For many years, physicians have been called upon to assume the role of health advocate for those communities negatively affected by the social/structural determinants of health [1], and both the Association of American Medical Colleges (AAMC) and the Association of Faculties of Medicine of Canada (AFMC) have demonstrated their commitment to this call [2,3]. In response to this, medical schools have worked to address curricular gaps related to equity, diversity, inclusion, and accessibility (EDIA) [4,5], but much work is still needed to seamlessly integrate these topics throughout the medical school curricula in a meaningful way [6].

Case-based learning (CBL) has been a prominent feature of the undergraduate medical curriculum at Dalhousie University for several years, and its application is found primarily within the first two years (pre-clerkship) of a four-year M.D. program. During multiple weekly, small-group CBL sessions, students discuss and debate patient scenarios under the guidance of faculty tutors who offer help using a guide (prepared by the case authors) that contains detailed prompts and additional information to share throughout the discussion. While cases are regularly reviewed for clinical currency, periodic deeper revisions of the curriculum's pedagogy in relation to social accountability are undertaken in accordance with accreditation cycles. In 2021-22, working groups (including working groups on Priority Communities, Anti-Oppressive Practice, Planetary Health, Addictions Medicine, and Generalism) reviewed the entire curriculum and put forward several recommendations for curricular change. These recommendations led to the subsequent creation of a new working group that was tasked with updating CBL materials. From this experience, new partnerships were created while existing ones, such as that between the university's health sciences library and the Faculty of Medicine, were strengthened.

Librarians are demonstrated partners in curriculum reform as well as social justice efforts. The literature

DOI: dx.doi.org/10.5195/jmla.2025.2106

describes academic librarians collaborating with faculty to instruct on critical information literacy [7], as well as making efforts to represent marginalized groups in their collections [8]. Within the academic health sciences library sector, there are examples of librarians working alongside faculty to expand curriculum content [9] and participating in team-based collaboration to revise cases depicting patients [10]. Quite recently, efforts to diversify teaching images in undergraduate medical curricula have involved collaboration between students, faculty, and librarians [11], thereby demonstrating the timeliness of this work and librarians' ability to collaborate with different stakeholder groups in support of systemic change.

This case report describes how a health sciences librarian integrated within a medical school working group to support efforts to update CBL materials for greater inclusivity and patient-centredness. It incorporates the perspectives of the librarian (JP), the working group Chair (LR), and Equity, Diversity, Inclusion and Accessibility (EDIA) Curriculum Reviewer (LP) (also referred to as the Reviewer) to demonstrate the value of including the library in the update and development of learning materials. The work described in this case report aligns with active calls for health sciences librarians to interrogate the profession's historical role in perpetuating harm against marginalized groups [12] and encourages health educators to consider how their library can supplement EDIA initiatives locally.

## CASE PRESENTATION

As previously noted, working groups were tasked with putting forth recommendations for revisions to the medical curriculum. A key recommendation adopted with respect to CBL was to diversify the patients represented in CBL cases and revise the cases and related curriculum materials (including tutor notes) to remove stigmatizing language. To address these recommendations, the Case Diversification Working Group was established in 2022. It was comprised of twenty-five members including clinicians/physicians, faculty members from the humanities and the biomedical and social sciences, with medical and other students across disciplines, and staff involved in community-engaged service learning. The group was tasked with reviewing and updating all CBL materials (approximately 200 cases) across the pre-clerkship years of the four-year medical curriculum. Case re-writes were largely completed by the previously noted Reviewer (LP) and the working group's Chair (LR) with regular input drawing on the expertise of the working group. The Chair and Reviewer also consulted external clinical and research experts in specific areas and collaborated with the program's Community Engaged Service Learning Program to carry out community engagement. Using an established framework to guide outreach efforts [13], engagement included (for example) outreach with New Brunswick immigration service groups, consultation with the African Nova Scotian Sisterhood and Brotherhood through the faculty's new Black Health Academic Director, and case collaboration with a newly formed provincial intersex society. Noteworthy goals for case revisions included challenging race-based medicine [14], integrating sex and gender diversity [15], portraying clinical care for patients with disabilities [16], and enriching the representation of patient-centred care [17]. In planning to conduct this work, core language used to frame this project's goals was thoroughly considered to ensure contextual understanding that guided the group's processes (see Table 1).

In addition to this, required and recommended readings in the cases were updated to ensure timely content that reflects decolonization efforts (as described in Table 1) and changes in scientific knowledge. Furthermore, images were diversified to challenge the assumption that white skin is the norm and to build clinical skills in identifying conditions in diverse skin tones.

In the summer of 2022, the Head of Dalhousie's health sciences library was invited to join the working group, and from there the opportunity was discussed with both liaison librarians to the Faculty of Medicine. One librarian (JP) was ultimately appointed to provide support for the project and joined the group in the fall of 2022. This support was intended to take the form of recommending library resources and conducting literature searches for the case updates and involved regular attendance at working group meetings. While the library was already accustomed to providing resource consultations and literature searching services as part of its normal offerings to faculty, becoming fully embedded in a faculty working group was less common and presented an opportunity for deeper engagement with faculty initiatives. In addition to this, the librarian had experience tutoring within the medical education CBL setting, which was an asset in supporting this work.

The librarian's integration into the Case Diversification Working Group was welcoming, and the librarian attended the next working group meeting after confirming interest in the opportunity and gaining access to working group documents and meeting materials. Since the working group had been operational prior to the librarian joining, there was a settling in period where the librarian observed conversations and determined ways to be of value to the group. In time, there was more comfort in sharing commentary during discussions on various topics, including the importance of faculty exercising critical appraisal skills rather than solely relying on point of care tools which can continually promote harmful biases [18]. Also, as an embedded member of the group, the librarian was welcome to offer suggestions on case materials which she did if she thought it helpful and within her area of expertise. She also provided on the spot recommendations

DOI: dx.doi.org/10.5195/jmla.2025.2106

**Table 1**

Key terms that framed case diversification efforts, along with their working definition and how they were operationalized.

| Term | Working Definition | How we applied it (examples) |
|---|---|---|
| Anti-oppressive practice | Anti-oppressive practice has been used as a framework for pedagogy and for health care provision (or both). Health care education for anti-oppressive practice develops an understanding of the *systemic* nature of *multiple* forms of oppression [19] such as colonialism, racism, sexism, cisheteronormativism, ableism, etc., particularly insofar as these forms of oppression intersect and constitute social determinants of health. It includes specific approaches to providing trauma-informed, inclusive, and affirming care. Anti-oppressive pedagogy involves critical analysis, self-reflection, and de-centering hierarchical teaching relations. | Made all patients' social identities explicit, and diversified these identities.<br>Diversified and gave short descriptions of caregiver and health care provider social identities.<br>Removed/replaced biased and stigmatizing language and frameworks.<br>Integrated discussion questions inviting critical reflection on structural determinants of health and medical complicity in structures of oppression (e.g. how medical science supported racism or enforced sex/gender binaries).<br>Modelled and taught trauma-informed care and advocacy.<br>Removed reference to people coming from the "third world" or "developing countries," or of the "industrialized" world and replaced where relevant with "low income" or "middle income" countries. |
| Anti-racism | Anti-racism is "the active process of identifying and eliminating racism by critically evaluating and reforming systems, institutional structures, policies, and language, with the goal of redistributing power equitably" [20 p2].<br>Anti-racist medical education specifically includes critical reflection on the history of medical racism, understanding race as a social construct and racism as a social determinant of health, addressing the biasing effects of common labelling practices in medical education and case presentation, recognizing racism as attitudinal, interpersonal, institutional, and structural, and developing strategies for challenging all forms of racism. | Identified instances of race-based medicine, and provided updated evidence reviews to inform discussions with case authors and curriculum leaders towards replacing "race-based" with "race-conscious" medicine.<br>Ensured representation of diverse skin of colour in images and raised awareness of the biasing effects of identifying diagnoses with individuals (e.g. "Lou Gherig's Disease" and the underdiagnosis of ALS in Black persons).<br>Revised descriptions of skin tone for diagnosis (e.g. descriptions of cyanosis, jaundice, striation) that are inaccurate outside of white individuals.<br>Directly challenged common false beliefs about the relative prevalence of substance use disorder by racialized identity.<br>Identified and revised instances where the social determinants of health were presented as individual risk factors and revised to present racism as a structural determinant of health and model advocacy to address its effects. |
| Decolonization | Decolonization is a social process, specific to a given context, of dismantling settler dominance in sovereignty, land, and knowledge systems. Decoloniality in pedagogy emphasizes reflexivity, dismantling hierarchical teaching, and centering oppressed knowledge systems [19]. Our Canadian context is that of a settler state on Indigenous lands, where Indigenous resurgence [21] meets state efforts towards "reconciliation" [22] "Decolonization is not a metaphor" [23 p1]: our cases *reflect* the broader societal context. Restructuring colonial power relations in the institution and classroom, key aspects of decolonializing pedagogy [19], were beyond the scope of this project. | Indigenous cases written by the program's new Indigenous Health Academic Lead.<br>Portrayed culture and the structural determinants of health in the transformational context of Indigenous resurgence.<br>Introduced learners to the growing Indigenous governance of local health and social care systems.<br>Portrayed the harms of ongoing settler colonialism.<br>Reinforced the concept of "two-eyed seeing" [24 p70].<br>Modelled trauma-informed care.<br>Educated for strategies to resist specific expressions of anti-Indigenous racism. |

DOI: dx.doi.org/10.5195/jmla.2025.2106

| | | |
|---|---|---|
| Patient-centered | Patient-centred cases portray patients in the context of their families and communities, as intersectional and subject to multiple structural determinants of health. Their experience of health and illness is longitudinal and personal. Patients receive education and counselling (as well as diagnosis and treatment) from their health care providers as they navigate care pathways, involving interprofessional health care teams and formal and informal caregivers, including services and resources in the community.<br>A patient-centred clinical approach includes the physician actively inquiring into patients' circumstances and values for shared decision-making, and demonstrating empathy. It contributes to a positive, collaborative, and compassionate therapeutic relationship. | Added narrative where the physician provides the diagnosis to the patient; included patient's response and follow-up questions/concerns.<br>Considered "What is this person's vision of a good life, and what is impeding success?" This might include their symptoms/diagnosis, movement through the health system, and structural forces counteracting their agency. These personal factors and concerns may have been added to the patient narrative and discussion questions.<br>Reviewed for language that might cast doubt, belittle, disempower, and blame patients (e.g. "deny", "complain") and replaced with patient-centered language.<br>Replaced descriptions of paternalistic decision-making with shared decision-making and respect for informed consent. |

to reading materials as the conversations took place, including links to the electronic copies of books held in the library's collection or journal articles that could address knowledge gaps noted during discussion.

With the librarian's expertise in resources and literature searching being the main driver for joining the group, a process gradually unfolded whereby literature searches were conducted and delivered to the working group's Chair and Reviewer when needed. While the health sciences library maintained an active literature searching service throughout this period, the librarian's integration into the working group meant she was on standby for any requests specific to this initiative, and those were prioritized as part of her regular workload. She also acted as the primary contact for the working group Chair and Reviewer when electronic resources were not working, if a one-off resource recommendation was needed, or if a case needed an updated permalink to a recommended/required reading.

All requests of the librarian were made informally and on an as-needed basis using several communication strategies such as discussion during group meetings, email, or Microsoft Teams messages. Since the librarian maintained access to working group documents, she was also assigned to find literature directly from those documents using the comments and tagging features. Timelines for delivery of results were sometimes discussed, but the librarian was confident that she would be able to prioritize searching in a timely manner since the working group was part of her portfolio. For searches that were challenging or warranted review of resources used primarily in other health professions (such as Nursing), the librarian solicited assistance and second opinions from colleagues within the health sciences library.

Providing evidence to support case revisions was challenging at times, and the variety of topics was stimulating for the librarian's searching skills (see Table 2 for the sample list of search topics explored).

Most of the searches relied on common biomedical databases such as PubMed and Embase, but some searches required the librarian to search for grey literature or browse multimedia tools to find video content that could bolster the learning material. For example, the librarian was asked to find information on making the APGAR score more inclusive, as recognizing the visual signs of oxygen deprivation in infants with varying skin tones is extremely important for medical learners. After much searching, the librarian provided evidence discussing the implications of incorrectly scoring Black neonates [25], along with a clinical skills video from a major point of care tool showing the APGAR being performed on a white doll, but with the narrator discussing the signs of oxygen deprivation to look for in diverse skin tones.

While identifying new resources for integration into cases was of paramount importance for the librarian's role, another common task involved assisting the Reviewer with updating old links to reading materials. In some instances, this was difficult as the original cases hadn't properly cited the resource, but instead included direction to go to a resource and click a specific heading, topic, etc. This is problematic for updating materials when the library regularly evaluates its collection and makes adjustments to fit the budget and evolving needs of its faculties. As such, the original case included a link to a resource the library had not subscribed to in many years. While the librarian leveraged her connections with hospital library colleagues who had access to this resource (in hopes of identifying the exact reading material being referred to), in the end this reading (and others like it) had to be changed to work with the library's current collection.

In the spring of 2024, the Case Diversification Working Group completed updates of all cases in the first- and

DOI: dx.doi.org/10.5195/jmla.2025.2106

**Table 2**

Sample of search topics and the curriculum unit where evidence was incorporated

| Topic Searched | Overarching Unit (and Component) |
|---|---|
| Access to care/delayed care for tuberculosis in Canada | Metabolism 2 (Respirology component) |
| Anti-oppressive practice in mental health/psychiatry | Neuroscience (Psychiatry component) |
| APGAR score testing in infants with diverse skin tones (including image banks) | Metabolism 2 (Cardiology component) |
| Cyanosis in infants with diverse skin tones (including image banks) | Metabolism 2 (Cardiology component) |
| EDIA & anti-racism in nephrology and cardiology | Metabolism 2 (Cardiology and Nephrology components) |
| EDIA in neurology | Neuroscience (Neurology component) |
| Gender & racial biases in medical diagnosis/treatment/decision-making | Incorporated across all units and components |
| Gender inclusive language in urology | Human Development (Urology component) |
| Guillan-Barré syndrome and patient experience/equity | Neuroscience (Neurology component) |
| Impact of disclosing Parkinson's disease on patients | Neuroscience (Neurology component) |
| Inclusive language in male breast cancer | Human Development (Genetics component) |
| Multiple sclerosis (MS) and race | Neuroscience (Neurology component) |
| Perinatal depression in partners/fathers | Neuroscience (Psychiatry component) |
| Postpartum depression in queer parents | Neuroscience (Psychiatry component) |

Note: Search topics were often framed as background questions, which gave the librarian flexibility in searching and provided case authors with a variety of interesting resources.

second-year medical curriculum across a two-year period. The revised curriculum materials have now been deployed to all pre-clerkship learners, and student feedback is regularly collected as part of curriculum delivery. Additionally, the experiences of both faculty and students who engage with these materials are being explored through qualitative research methods, and there are plans underway to continue this work through formalized processes that will include the library's involvement. Thus, the relationship between the Faculty of Medicine and the health sciences library can continue for future EDIA initiatives in the medical school, due to the positive outcome of this collaboration.

## DISCUSSION

The Case Diversification Working Group within Dalhousie University's Faculty of Medicine embarked on a mission to increase the inclusivity and patient-centredness of CBL materials within its pre-clerkship medical curricula. As part of this, a health sciences librarian was invited to join the group, and while the initial purpose of this invitation was to increase access to timely literature and resource recommendations, several opportunities for reflection emerged from this experience.

Broadly speaking, the librarian's embeddedness in the working group (and observation of monthly meetings) gave a richer perspective on the goals of the project and the types of resources needed to update materials. While the health sciences library is accustomed to conducting literature searches for faculty members, these sometimes require a short reference interview to determine the exact nature of the request, the purpose for needing the literature, and to determine time requirements and the rigour of the search. Having been embedded in the working group and observing meetings, the librarian fully understood the details of the request and the overall goals of the project and was able to jump right into searching and suggesting resources. From the perspective of the working group Chair and Reviewer, active participation of a librarian within the working group led to faster retrieval of evidence to support case revisions, with little need for additional context. In addition to this, in-depth literature searching often requires multiple attempts that include variations in terminology. Due to the existing ties between the librarian and the working group, she felt comfortable asking the Chair and Reviewer to share alternate vocabulary for key concepts and knew that informal check-ins regarding search parameters and their progress would be welcome. In searching for evidence, the librarian was sometimes surprised at how challenging it was to find what was needed, even when using comprehensive techniques that involved keyword/subject heading searching, citation chaining, and a variety of resources. The search for inclusive materials on the APGAR score is a noteworthy example of this, and after reflecting on the experience she realized her surprise at how difficult some

DOI: dx.doi.org/10.5195/jmla.2025.2106

searches were was due to her privilege, which caused her to take Medicine's consideration of her needs as a white settler for granted. Reflecting on this privilege also led to a greater understanding that there is a time and a place to deliver search results where inclusivity and patient-centredness is the goal. While health sciences librarians have positively contributed to patient rounds by providing evidence on demand [26], this working group's mandate required deeper appraisal of the evidence to ensure it did not contain outdated language or ideas that perpetuate further harm. Therefore, while the librarian initially provided links to articles in real-time during online group meetings, it was consequently determined that was no longer appropriate and literature would be provided outside the working group's meetings to ensure in-depth appraisal prior to it being considered for integration into cases.

The filtering of evidence was conducted with heavy involvement from the subject matter experts on the working group, and rich conversations between case authors also took place once the librarian delivered preliminary search results. A prominent component of this stage was consideration of who the task of appraising evidence should be assigned to, since a goal for the working group was to regularly reflect on the process and ensure group members from underrepresented communities were not disproportionately tasked with educating others. Ultimately, the gathering and reviewing of evidence was seen as part of the collective group process, as the goal was to transform the medical learning culture rather than simply tick boxes without actual change [6]. During revisions, cases were read multiple times, and the work followed a very iterative process. Thus, the librarian was sometimes relied upon to perform follow-up searches on a given topic rather than simply deliver results and close the request, and by having the working group already accounted for in the librarian's portfolio, these follow-up requests were seamless and fulfilled quickly. In addition to this, the collective group process meant that some evidence used in cases was not provided through the librarian's search methods but was sourced by those working directly on case revisions. This was a natural by-product of the group's wide-ranging expertise and interest in this initiative and led to the inclusion of supplementary resources such as dermatological image collections that are openly available online [27]. Thus, it was demonstrated through this process that traditional, scholarly evidence can co-exist alongside more mainstream resources within medical education materials.

While community consultations were part of the case diversification process, it was not possible to discuss patients' lived experience across all illnesses; nor could we expect one or two people to speak for a community or population. Incorporating evidence provided by the librarian helped the case authors introduce patient voices in a meaningful way. For example, the Neurology component of the medical curriculum includes a case about a patient who develops Guillain-Barre syndrome. The librarian completed a literature search on patient experience of people living with this syndrome, which elicited qualitative research exploring lived experiences and quality of life. Content was added about how the patient was supported by the healthcare team in hospital, and her concerns about how to take time away from work, pay her mortgage, and continue with her own caregiving responsibilities were also articulated within the materials. Therefore, the inclusion of this evidence highlights the socioeconomic impacts of illness on patients, with the goal of helping learners understand the patient perspective.

Throughout this process, reflections also took place as part of collections development work at the library. In considering how library collections can impact faculty efforts to increase inclusivity in learning materials, questions to product representatives on how their resources support EDIA in Medicine became more common. Responses to these questions were sometimes surprising given that prominent medical textbooks have been critiqued for their over-representation of white male patients in images [28], open education resources have been created to offer images depicting diversity in healthcare [29], and there are well-known information products on the market that do demonstrate a commitment to change [30]. Since more progress is evidently needed in this area, libraries should continue asking vendors how their resource aligns with calls for EDIA in healthcare, so it remains at the forefront. In addition to this, the mass updating of learning materials highlighted the importance of electronic library resources to support evidence-based curricula. Medical students have indicated that eBooks have greater convenience [31], yet high cost and electronic availability of titles [32] still create barriers for libraries to purchase in this format. To address this, librarians can continue pressing vendors on offering different format choices for key titles, engage in conversations with faculty about choosing alternate textbooks, or promote the idea of including open education resources in medical school curricula.

From a relational standpoint, it is important to acknowledge that librarians may face challenges when integrating with working groups who are initially unsure of the services they can provide. While the working relationship described here was supported by existing ties between the library and the Faculty of Medicine, an openness to growth and shared learning (by all parties involved) allowed the librarian's involvement in this initiative to succeed. For librarians who wish to support EDIA efforts at their institutions (academic or clinical) but are struggling to advocate for their abilities, beginning with key stakeholders who already value the library's offerings can be a powerful way to promote their utility in new initiatives. Adding to this, finding creative ways to demonstrate the unique value of the library is a useful place to begin when looking to expand networks and

DOI: dx.doi.org/10.5195/jmla.2025.2106

reach. For example, when liaising with patrons who share interest/engagement in EDIA-related work, creating auto alerts, helping compile reading lists, and/or establishing project accounts within databases for easy access to evidence can demonstrate high value. Additionally, reaching out to medical education departments to ask for opportunities to teach on searching for EDIA-related topics, or promoting ethical data practices for researchers studying underserved communities are also ways to support EDIA efforts while building networks. These relationships are important, as this work deserves ongoing reflection and is never finished. From a curriculum development standpoint, it is important that subject-matter expertise as well as knowledge on how to find and appraise information remain available to curriculum developers across healthcare programs. Additionally, it is also imperative that mechanisms of ongoing review of learning materials be implemented, as they are an important component of making medical curricula more inclusive [6]. Librarians have much to offer their organizations who are pursuing this work, and their efforts to facilitate access to timely, patient-centered evidence can help shape clinicians into more inclusive role models for tomorrow's health workforce.

## DATA AVAILABILITY STATEMENT

There are no data associated with this article.

## AUTHOR CONTRIBUTIONS

Jackie Phinney: Conceptualization, project administration, visualization, writing-original draft, writing-review & editing; Leanne Picketts: Conceptualization, visualization, writing-original draft, writing-review & editing; Lynette Reid: Conceptualization, visualization, writing-original draft, writing-review & editing.

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*Received November 2024; accepted June 2025*



ISSN 1558-9439 (Online)

CASE REPORT
DOI: dx.doi.org/10.5195/jmla.2025.2213

# Evaluating search quality and article choice in evidence-based medicine assignments of preclinical students

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*See end of article for authors' affiliations.*

**Background:** This case report describes the integration of a capstone Evidence-Based Medicine (EBM) assignment into a first-year medical student curriculum and presents an analysis of the correlation between search strategy quality and article selection quality within that assignment.

**Case Presentation:** A whole-task EBM assignment, requiring students to address a clinical scenario by completing all EBM steps, was implemented after a curriculum-integrated EBM course. Student performance on their search strategy and article selection was assessed using a rubric (1-4 scale). Spearman's rank correlation coefficient was used to assess the relationship between these two variables. Eighty-two students completed the assignment. Fifty-nine percent received a score of 3 for their search strategy, while 77% received a score of 4 for article selection. Spearman's rank correlation coefficient was 0.19 (p-value = 0.086).

**Conclusions:** While a weak, non-statistically significant correlation was observed between search quality and article selection, the analysis revealed patterns that may inform future instructional design. Educators should consider emphasizing the importance of selecting up-to-date and high-quality evidence and addressing common search errors. Further research, incorporating direct observation and baseline assessments, is needed to draw more definitive conclusions.

**Keywords:** Evidence-Based Medicine; Curriculum; Medical Students; Assessment; Librarians

See end of article for supplemental content.

## BACKGROUND

Evidence-Based Medicine (EBM) is a critical skill to be developed in medical education training, essential for both school accreditation[1] and performance in USMLE exams[2]. In addition, medical students are required to demonstrate EBM competence prior to residency[3]. Librarians, with their expertise in question formulation, information retrieval, and critical appraisal, are well-positioned to teach EBM. Their involvement in curricula ranges from embedded librarianship in larger courses[4, 5] and leading longitudinal, embedded courses[6-9] to delivering discrete skills workshops[10-12] and offering elective courses[13].

EBM training typically includes instruction on the five steps of EBM: question formulation, evidence retrieval and selection, critical appraisal, application to the scenario, and reflection on performance in the whole EBM task. Each of these steps is necessary for ensuring that medical practice is informed by high-quality evidence [14]. While each step is individually important, researchers suggest that whole-task approaches, in which all the steps are combined in a single task, benefit learning in EBM [15].

In developing instruction and assessment of EBM skills, we sought to understand the relationship between the quality of evidence searches and the quality of the evidence ultimately retrieved, as the ability to effectively search for and select relevant articles is a critical component of EBM. This study examines potential correlations between the quality of students' searches and the quality of their article selections for a whole-task assignment within an EBM course. We hypothesize that search quality (hereafter "search") and article selection quality (hereafter "selection") for preclinical medical students are positively correlated.

DOI: dx.doi.org/10.5195/jmla.2025.2213

## CASE PRESENTATION

At NYU Grossman School of Medicine, librarians implemented a capstone assignment after a curriculum-integrated EBM course for preclinical, first-year medical students. Although medical students may have previous experience with research, the EBM course introduces new skills such as how to frame a clinical question, develop effective search strategies, and search biomedical databases efficiently. During the course, they are given instructions and opportunities to conduct searches in different databases.

### Curriculum and Setting

The pre-clinical EBM curriculum at NYU Grossman School of Medicine consists of five required sessions, part of a year-long multidisciplinary course, Foundational Clinical Skills. The sessions are taught about once a month in the second half of the first-year curriculum. In designing the course, we employed different pedagogical strategies proven to help in knowledge retention, including a distributed practice of learning rather than stand-alone courses[16], a whole-task EBM capstone assignment in which students practice all five steps of EBM (Ask, Acquire, Appraise, Apply, Assess) using several clinical scenarios [15], and small-group learning activities.

The first module introduces students to EBM, the second delves into finding evidence, and the remaining modules are devoted to critical appraisal. The three critical appraisal classes are dedicated to the appraisal of cohort studies, randomized controlled trials, and systematic reviews and meta-analyses, all taught in a small group, flipped classroom setting. Before and after this curriculum, students complete a pre- and post-test. After the last critical appraisal class, students complete the whole-task assignment, part of which is the focus of this research. This assignment was embedded in a learning management system, where students submitted their answers and received individual feedback on their performance.

The course lead is a medical librarian and the content director for EBM in the preclinical undergraduate medical education curriculum, having designed and taught these classes for five years. All other facilitators are medical librarians with experience in teaching EBM to a variety of audiences.

### Assignment

As a whole-task activity, this assignment was built so that learners would have the opportunity to practice the constituent components of EBM in an integrated manner. This assignment was mandatory and was set up in the learning management system Brightspace[17] as a quiz. Although students received a grade, this was a formative assessment and did not count towards their final Foundational Clinical Skills course grade. Learners had about ten days to complete both this assignment and the post-test. After completion, students were given narrative individual feedback.

Since this is taught in the preclinical curriculum, learners practice with clinical scenarios instead of real patients. Based on the scenario provided below, they were free to formulate their own questions and select any article they believed to be appropriate to answer their question. The goal was to select the best evidence to answer the question.

*Your patient is 17 years old and recently has been struggling with suicidal ideation. They are a recreational marijuana user with no history of mental health disorders. You are wondering whether marijuana use might be associated with suicidal thoughts and behavior.*

*Follow the five steps of EBM to examine the best and most current evidence regarding this concern.*

This scenario was used for two reasons. First, the EBM classes in the NYU Grossman School of Medicine curriculum are integrated with the organ systems content. In this case, the assignment aligned with the Brain and Behavior content. Second, the specific topic was based on the number of relevant PubMed articles that address the relationship between suicidal ideation and marijuana use in adolescents. To ensure an efficient evaluation process, we chose a topic that would yield a smaller number of articles when following best practices in database searching. This would prevent assessors from having to review an overwhelming amount of literature, which would significantly delay the feedback response time. During the four years we used this scenario, cohorts of just over 100 students selected only 10 to 15 unique articles. These few articles on the topic have remained relatively consistent from year to year.

To investigate the proposed research question, we focused on analyzing two questions from the assignment:

1. List your final search strategy (keywords AND filters used, if any).
2. Select one article to answer your question.

With these questions, we sought to assess whether there was a correlation between search strategy and the quality of the articles selected.

### Population

The population comprised 105 first-year medical students. From this total, 82 students completed this assignment in spring 2023 and agreed to have their data used for quality improvement reports, such as this one. The data analyzed includes only de-identified datasets from consenting students.

DOI: dx.doi.org/10.5195/jmla.2025.2213

### Answer Scoring

To help reduce bias and improve consistency, we developed a rubric (appendix 1) specifically for this study. This rubric was developed after scoring these assignments for a few years for previous cohorts and applied to the questions described above, and it was revised by the three authors. Additionally, we decided to assess the answers for search and selection separately. By evaluating the two questions independently, we aimed to prevent potential bias from students' responses in the searching questions influencing the assessment of the selection answers.

Only one rater (JM) scored the assignment. Each of the two questions analyzed received a score from 1 (does not meet expectations) to 4 (exceeds expectations). Note that this rubric was developed for this specific scenario and should not be used for other scenarios without adaptations. As mentioned, the literature regarding the relationship between marijuana use and suicidal ideation in adolescents is sparse. In addition, because of the nature of this topic, certain study designs are not feasible. Hence, the available systematic reviews and meta-analyses would constitute stronger evidence than one observational study alone — we want to underscore that this is not the case for all clinical questions.

### Statistical analysis

Because the data consists of ordinal data, we used Spearman's rank correlation coefficient to test whether there was a relationship between the two datasets. The test's goal is to assess whether the change in the magnitude of one variable is associated with a change in another's, either in the same (positive correlation) or the opposite (negative correlation) direction[18].

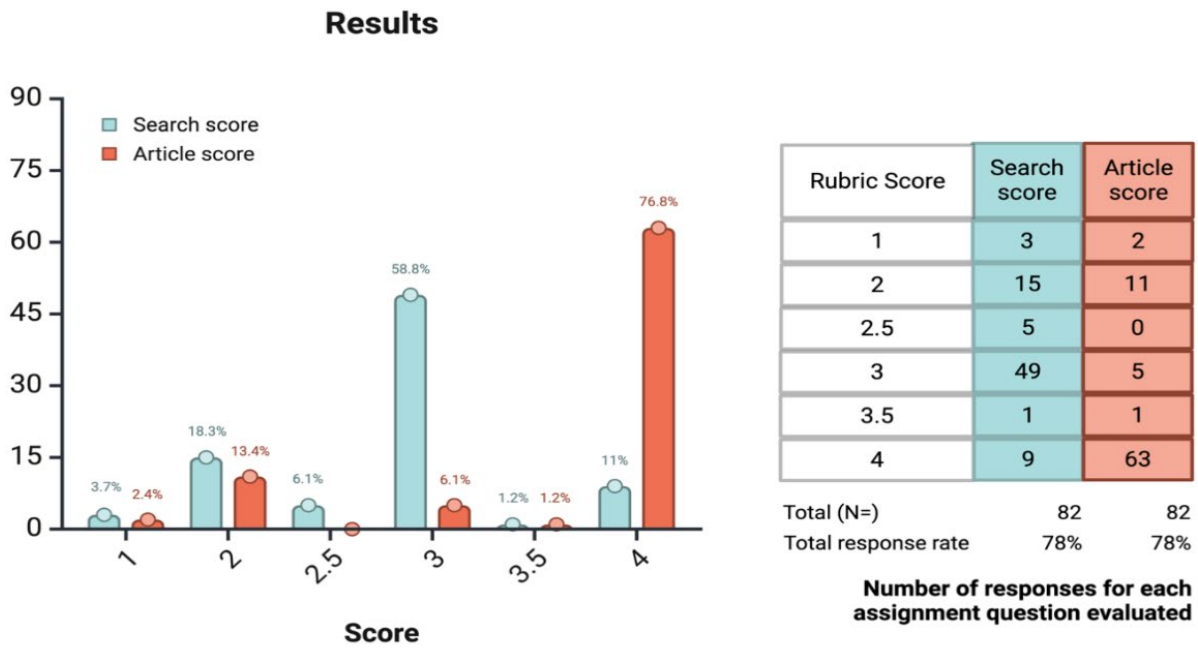
### Results

Eighty-two students completed this assignment. The possible scores for searching were posed as a scale ranging from one (does not meet expectations) to four (exceed expectations). As the rubric shows (appendix 1), there was the possibility of a 0.5 points deduction for pre-established events. Most learners (about 59%) received a score of three, while only 11% received the maximum score of four (figure 1).

The same grading scale (1-4, with possible deductions) was applied to the evidence selection rubric. For this question, most learners (about 77%) received the maximum score of four, exceeding expectations. These students selected a recent systematic review related to the scenario.

Table 1 lists the articles chosen by these students and the number of times that title was selected: 82 students chose 16 different articles. Thirty-two students (39%) selected the two most current systematic reviews on this topic at the time. Interestingly, learners also selected book chapters, cross-sectional studies, and older articles, although less frequently — these types of articles do not correspond to the best, most current evidence.

**Figure 1** Distribution of Scores for Search Quality and Article Selection (unmatched). Created with BioRender.com.




| Rubric Score | Search score | Article score |
|---|---|---|
| 1 | 3 | 2 |
| 2 | 15 | 11 |
| 2.5 | 5 | 0 |
| 3 | 49 | 5 |
| 3.5 | 1 | 1 |
| 4 | 9 | 63 |
| Total (N=) | 82 | 82 |
| Total response rate | 78% | 78% |

**Number of responses for each assignment question evaluated**

DOI: dx.doi.org/10.5195/jmla.2025.2213

**Table 1**

Types and Frequency of Articles Selected by Students.

| First Author | Title of Article | Type of Article | Year of Publication | Number of Times Selected |
|---|---|---|---|---|
| Gobbi G [19] | Association of cannabis use in adolescence and risk of depression, anxiety, and suicidality in young adulthood: A systematic review and meta-analysis | Systematic Review and Meta-Analysis | 2019 | 28 |
| Fresán A [20] | Cannabis smoking increases the risk of suicide ideation and suicide attempt in young individuals of 11-21 years: A systematic review and meta-analysis | Systematic Review and Meta-Analysis | 2022 | 6 |
| Flores MW [21] | US trends in the association of suicide ideation/behaviors with marijuana use among adolescents ages 12-17 and differences by gender and race/ethnicity | Cross-sectional study | 2023 | 3 |
| Kahn GD [22] | Marijuana use is associated with suicidal ideation and behavior among us adolescents at rates similar to tobacco and alcohol | Cross-sectional study | 2022 | 2 |
| Zhang X [23] | Suicidal ideation and substance use among adolescents and young adults: a bidirectional relation? | Cohort Study | 2014 | 2 |
| Lydiard JB [24] | Prospective associations between cannabis use and depressive symptoms across adolescence and early adulthood | Cohort Study | 2023 | 1 |
| Athanassiou M [25] | The clouded debate: A systematic review of comparative longitudinal studies examining the impact of recreational cannabis legalization on key public health outcomes | Systematic Review | 2023 | 1 |
| Carvalho JV [26] | Association between cannabis use and suicidal behavior: A systematic review of cohort studies | Systematic Review | 2022 | 1 |
| Basith SA [27] | Substance Use Disorders (SUD) and suicidal behaviors in adolescents: Insights from cross-sectional inpatient study | Cross-Sectional Study | 2021 | 1 |
| Bolanis D [28] | Cannabis use, depression and suicidal ideation in adolescence: Direction of associations in a population based cohort | Cohort Study | 2020 | 1 |
| Sellers CM [29] | Substance use and suicidal ideation among child welfare involved adolescents: A longitudinal examination | Cross-sectional Study | 2019 | 1 |
| Bahorik AL [30] | Medical and non-medical marijuana use in depression: Longitudinal associations with suicidal ideation, everyday functioning, and psychiatry service utilization | Randomized Controlled Trial (secondary data) | 2018 | 1 |
| Gilder DA [31] | Depression symptoms associated with cannabis dependence in an adolescent American Indian community sample | Cross-Sectional Study | 2012 | 1 |
| Prescrire Int [32] | Adverse effects of cannabis | Review | 2011 | 1 |
| Pedersen W [33] | Does cannabis use lead to depression and suicidal behaviours? A population-based longitudinal study | Cohort Study | 2008 | 1 |
| Resnick MD [34] | Protecting adolescents from harm: Findings from the national longitudinal study on adolescent health | Cross-sectional Study | 1997 | 1 |

To better visualize the scores, we created a contingency table (Table 2). The data shows that 40 students who scored 3 in their search received a score of 4 for their article selection. In addition, 11 students with a search score of 2 achieved the highest score for the article selection. Three students with the lowest search score failed to select an appropriate article to answer their question, receiving scores of 1 or 2 for their article.

We used three symbols to denote three different scoring patterns: high search scores (≥ 3) with an equal or higher selection score (denoted as *, green), lower searching scores (≤ 2.5), with equal or higher selection scores

DOI: dx.doi.org/10.5195/jmla.2025.2213

**Table 2**

Contingency Table of Search Quality and Article Selection Scores. ⊙ blue: lower search scores and equal or higher selection scores; * green: higher search scores and equal or higher selection scores; - magenta: search scores higher than selection scores.

| | Article Selection 1 | Article Selection 2 | Article Selection 3 | Article Selection 3.5 | Article Selection 4 |
|---|---|---|---|---|---|
| Search 1 | ⊙ 1 | ⊙ 2 | | | |
| Search 2 | | ⊙ 2 | ⊙ 1 | | ⊙ 11 |
| Search 2.5 | | - 1 | | ⊙ 1 | ⊙ 4 |
| Search 3 | | - 6 | * 3 | | * 40 |
| Search 3.5 | - 1 | | | | |
| Search 4 | | | - 1 | | * 8 |

(denoted as ⊙, blue) and search scores higher than selection scores (denoted as -, pink). Fifty-one students (62%) who scored 3 or more in their search had an equal or higher score in their article selection (*). For students with lower search scores, there was also a trend where their article selection scores were equal or higher than their searches (⊙). Only nine students (11%) had a search score higher than their selection score (-).

The table shows that 62% of high scoring students (green * cells) scored equal or higher in article selection compared to searching, while 26% (blue ⊙ cells) of low scoring students had an equal or higher score in article selection. Among students who scored 3 or higher in their search, 86% (51 students) also scored 3 or higher on article selection. Conversely, 69% (16 students) who scored 2.5 or lower in searching achieved 2.5 or higher in article selection, with an absolute difference of 17%. To assess the relationship between these variables, we calculated the Spearman's correlation coefficient. The result (r=0.19, p-value = 0.086) indicates a weak, positive correlation that is not statistically significant.

## DISCUSSION

This study attempted to determine whether there was a correlation between the quality of searches and the quality of article selection for a whole-task EBM assignment for preclinical medical students. We hypothesized that there would be a trend where higher scores in searches would lead to higher scores in selection. After analysis, the data showed that there was a weak, positive correlation between these two questions, but the findings were not statistically significant (p-value = 0.086).

The contingency table, however, provides some insight into the relationship between search quality and article selection based on this assignment. The fact that a portion of students with lower search scores (≤2.5) still managed to select appropriate articles suggests that students may be compensating for poor search skills through browsing, searching in other databases, or using other strategies. In addition, many students had article selection scores equal to or higher than their search scores. This could indicate that students are better at selecting appropriate articles than they are at searching. It is also possible that the assignment design facilitated good selection even with suboptimal searches, as we selected a topic with narrow available evidence on purpose.

Several practical implications arise from this study. First, instructors should explicitly address the issue of students selecting older articles, book chapters, or cross-sectional studies when more current and less prone to bias evidence is available. Instructors should consider providing specific instruction on how to identify the most up-to-date and high-quality evidence, which should be reinforced throughout the curriculum if possible. This is a change we implemented in our curriculum following this assessment. Second, even though the correlation between search quality and article selection was not statistically significant, the data suggests that search skills may influence article selection. Therefore, instructors should continue to emphasize and reinforce searching skills: this should help both in student learning and in providing more robust data for future studies. Third, educators should be mindful of the scope of the topic chosen for EBM assignments, as this can impact the results. A broader topic with more diverse evidence could provide a more realistic and challenging learning experience. Based on this reflection, we plan to change the assignment topic in future cohorts. Fourth, we encourage educators to systematically assess students' searching patterns. We observed certain behaviors that could impact the database results negatively (e.g., use of quotation marks for all keywords in PubMed, disabling Automatic Term Mapping, improper use of Boolean operators, lack of appropriate synonyms, etc.), which are now addressed in

DOI: dx.doi.org/10.5195/jmla.2025.2213

advance. Lastly, we note that both this capstone assignment and the post-test were released and due on the same day through the Learning Management System, causing some confusion among students who thought that there was only one activity to complete. As a result, several students were missing either the assignment or the post-test. Therefore, we recommend that separate tasks should have different release and due dates to avoid confusion.

This study has several strengths. First, it addresses a gap in the literature by focusing on the relationship between search quality and article selection. Researchers have noted that the focus on critical appraisal rather than the other EBM steps is a shortcoming of this literature[14] and this study adds evidence to the assessment of earlier steps. Second, the use of a whole-task assignment, where students were free to formulate their own questions and searches, adds to the validity of the study. Third, a rubric was used to assess search quality and article selection, helping reduce bias and improve consistency. Finally, the study is based on a real-world EBM assignment, part of a medical school curriculum, and highlights that continuous assessment and reflection improves curriculum, as discussed in the paragraph above.

This study also has several limitations that should be considered. We assessed only one cohort of students from a single institution, which may limit the generalizability of our findings. Furthermore, the assignment did not include direct observation, making it challenging to understand the context, idea generation, browsing patterns, and search formulation and reformulation tactics that students might have employed. An additional limitation is that the rubric was not formally validated and was designed based on the topic chosen. This narrow topic may have influenced the range of articles available for student selection. Finally, there could be potential confounding variables that might have influenced the results, such as prior knowledge or experience with database searching, which were not measured as a baseline.

Future research should incorporate direct observation of the search and selection process in order to better capture student performance. Although challenging, conducting longitudinal studies that follow students throughout their medical education could help provide insights into how their search and selection skills develop over time. Such studies could assess the long-term impact of EBM training on students' abilities and identify key points in the curriculum where reinforcement or additional instruction is most needed. Another helpful assessment would be to evaluate students' prior knowledge and experience with database searching before starting EBM classes. With this type of data, researchers could also investigate whether certain groups of students benefit more from specific types of training. Another possible future direction is analyzing the performance of students with high search scores but low selection scores, and vice versa. This could elucidate factors that could contribute to efficient or inefficient evidence selection in the EBM process. Finally, with the increasing use of AI in literature searches, future studies could examine how the use of AI tools can impact students' search and article selection compared to traditional methods.

## ACKNOWLEDGMENTS

This research was developed through the training and support provided by the MLA Research Training Institute (RTI).

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available in Zenodo at https://doi.org/10.5281/zenodo.15683435.

## AUTHOR CONTRIBUTIONS STATEMENT

Juliana Magro: Conceptualization; data curation; formal analysis; investigation; methodology; visualization; writing—original draft. Caitlin Plovnick: Conceptualization; writing—review and editing. Joey Nicholson: Conceptualization; writing—review and editing.

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## SUPPLEMENTAL FILES

**Appendix A**

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*Received April 2025; accepted June 2025*



ISSN 1558-9439 (Online)

CASE REPORT
DOI: dx.doi.org/10.5195/jmla.2025.2092

# Accessibility audit of the Midwest Chapter of the Medical Library Association

JJ Pionke; Carol Shannon; Matthew Regan; Gerald Natal; Jessica D. Gilbert Redman; Jessica Decaro; Anna Biszaha; Julia Carol Stumpff; Jennifer Feldman; Sara Westall

*ee end of article for authors' affiliations.*

**Background:** In 2023, JJ Pionke became President of the Midwest Chapter of the Medical Library Association (MWCMLA). He determined that for his presidential year, he would form a task force to determine the accessibility levels of the chapter and remediate accessibility issues as appropriate.

**Case Presentation:** To accomplish the accessibility audit of the MWCMLA, Pionke formed an Accessibility Task Force that was time limited to one year. Task force meetings were held once a month to keep people accountable and to share out progress and requests for assistance. The task force was broken up into four teams: annual meeting, policy, social media, and website. Task force members could be on more than one team. The goals of each team were generally the same: what are other organizations doing, what do we have already if anything, and develop best practices/policy/etc. as needed.

**Conclusions:** The teams fulfilled their mandate by creating best practices/guidelines/policies documents. Some accessibility remediation was needed for the chapter website. The task force's findings and materials were shared out among the MWCMLA as well as passed on to the presidents of the other chapters, many of whom had expressed interest in the results.

**Keywords:** Disability; accessibility; Midwest Chapter of the Medical Library Association; presidential project; task force; project management; policy

## BACKGROUND

While librarianship has long been interested in accessibility for people with disabilities, even before the Americans with Disabilities Act (ADA) was signed into law in 1990, the profession has recently taken a much keener interest in improving accessibility of our spaces and services for both patrons and employees. Libraries have leaned heavily on ADA for accessibility of physical spaces. There are several pieces of legislation, in addition to ADA, that cover digital accessibility including but not limited to Section 508 of the Rehabilitation Act of 1973. Likewise the Web Content Accessibility Guidelines (WCAG) is the major website accessibility guidelines followed worldwide. As interest in accessibility has grown within the profession, keeping in mind that accessibility is beyond ADA compliance, there has been growing concern over how accessible library organizations are both internally in terms of documents like meeting minutes, and externally such as organization websites and conferences. This case study focuses on an accessibility audit that was conducted by the Midwest Chapter of the Medical Library Association (MWCMLA) of its policies regarding accessibility in various domains such as the annual meeting, social media, and general accessibility policy as well as the accessibility of the MWCMLA's website.

## CASE PRESENTATION

In 2023, JJ Pionke began his term as President of the MWCMLA. He determined that for his presidential year he wanted to create a one year time limited task force to conduct an accessibility audit of the organization. Pionke's research expertise is in disability and accessibility for both library patrons and employees so leading the accessibility audit was a natural fit for him. He sent out a recruitment email to the MWCMLA email listserv. The entire group of people interested in doing the work met and then broke up into teams to address the four separate areas of need: annual meeting, policy, social media, and website. Members of the task force could be on any team they wished and could be on more than one team. Pionke largely acted as the project manager for the entire project by scheduling and running monthly meetings, acting as an expert consultant, and kept the entire task force time and project aware. The teams met individually on their own schedules and typically sent at least one representative to a monthly task force meeting for checking in, getting advice and assistance, brainstorming, etc. At the end of the

DOI: dx.doi.org/10.5195/jmla.2025.2092

year-long task force, the team brought together their individual outputs such as social media best practices as well as task force outputs like an executive summary that was distributed to the entire MWCMLA and also disseminated to the other Chapter Presidents. Each team had slightly different scopes depending on what their broader accessibility focus was. Below is a breakdown of what each team focused on and the outputs that they created.

### Annual Meeting Team

The annual meeting team (Carol Shannon, Gerald Natal, and Ximena Chrisagis) began by surveying the websites of a variety of library organizations. While there were many resources listed, only one set of older guidelines from 2016 was discovered. The team next turned their focus to university websites, specifically those of the University Library and the Office of Diversity, Equity, and Inclusion, both at the University of Michigan, and the Accessible Meeting and Event Checklist of Cornell University. All three sites were comprehensive, clear, and included information on in-person and virtual meetings, including information for the conference (before and during the meeting) and for presenters and participants.

The team created two documents, one for in-person and one for virtual conferences, to make it easier for the conference planners to see what it was they needed to do for accessibility. The documents also contain links to useful resources for conference planners and participants. Some guidelines will need to be reconsidered, as the 2025 conference for the MWCMLA will be in a hybrid format (virtual but with the possibility of an institution hosting a "watch party" to recreate some of the activities that we miss from in-person conferences like catered receptions for networking).

All sections of the documents have been assigned to specific conference planning subcommittees, so that everyone involved should understand which subcommittee is responsible for which part of planning. The MWCMLA Mixers, a quarterly "lunch and learn" webinar, hosted an informal discussion on accessibility and the conference for members to learn more about the new accessibility policies.

### Policy Team

The policy team (Julia Stumpff, Sara Westall, and Jennifer Feldman) evaluated all MWCMLA websites looking for accessibility policies. They then reached out to all chapters to see if they had any accessibility policies not found on chapter websites. No chapter had an accessibility policy.

The committee then conducted a literature search on accessibility policies and drafted a chapter policy based on findings from the literature search [1-5]. The draft policy was presented to the accessibility task force for feedback and edits. Next, it was taken to the MWCMLA Board for suggestions and edits.

Once approved, the accessibility policy was posted on the chapter website and will be reviewed annually by the Communication and IDEA committees.

### Social Media Team

The social media team (JJ Pionke, Jessica D. Gilbert Redman, and Jessica DeCaro) completed an exploratory evaluation of social media policies in other organizations. Given the wide range of social media options available today and the ever-changing social media landscape, the group decided to create a best practices guide, providing details on specifics to make social media posts as accessible as possible for a wide variety of platforms (e.g., using alt text for images wherever the platform allows). In addition to the generalized advice, the team also included links to specific accessibility pages to common social media platforms, both those that the MWCMLA currently uses and ones that may be useful in the future.

Given the unpredictable nature of social media changes, it is expected that this resource will be a living document and updated regularly to include appropriate information from current social media platforms and processes.

### Website Team

The website team (Matt Regan, Anna Biszaha, and Jessica D. Gilbert Redman) completed a digital accessibility audit of all public-facing pages of the MWCMLA website with the goal of bringing the site into compliance with WCAG 2.2 AA standards. To complete this audit, the team used the WebAIM WAVE Web Accessibility Evaluation Tool and then logged any accessibility issues in a tracking spreadsheet. Over 125 issues were reported by WebAIM's WAVE, including errors, alerts, structural elements, and webpage features. Each reported issue was evaluated, a determination was made whether a change was truly needed, and solutions were researched. Access to edit the website was granted to each team member so that when a solution was identified and could be implemented, the team was able to immediately fix errors.

Many errors were determined to be caused by how Wild Apricot, which is the CMS used to publish the website, formats content. First, it was discovered that the native header construction and navigation menu caused many accessibility issues that repeated on every page of the website. Due to this, a new page template was created using custom HTML and CSS that could be applied to every web page. This new template included a modified login button, site search form, and adjustments to the image used for the logo. Second, Wild Apricot uses "gadgets" to organize and format content on the website, but uses tables to do so, which was flagged as an accessibility issue. It became necessary to delete gadgets where possible and reorganize content using custom

DOI: dx.doi.org/10.5195/jmla.2025.2092

HTML. Lastly, Wild Apricot organizes pages into the navigation menu as they are created through page settings. That navigation menu automatically generates title attributes for each link which matches the name of the webpage, which was flagged as an accessibility issue. There are no methods in the system to remove those attributes, so it was necessary to contact the Wild Apricot development team, which led to the creation of a JavaScript string that corrected this issue site-wide. Other site-wide accessibility issues, including contrast errors for navigation links, were corrected using the CSS customization options.

Many additional errors were fixed on a page-by-page basis. Because much of the content in the site was imported as raw HTML from the previous version, there were prolific heading structure issues to correct. Broken links were identified and corrected or removed, and link text was streamlined to improve consistency in navigation. During this process, content was updated, duplicate information consolidated, and consistent formatting applied to related pages to improve usability.

There are still a number of accessibility issues that have not, or can not, be resolved during the scope of this project. The most widespread issue is the presence of PDFs and Word documents linked throughout the website. It was determined that evaluating these documents for accessibility was outside the scope of the website team, and the large number made it impractical for the web accessibility task force to correct at this time. The team recommends that future committee chairs receive training to create accessible PDFs for any future documents to be uploaded to the website. One of the more impactful issues is that the top menu cannot be fully utilized through keyboard navigation, which will be a definite barrier to anyone accessing the site through a screen reader. This issue cannot be addressed without the intervention of the Wild Apricot development team, as the navigation menu is automatically generated by the software. There are also a few form label issues, such as the login form, which are automatically generated and unable to be edited.

Overall, the accessibility team feels it has greatly improved the accessibility and usability of the website, within the limitations of the website software. However, it has become apparent that future efforts to improve accessibility should include advocating for Wild Apricot to address the inherent accessibility issues of their software, or to consider other alternatives. This process has led to a consensus among team members that a permanent website team may be warranted and that periodic reviews of the site will be necessary to maintain compliance.

**Actionable Ideas**

- Scope: Be very clear and specific about what the scope of the project is. Is the team doing an assessment only or are they empowered to create policy/best practices documents/fix digital objects, etc.
- Project Management: Be robust with project management and time management skills. For example, be clear on how long the committee/task force/working group is going to be together. Set regular deadlines and standing meetings for checking in. Have a project manager who schedules and runs all of the meetings to keep everyone on track, on task, and on target.
- Many Hands Make Light Work: Recruit a sufficiently sized group and then break the group up into teams based on where their interests are. Have at least one person from each team be a representative to monthly check-in meetings.
- Create Tangible Outputs Both Internally and Externally to the Organization: In the case of this project, each team produced an output whether it was a policy document or a best practices list or making the website more accessible. However, working within academia means that certain outputs are more favored than others for tenure and/or promotion. To that end, there were additional outputs that could be directly pointed to in curriculum vitaes/annual reports/promotion and/or tenure papers. These outputs were an executive summary for dissemination to the MWCMLA and to the Presidents of other Chapters, a poster suitable for conferences that anyone on the task force could use, and a case report article for an academic journal of the entire project.

## CONCLUSION

The accessibility audit of the MWCMLA was successful in large part because there was a team of people that self-selected into the project due to their interest in either learning accessibility skills or applying those skills or both. The four teams each had a scope and support throughout the year-long process as well as a scaffolded structure which included deadlines and regular meetings. The audit drew a lot of interest from both within the MWCMLA and other Chapters because accessibility is a topic that is becoming more discussed within librarianship and there is a need within the profession to be more accessible. A clear scope, strong project and time management, and a group of willing professionals who wanted to learn more and contribute to bettering the organization, is what made the accessibility audit of the MWCMLA a success.

DOI: dx.doi.org/10.5195/jmla.2025.2092

## AUTHOR CONTRIBUTIONS

All authors took part in the investigation and writing with JJ Pionke also doing project administration, writing, reviewing, and editing.

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*Received October 2024; accepted June 2025*



ISSN 1558-9439 (Online)

COMMENTARY
DOI: dx.doi.org/10.5195/jmla.2025.2159

# Inclusive survey design: MCMLA's lessons learned from an inclusivity and climate assessment

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In Fall 2019, the Midcontinental Chapter of the Medical Library Association (MCMLA) welcomed a new incoming chair who outlined four priorities for their tenure including "adopting Diversity & Inclusion (D&I) values, policies, and practices in every aspect of the organization" [1]. These priorities led to the MCMLA Executive Committee approving the creation of the Diversity and Inclusion (D&I) Task Force. The task force created a survey to capture the makeup of the current MCMLA membership, as well as to assess the diversity climate of the organization.

The MCMLA D&I Task Force consulted professional resources and modified an existing survey from the Mid-Atlantic Chapter of the Medical Library Association (MAC-MLA) to develop their assessment tool. The updated survey was designed to examine several issues related to climate, such as perceptions of the diversity of MCMLA membership and leadership, participants' experiences of discrimination at MCMLA conferences, and individuals' desire to learn more about advocacy. The task force planned to use the survey results to better understand and address climate issues specific to diversity and inclusion within MCMLA. The survey was distributed to membership first in 2020 as a short survey, then in 2021as a improved, longer survey whose results were presented at our 2021 MCMLA Conference Meeting. This commentary will detail how the task force carefully designed the survey questions to incorporate timely and sensitive approaches to assessing demographics and resource needs related to diversity and inclusion.

## LEARNING ABOUT CHAPTER DIVERSITY

The need to diversify the library workforce has led numerous libraries, including public, academic, and special libraries as well as library associations to adopt diversity initiatives and policies to create more inclusive library environments. The Mid-Atlantic Chapter (MAC) was the pioneer chapter of MLA in bringing diversity to the list of their priorities [2]. Two years before MLA started their diversity initiative, MAC of the MLA was looking into ways to promote diversity within MAC membership and decided to develop and distribute first a short survey, then followed by a longer and more comprehensive survey, to get an accurate picture of the diversity of MAC as well as gather ideas to assist with programming and recruitment [2]. In 2019, the Midcontinental Chapter of the Medical Library Association (MCMLA) D&I task force spearheaded another initiative. Brenda Linares, the previous MAC Diversity Task Group Chair, started in a new position in a state within the MCMLA region and brought her experience and ideas which were then able to be used for the MCMLA Diversity Survey. The task force administered an online survey to determine the demographic makeup of the association as well as to seek members' opinions on MCMLA's efforts to address and educate on topics of diversity, equity and inclusion [3]. Where many of the original questions from the MAC Diversity Survey were included, the committee made deliberate decisions to eliminate specific questions. The committee sent out a shorter initial survey and did not have much response. The task force met later and decided re-evaluate the survey, developing a more comprehensive and inclusive survey, as well as deciding to provide incentives for participation to increase participation.

Being able to have someone who had been involved with MAC-MLA and could share her experience with the process of developing a survey, as well as the final questions sent to their membership, was helpful. The MCMLA D&I Task Force was able to save time by not having to develop a survey from scratch. As the task force reviewed the existing survey, the new MCMLA chair Shandra Knight would often ask the "so what" question, encouraging the task force to consider what would be done with the information if collected, leading to pre-existing questions being eliminated and the order of the questions being changed for flow. One of the items the task force worked to keep at the forefront was to ask questions about how members felt as part of MCMLA, as we do not have control over other environments, such as work or home-life.

Questions were reordered on the survey based on the level of importance determined by the task force. We decided to ask the climate questions first and then the demographic questions, so we had people's responses

DOI: dx.doi.org/10.5195/jmla.2025.2159

about MCMLA and did not communicate the feeling that we just cared about their demographics. The task force wanted participants to feel included and that their opinions about MCMLA and diversity were important. The original MAC survey asked if participants were treated with respect by other members of MAC, as well as if they were being treated equitably. MCMLA chose to ask questions about how respondents were treated and if they felt they were treated equally regardless of the various identities in our chapter. We collected this data using multiple-choice questions and a Likert scale (a Likert scale assumes that the strength/intensity of an attitude is linear, i.e., on a continuum from strongly agree to strongly disagree) to evaluate participants' perceptions of how MCMLA and its members treat individuals based on various identities." We concluded the survey by asking what MCMLA could do to improve diversity and inclusion within the chapter.

### Inclusive Language Around Sexual Orientation and Gender Identity

Since the questions' initial development by MAC, there have been expansions in inclusivity language as we are always learning more about the spectrum of diversity, equity, and inclusion, with most of the evolving discussions centering on the Sexual Orientation and Gender Identity (SOGI), race/ethnicity, and disability questions. The MCMLA task force discussed the purpose of including gender in a survey. The task force believed in the "so-what" purpose of this question rested in the foundation of affirmative action initiatives. For instance, men still earn more than women in the library administrative sector. ALA statistics tell us "though most library directors are women, the percentage of directors who are men exceeds the percentage of librarians who are men. Also, men's salaries tend to be higher than women's, even for the same position" [4].

Another goal for the MCMLA D&I Task Force was to better serve LGBTQIA+ members, ensuring they feel welcomed and accepted. Wanting to avoid outdated, inaccurate, or harmful terms—and recognizing that LGBTQ+, LGBTQIA, and LGBT+ are more inclusive than the now-outdated "LGBT"—the MCMLA D&I Committee carefully reviewed the research to choose terminology that reflects current, respectful, and inclusive language. The research defined sexual orientation as who you are attracted to and want to have relationships with, and who you feel romantically, sexually, and emotionally attracted to [5]. It has typically included the labels such as: gay, lesbian, straight, and bisexual, which is different from gender identity. Gender identity–defined as one's internal sense of being a man, woman, both, neither of these, or something else–is a powerful determinant of one's lived experience [6]. Gender identity can be consistent with or different from the sex that someone was assigned at birth. Sex assigned at birth is typically based on external genitalia, and is recorded as female, intersex, or male. Transgender is an umbrella term for people whose gender identity differs from the sex assigned to them at birth, while cisgender is a term for people whose gender identity

**Table 1**

Considerations and choices made to strive for inclusive language in the D&I survey

| Key Consideration | Action Taken | Reasoning |
|---|---|---|
| Inclusive Terminology | Used LGBTQ+, LGBTQIA, LGBT+ instead of LGBT | LGBT is considered outdated |
| Survey Response Options | Reduced from 10 to 6 | Removed pansexual, queer, and questioning/not sure |
| Additional Options | Added "Prefer not to say" and "Prefer to self-describe" | To respect respondent preferences |
| Terminology Sensitivity | Defined all terms used in the survey | To recognize ambiguity and generational differences |
| Heterosexual Label Update | Changed to "Heterosexual/Straight" | To modernize language |
| Gay and Lesbian Categories | Combined into one | To simplify and be more inclusive |
| Avoiding Negative Connotations | Did not use "homosexual" | To recognize its negative connotation |
| Use of "Queer" | Removed from options but acknowledged its complexity | Empowering to some, pejorative to others |

DOI: dx.doi.org/10.5195/jmla.2025.2159

aligns with their sex assigned at birth. "Nonbinary" is an umbrella term for gender identities that are not exclusively man or woman; rather, they could be a blend of both or neither. Other words that people use for nonbinary identities include agender, bigender, gender-expansive, or genderqueer. Table 1 outlines the considerations and actions taken by the D&T Task Force members to create a survey with inclusive and current terminology.

### Inclusive Language Around Race and Ethnicity

The next intentional "so what" category the task force sought to capture demographic information about the MCMLA population was race/ethnicity. Like individuals who belong to a sexual minority group, those in a racial minority face disparities such as health, employment, and environmental. Like terms used for SOGI, terms used to refer to racial and ethnic groups continue to change and evolve over time. To have a responsive survey, it is important to use the racial/ethnic categories that the participants use themselves whenever possible, allowing for personal preference or an updated preferred designation as some designations are considered outdated. Race refers to the physical differences seen in groups or cultures that are considered socially significant, where ethnicity refers to the shared cultural characteristics such as language, beliefs, and practices. The U.S. Census Bureau considers race and ethnicity two separate things. The Census Bureau allows individuals to report themselves as: White; Black or African American; Asian; American Indian and Alaska Native; Native Hawaiian and other Pacific Island; or some other race. Respondents can report multiple races. Ethnicity on the other hand refers to a group of people that share a common descent, history, and/or homeland [7]. And because Hispanic/Latinos may be of any race(s), the U.S. Census groups Latinos or Hispanics further breaks down the ethnic group "Hispanic/Latino" into races as well. Race is considered a social construct that it is not consistently acknowledged across cultures. In an effort to be more culturally inclusive, MCMLA chose to include three categories in the survey-ethnic background, nationality, and race [8].

### Inclusive Language Around Disability Status

The task force was once again faced with the issue of why they were collecting data when they looked at asking MCMLA members if they had a disability. The original MAC survey asked participants if they had no disability, prefer not to answer, limited cognitive or physical condition or other. Worldwide, about 15% of the world population and about 12.6% of the US population have a disability [9]. The American Community Survey defines disability as having hearing difficulty, cognitive difficulty, ambulatory difficulty, self-care difficulty, or independent living difficulty [10]. Our professional ethics, as expressed by the American Library Association, also make it clear that meeting the needs of disabled patrons and workers should be made a priority [11]. The task force concluded that asking members to disclose if they had a disability (as was done in the MAC survey) was not inclusive of the disabilities that have been increasingly recognized as disabilities in recent times. For example, "depression, a mood disorder that is marked by varying degrees of sadness," would not fall under the two main disabilities listed on the survey question as is [12]. The task force determined their "so what" for asking about disabilities was to better understand the MCMLA membership conference spaces' accessibility needs, specifically mobility for in-person conferences and audiovisual needs for both in-person and virtual. A suggestion was made for the task force to change the wording from asking an individual that self identifies with a disability how it impacts their daily lives to instead providing a blank box for folks to fill in with their needs. Therefore, the task force decided to reformat the disability question in the following way: Do you have a disability that impacts your interactions with MCMLA? If yes, tell us how you experience the impact and tell us what we can do to improve accessibility.

The open-ended responses in our survey provided feedback on the pilot survey itself that will aid us in refining our survey questions should we choose to administer the survey again in the future. In addition, the qualitative feedback collected may assist others interested in developing similar surveys. The collected data included in this article focuses on feedback on the survey itself rather than other aspects collected by the survey to provide guidance for other groups seeking to conduct similar surveys of their membership.

## LESSONS LEARNED

When collecting data and sending surveys, we realized that there would be things that worked well and things that did not. Here are some of the lessons learned for people who might be interested in conducting their own survey in the future.

One major takeaway was learning that providing fewer options specifically as it pertained to the SOGI questions was more inclusive than providing more options. We reduced the number of options that had been offered originally on the MAC survey and added an "other" option with an area for participants to enter in their preferred method to describe themselves. We've found that the terms people prefer to describe themselves often go beyond the standard response options typically used in surveys. If we don't allow respondents the space to identify themselves more accurately, we risk misrepresenting the communities we aim to understand—and may unintentionally reinforce existing social inequalities.

DOI: dx.doi.org/10.5195/jmla.2025.2159

As for survey design though the original Diversity Survey from MAC had been created using Qualtrics, we chose to use Redcap since that was the tool in which we had access that had the level of data security we wanted. As we collected data and tried to analyze the results, we found that the task force members were not versed in Redcap, and it was difficult to learn as you go. Therefore, we recommend that one of your team members be familiar with the tool being used for gathering the data. However, the ability to privatize the data is essential, and therefore, if you must choose between familiarity of a tool over data security, we will always recommend prioritizing data security. When considering improving the usability of the survey, we chose to use conditional IF/THEN logic, so follow-up questions only appeared when relevant, minimizing screen clutter. A visible progress bar was also added to help participants track their completion status, and an easy-to-find exit button provided a sense of control and accessibility throughout the process.

When first creating a diversity survey, the D&I task force recommends taking the time to establish the purpose, or your "so what," and establish a guideline for what the data can and will be used for, including who will have access to the data, where it will be stored, for how long, etc. As with any other survey that involves humans, make sure to disclose those guidelines to participants so they know how their information is being used, where it is being kept, and that they have the option to opt out of participation at any time. If you are offering your participants an incentive to participate, establish what the incentive will be, who will fund it, how incentives will be awarded etc. ahead of time so that all information can be disclosed from the very beginning. Make sure to send reminders and updates on response rates to all chapter members on a regular basis through a variety of communication methods – we used social media, email, and the chapter newsletter.

One of our questions focused on MCMLA's education efforts, asking survey participants about which areas of diversity, equity, and inclusion need to be better addressed in the educational programs offered by MCMLA. The available options included age, gender/gender identity, disability, ethnic background, nationality, perceived socioeconomic status, race, religion, and sexual orientation. We included an "Other" option where respondents could write in additional areas. One participant noted "weight/size is not a protected class, and yet 60%+ of the country is overweight or obese." This participant's feedback encourages us and others to consider adding in weight/size as another aspect of diversity that could be captured in surveys and should be considered in educational offerings.

At the end of our survey, we had an option where respondents could offer "Additional Comments." One participant noted, "I can't answer a lot of these the way they are written - I haven't experience[d] or observed anything in MCMLA relating to race because almost everyone I interact with or see here is of the same general background as myself... We should consult members with diverse backgrounds while avoiding pigeon-holing them or forcing them into doing a lot of extra work." We appreciate this participant's feedback and note that this may be a limitation in the data that was collected in the survey. In any revised, future surveys, it may be necessary to consider the wording of the questions to recognize that there may be a limitation in the diversity of interactions our MCMLA members have in organizational activities.

## CONCLUSION

In designing and implementing the MCMLA Diversity and Inclusion survey, the task force was committed to approaching the work with care, intention, and a willingness to learn. By building upon the foundation laid by the MAC-MLA and thoughtfully adapting survey language and design, the task force created a tool that reflects current understandings of inclusive terminology and ethical data collection. The lessons learned throughout this process—especially around the importance of asking "so what" at each step—offer valuable insights for others seeking to assess and improve the inclusivity of their organizations. As MCMLA continues its diversity, equity, and inclusion journey, this survey serves as both a starting point for deeper conversations and a model for other chapters and associations working to create more welcoming and representative library communities.

## RESEARCHERS' POSITIONALITIES STATEMENT

The authors of this study represent a variety of personal backgrounds, including diverse races and ethnicities, sexual orientations, family structures, socio-economic levels, and professional roles. They have experience serving on DEI committees within professional associations and at their institutions. They do not, however, purport to represent all communities within the umbrella of DEI efforts as they can only speak to their own experiences and backgrounds (e.g., the authorship of this paper is comprised entirely of cisgender females and therefore cannot speak to the experiences of transgender individuals or cisgender men). The discussions laid out in this study should continue to seek to invite all to the table so more perspectives can be included.

## DATA AVAILABILITY STATEMENT

There is no data associated with this article.

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*Received January 2025; accepted June 2025*



ISSN 1558-9439 (Online)

HISTORY MATTERS
DOI: dx.doi.org/10.5195/jmla.2025.2235

# PubMed Central: offering a trove of historical medical journals

**Jeffrey S. Reznick; Kathryn Funk; Laura Randall; Katy Rose Taylor; Katherine Chan; Ellen Adams**

*See end of article for authors' affiliations.*

This article briefly documents the history and significance of PubMed Central (PMC) Journal Backfiles Digitization, 2004-2024 to raise awareness of this open access project among researchers who will find much to discover to advance understanding about the human condition across time and place. The success of PMC Journal Backfiles Digitization—including the interdisciplinary teamwork and partnerships underpinning it— provides a blueprint for future efforts to make the globally appreciated collections of the National Library of Medicine (NLM) accessible to all. By continuing to prioritize open access, teamwork, and partnerships, NLM and likeminded institutions can ensure that knowledge and data inform the advancement of medicine and public health.

**Keywords:** Biomedical journals; Historical Medical Archive; Digitization; Articles; PubMed Central

In 2004, a collaboration began—eventually spanning two decades—that would measurably transform access to historical medical literature: PubMed Central (PMC) Journal Backfiles Digitization [1, 2] [Figures 1 and 2]. This ambitious project involved digitizing and making available via open access the back issues of a vast collection of medical journals rich with qualitative and quantitative data to be discovered and studied to advance understanding of the human condition across time and place.

From 2004 to 2010, the project included journals both already participating in and just getting started with PMC, whose back issues were not yet available in digital form. It involved a multidisciplinary team comprised of staff of the National Library of Medicine (NLM), Wellcome Trust, and UK Joint Information Systems Committee (JISC). Together, they embarked on a process of sourcing the complete physical runs of participating journals, digitizing them, and linking their associated data. Among the journals included in the project were the *Annals of Surgery*, *Biochemical Journal*, *Journal of Physiology* and *Medical History*, and many more which illuminate the intersection of science and society over two centuries [3].

The process involved more than simply scanning pages. The NLM team of technical experts meticulously tagged each article with metadata, including titles, authors, affiliations, and publication details. The team created a PDF file for every discrete item in the archive (article, editorial, letter, advertisement, etc.), and they used optical character recognition (OCR) technology to generate searchable text. They developed innovative ways to link articles with corresponding records in the catalog of the NLM, as well as Digital Object Identifiers (DOIs) when available, making more content discoverable and readily available to researchers, teachers, and learners worldwide. Additionally, the team created corresponding PubMed records from the scanned articles that had not already been indexed in PubMed to further increase discoverability and availability of this content.

By the end of 2010, the team made available, through PMC, more than one million articles from 160 journals, spanning nearly two centuries. This corpus included groundbreaking works that changed the face of medicine, such as Alexander Fleming's 1929 paper on penicillin, Richard Doll's 1954 study linking smoking to lung cancer, and Walter Reed's 1902 research demonstrating mosquito transmission of yellow fever [2, 3].

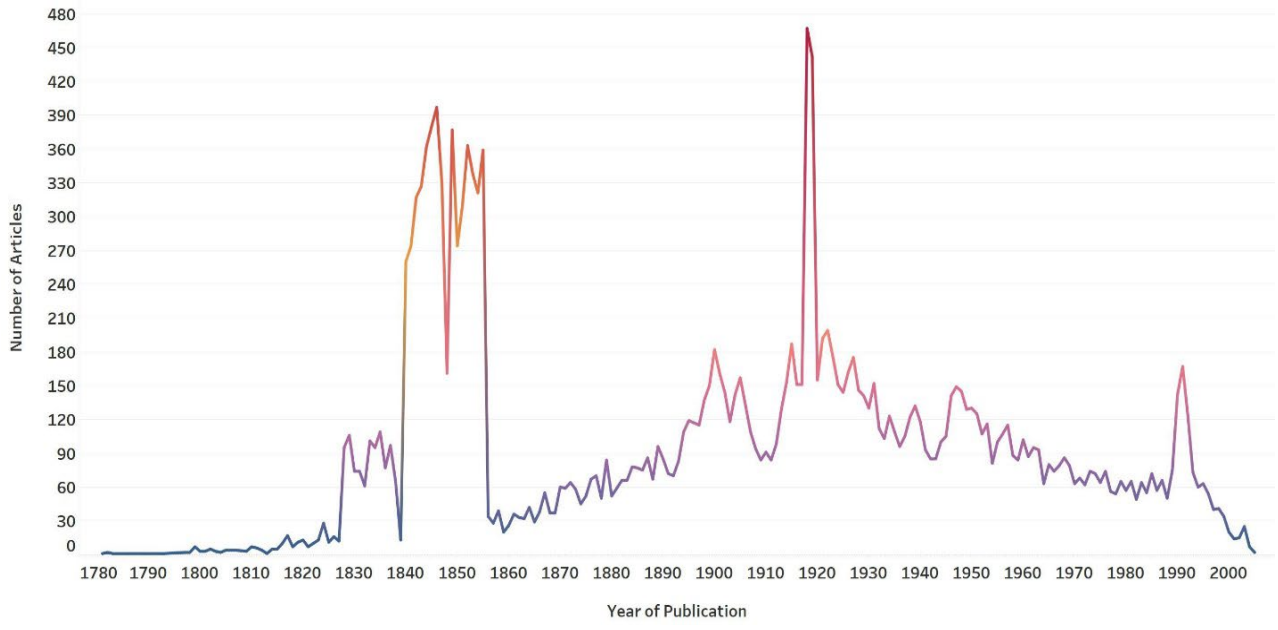
The impact of this newfound online availability was immediate and profound. The *Journal of Anatomy*, recognizing the value of open access, celebrated the availability of its entire archive online, noting its inclusion in the "100 most influential journals in biology and medicine over the past 100 years [4]." Similarly, *Medical History* lauded the project's alignment with open access principles, making its entire archive freely available for the first time [5]. Comparable appreciation of the PMC backfiles initiative appeared in the *Biochemical Journal*, *British Journal of Medical Practice*, *Canadian Medical Association Journal*, and *Journal of Physiology* [6, 7, 8, 9]

Building on this success, and in continued partnership with the Wellcome Trust, PMC Journal Backfiles Digitization expanded its scope from 2014 to 2019 [10]. The focus shifted to include the physical preservation of

DOI: dx.doi.org/10.5195/jmla.2025.2235

**Figure 1** Depicting all titles of PubMed Central (PMC) Journal Backfiles Digitization available under a Creative Commons License or in the Public Domain, and located at https://ftp.ncbi.nlm.nih.gov/pub/pmc/historical_ocr/. Title sizes are proportional to individual file sizes which range from 0.2 to 116 megabytes.


**Figure 2** Depicting all titles of Figure 1 by number of articles and year of publication.



DOI: dx.doi.org/10.5195/jmla.2025.2235

the original journals in their printed and published form, ensuring their long-term survival for future generations. Work began with journals related to mental health, including *Mental Health*, *Mental Hygiene*, *Journal of Psychological Medicine* and *Mental Pathology*. The project broadened its selection to include journals of general relevance, such as the *British and Foreign Medico-Chirurgical Review* and *Transactions of the Epidemiology Society of London*. It also encompassed titles long sought after in digital form by historians, such as the *Indian Medical Gazette* and *The Hospital* [11, 12].

By 2019, the team added over two dozen titles to PMC, spanning three centuries, encompassing hundreds of thousands of pages, and including certain titles determined to be Orphan Works. The result was a vast searchable collection of over 650,000 pages comprising tens of thousands of articles, all freely available for reading, downloading, and even text mining. Articles from Orphan Works appeared under the Creative Commons Attribution-NonCommercial 4.0 International License. Today and tomorrow, countless new avenues for discovery and understanding await all researchers, teachers, and learners who explore PMC and study its rich historical content.

Indeed, engagement with this corpus was remarkable. On average, 150,000 articles from the collection were viewed each month. In 2024 alone, users downloaded the historical optical character recognition (OCR) dataset, consisting of nearly 90 titles, in its entirety approximately 300 times. Historical articles made available under Creative Commons license terms are also integrated into the PMC Open Access Subset, a rich corpus of more than six million biomedical research articles available for bulk retrieval and reuse [13]. While the specific uses of the downloaded data remain unknown, the sheer volume of downloads suggests a high level of interest and utilization by researchers, teachers, and learners.

Recognizing the importance of continuous outreach to and engagement with NLM's patrons, the project team combined their experience and expertise in various strategies to highlight the value of the collection for research, teaching, and learning. They co-authored blog posts on popular platforms including *Circulating Now*, *History News Network*, and *Musings from the Mezzanine*, thereby showcasing the content of specific journals and encouraging their exploration and discovery. They also worked together to create thematic visualizations of the corpus, by creating compelling snapshots of its wealth of information ripe to be studied [14, 15, 16].

The next chapter of PMC Journal Backfiles Digitization, spanning from 2019 to early 2024, focused on digitizing public domain titles, notably the *Atlanta Journal-Record of Medicine* (1899-1918), *Buffalo Medical Journal* (1895-1918), *The Chicago Medical Journal and Examiner* (1875-1889), *The Dental Register* (1847-1923), and *Daniel's Texas Medical Journal* (1893-1919). This effort added to PMC nearly two dozen more titles and over 75,000 articles, further expanding its depth and breadth [17].

PMC Journal Backfiles Digitization stands as a testament to the transformative power of open access and digital preservation. By making a vast collection of historical medical literature freely available, the project has democratized access to this knowledge, opening to researchers, teachers, and learners countless new avenues for understanding medicine as it has changed over time, and its changing impact on science and society.

PMC Journal Backfiles Digitization also highlights areas for future growth, development, and engagement with researchers, teachers, and learners in the related and evolving fields of digital humanities, data science, and artificial intelligence. Indeed, through further advancements in AI and text-mining techniques, opportunities abound to explore and learn from this open access corpus. Term proximity searches hold the promise of identifying early mentions or implicit references to medical conditions before their larger recognition, while sentiment analyses could identify changes in opinion related to treatments, public health policies, and emerging medical technologies.

The team acknowledges the need to understand better how researchers, teachers, and learners have utilized the corpus, and how many more could benefit from its content. Direct user surveys could provide valuable insights into the impact of this open access. They could also inform future digitization efforts and priorities. The co-authors of the article certainly welcome hearing feedback from individuals who are studying PMC backfiles to unearth new insights about the human condition across time and place.

The success of PMC Journal Backfiles Digitization provides a blueprint for future efforts to make NLM's globally appreciated historical collections accessible to all. By continuing to prioritize open access and leverage lessons learned in digitization initiatives, NLM can ensure that knowledge and data across historical time and place continue to inform the advancement of medicine and public health across time and place today and in the future.

## ACKNOWLEDGEMENTS

Staff of the National Library of Medicine (NLM), National Institutes of Health, co-authored this article with support from NLM.

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*Received May 2024; accepted August 2025*



ISSN 1558-9439 (Online)

DOI: dx.doi.org/10.5195/jmla.2025.2201

Andresen, Kathy. **Optimizing Population Health: Strategies for Advanced Level Nurses.** First Edition; Pensacola, FL; University of West Florida Pressbooks; 2024. (Open Educational Resources). 117 p. Free (Open Educational Resource). ISBN: 1724332089.

*Optimising Population Health: Strategies for Advanced Nurses* offers a down-to-earth, in-depth review of current population health content suitable for advanced nurses. Written for Master of Science in Nursing (MSN) students at the University of West Florida, the book aims to provide essential content for advanced nurses to study the most pressing issues in contemporary population health. Consisting of four sections—population health, cultural humility, health promotion, and contemporary health issues—this text presents evidence-based approaches, strategies, and resources designed to support nurses in developing practice and leadership skills in the definition and approach to population health. The primary audience is MSN students, but it is also a resource for practising nurses involved in leadership, education, or public health roles.

### Chapter 1: Introduction to Population Health

Population Health: Chapter one lays the foundation by introducing the reader to the basics of population health—one of the main components of advanced practice nursing skills. This chapter covers the demographic and geographic framework of the population, which provides a basis for understanding how population health outcomes are influenced by the broader social and environmental context. Each chapter ends with evidence-based recommendations that explain the role of health assessment in developing population health strategies and exploring the Social Determinants of Health (SDOH). Public health priorities in the United States are succinctly summarised in Healthy People 2030, one of the pillars of this chapter and a major strength of the book. This project sets the standard that advanced nurses in the field of public health must achieve. In this chapter, the emphasis on health partnerships and collaboration between sectors is very important, as it highlights the importance of an interdisciplinary approach in dealing with complex health issues. This section is particularly useful for MSN students who are studying for leadership positions where managing or leading such unions will be very important.

### Chapter 2: Cultural Humility

Unlike the traditional idea of cultural competence, where one assumes a broad understanding of the entire culture, cultural humility emphasises a lifelong learning journey, recognising the need for healthcare practitioners to remain open-minded and open to the different perspectives and experiences of the patients they treat. Cultural humility is a lifelong process of self-evaluation and self-criticism that is key to combating the implicit biases that impact patient care, this chapter explains. This chapter's emphasis on implicit bias, and its damaging impact, is particularly relevant as healthcare organisations seek to eliminate discriminatory differences in care. This chapter explains how awareness of Adverse Childhood Experiences (ACEs) and Trauma-Informed Care (TIC) will help advanced nurses identify and address the long-term impact of trauma on patient populations. Particularly relevant for nurses who practice in public health or care for vulnerable populations, where understanding and addressing trauma can form the basis of patient care. This chapter's in-depth presentation on cultural humility, implicit bias, and trauma should be read by all of us who work in patient care as well as those who try to advocate for health equity.

### Chapter 3: Health Promotion

This chapter links the concept of population health with a strategy of action to improve health. This chapter discusses the Levels of Prevention (primordial, primary, secondary, tertiary, and quaternary prevention) and relevant examples of these levels of prevention in practice. The discussion of health promotion theories, such as the Health Belief Model, Social Cognitive Theory, and the Transtheoretical Model, provides a basis for nurses to plan interventions that can lead to sustainable health and disease prevention. In a very helpful section, this chapter discusses health literacy, an aspect of population health planning that is rarely referred to. How health literacy correlates with health outcomes is important for nurses as they seek to educate, engage, and promote healthy communities. This chapter provides a practical approach to outlining health promotion strategies that are important for advanced nurses who are not only responsible for the specific health problems of their clients, but also responsible for offering preventive measures for future health problems.

### Chapter 4: Contemporary Health Issues

This chapter focuses on several crucial global health challenges today such as the SDGs, climate change, and disaster management. As the role of APNs has an important role in controlling mass health crises, these topics are becoming increasingly important for their practice. This chapter inspires nurses to think about health interventions in a global context by aligning population health priorities with the SDGs. The sections relating to disaster management and infectious diseases are of particular concern given the increasing expression of global health emergencies such as pandemics and natural

DOI: dx.doi.org/10.5195/jmla.2025.2201

disasters. This chapter also discusses preparing students to face these challenges from a population health perspective for advanced practice nurses in leadership and education roles. Nurses are also encouraged to advocate for health policies that address the upstream determinants of health equity including climate change and socioeconomic inequalities, with clear next steps to help nurses understand how to use policy as a lever for change.

## Advantages of This Book

Optimising Population Health provides a strong blend of academic rigour and real-world support, especially with the widespread adoption of open educational resources (OER) in this book, making it very accessible to students and practitioners. Therefore, this book complements traditional textbooks in the field of population health, which can be limited by high costs and static content, and presents dynamic and updated material that can be modified and consolidated at no cost to users. As a freely available publication, this book can be updated from time to time so that students and health workers can have the latest population health strategies and tools they can use. The book also provides real-time digital resources for the learning experience through videos and interactive links. The book also delves into cultural humility and the importance of trauma-informed care, making it a must-read for nurses serious about health equity.

## Potential Readership

This book is designed specifically for MSN students, especially the FNP, Nurse Educator, and Nurse Leader programmes. Due to its comprehensive approach, this book is also useful for practising nurses who wish to broaden their knowledge base in the fields of population health, health promotion, and advocacy. This book is timely for advanced practice nurses in leadership, policy-making, or public health roles, as it provides theoretical knowledge and practical tools that enable readers to consider how to manage new health challenges. As a nursing educator, this book is a very helpful resource when looking for current material to include in your courses, especially when teaching population health, public health nursing, or health policy courses. This knowledge will also be useful for health systems working to optimise care models by implementing population health strategies and interprofessional collaboration.

## Conclusion

Optimising the Health of Populations is a well-considered text that provides a fundamental understanding for practitioners who want to improve and/or develop their practice in the field of population health. Quest shows that the combination of theory, evidence-based strategies, and practical tools is invaluable for advanced practice nurses, educators, and policy advocates. This book stands out in its emphasis on cultural humility, implicit bias, and health promotion strategies, with the ultimate goal of advancing health equity and addressing global health challenges. The open access model of this book makes another major contribution, as access to the text allows it to be shared and adapted for various uses in nursing programmes at universities around the world. With its focus on developing nurses to lead in improving healthcare outcomes for those who are most vulnerable, this book will remain a real-time resource as the health of populations continues to evolve in various communities.

## Acknowledgments

The authors would like to express their heartfelt appreciation and gratitude to the Lembaga Pengelola Dana Pendidikan - LPDP (Indonesia Endowment Fund for Education) under the Ministry of Finance of the Republic of Indonesia for sponsoring the authors' Doctor's degree and supporting this publication and collaboration.

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ISSN 1558-9439 (Online)

PROCEEDINGS
DOI: dx.doi.org/10.5195/jmla.2025.2356

# 124th Annual Conference, Medical Library Association, Inc., Portland, OR, May 18-21, 2024

# 2024 Annual Business Meeting and Presidential Inaugural Address, June 5, 2024

Kate E. Corcoran

*See end of article for authors' affiliations.*

See end of article for supplemental content.

## CONTENTS



## INTRODUCTION

The Medical Library Association (MLA) held its 124th annual conference May 18-121, 2024, in Portland, Oregon. The meeting was entitled "MLA '24: Stronger Together" and used a hybrid model with some events in person, and some virtually. The virtual conference was broken into segments, available using a variety of online platforms. Final numbers: total paid attendance for the conference was 1,035 attendees, with 821 attending in person and 214 attending virtually. Conference content, including the meeting program and various electronic presentations from special content symposia, plenary sessions, poster sessions, and program sessions can be accessed by conference registrants via the association's website, MLANET.

## PRECONFERENCE CONTINUING EDUCATION AND AI SUMMIT

May 18, 2024

### CE100 - Essential Searching Skills for Librarians on Systematic Review Teams

Instructors: Carrie Price, Health Professions Librarian, Albert S. Cook Library, Towson University, Towson, MD; David Farris, Research Services Librarian, Research Medical Library, University of Texas, MD Anderson Cancer Center–Houston; Rachael Lebo, Clinical Services Librarian, Wegner Health Sciences Library, University of South Dakota–Sioux Falls.

### CE200 - Master Data Cleaning and Wrangling with OpenRefine and Python

Instructor: Paige Scudder, Research and Instruction Librarian, Tufts Hirsh Health Sciences Library, Boston, MA.

### CE201 - Collections Budgeting: It's More than Spreadsheets

Instructor: Susan K. Kendall, AHIP, Head, Collections Strategies and Copyright Librarian, Michigan State University Libraries, East Lansing, MI.

### CE400 - The Joy of Project Management! Managing All Projects, Large and Small

Janet Crum, Director, Health Sciences Library, University of Arizona–Tucson; and Elisa Cortez, AHIP, Medical Education and Clinical Outreach Librarian, University of California–Riverside.

DOI: dx.doi.org/10.5195/jmla.2025.2356

### AI Summit: "Why AI? Transforming the Health Information Profession"

Sponsored by Elsevier

Designed to be a high-level strategic summit for AI leaders and planners, the summit brought together health information professionals, representatives from vendors to health libraries, and National Library of Medicine staff to provide planners and leaders in the health information AI space with knowledge and insights needed to address the rise of artificial intelligence in all aspects of library operations.

## OPENING SESSION AND PRESIDENTIAL ADDRESS

May 19, 2024

Amy Blevins, 2023/2024 MLA President
Liz Kellermeyer, AHIP, MLA '24 Cochair
Emily Vardell, AHIP, MLA '24 Cochair

Amy Blevins: Good morning! Thank you for being here today on this beautiful morning in Portland, Oregon. Welcome to everybody who's attending both in person and virtually. My name is Amy Blevins. I am the MLA president for 2023 to 2024.

It's been a long road to get here to Portland. For those of you who remember, we were supposed to be here in 2020 but unfortunately, COVID19 had different plans for us, but we're finally here. How are you guys all feeling? Has anybody seen any Sasquatches around? Not yet.

As of this morning, we have 1,331 registrants and exhibitor representatives. We have 1,092 people in person, and I'm assuming they're all in this room right now. And then we have 239 virtual attendees. For those of you who are unable to attend in person, the National Program Committee and conference staff have planned yet another conference with a robust and interactive virtual component taking place at the same time that we are meeting in Portland. For those of you on the East Coast, it's a little later in the day than it is for us here on the West Coast, there are more live stream sessions, virtual presenters presenting live virtual sessions. And since none of us can be in two places at once yet, even though Gabe showed us yesterday you can have an AI version of yourself, there's going to be a lot of recordings and on demand sessions that you can attend later. We'll continue to experiment, so stay tuned for what may come next. We'll keep learning, adjusting, and moving forward, always with our professional needs and interest in mind.

And now it's my great pleasure to introduce Emily Vardell, AHIP, and Liz Kellermeyer, AHIP, your 2024 National Program Committee Cochairs. Please join me in giving them a warm welcome. [Applause]

Emily Vardell: Thank you, Amy. I am Emily Vardell.

Liz Kellermeyer: And I am Liz Kellermeyer.

Together: Welcome to Portland!

Emily Vardell: It is our honor and privilege these few days to conduct this conference on the traditional lands of many Indigenous Peoples, whose ancestors have stewarded this land for thousands of years. The Portland Indian Leaders Roundtable document "Leading with Tradition"[1] noted that "The Portland Metro area rests on traditional village sites of the Multnomah, Wasco, Cowlitz, Kathlamet, Clackamas, Bands of Chinook, Tualatin Kalapuya, Molalla, and many other tribes who made their homes along the Columbia River, creating communities and summer encampments to harvest and use the abundant natural resources of the area."

We honor their history.

We also acknowledge the systemic policies of genocide, relocation, and assimilation that still impact many Indigenous and Native American families today. As guests on these lands, we respect the work of Indigenous leaders and families, and recognize their knowledge, creativity, and resilience.

We encourage you to discover more at the Naya Family Center website, nayapdx.org, or the Native Arts and Cultures Foundation, at nativeartsandcultures.org.

Liz Kellermeyer: This conference is governed by the MLA statement of appropriate conduct, which you'll find on pages six and seven of your official program. It applies to all of our activities, including conferences, meetings, workshops, online forums, social media, continuing education and all means of communication.

It applies to all of us at this conference. I encourage all of you to read it in the spirit of an open, inclusive and collaborative environment for diversity, equity, inclusion and belonging in professional practice; the leadership of information professionals; accessibility for all stakeholder groups; and the ethical standards that call us to conduct all professional relationships with courtesy and respect.

You will also have the facility in most sessions to chat and ask questions, but we've also been warned that [our meeting] software adheres to the scheduled times for sessions: virtual session moderators be warned!

Emily Vardell: As Amy mentioned, we are so delighted to finally return to Portland, for real! It's been 37 years since MLA was last here–that's a lot of water under this city's 12 bridges.

Liz Kellermeyer: In 1987, for some attendees and leaders, the MLA annual conference was 10 days long.

Emily Vardell: "The Internet", which was really not yet public, was 5 years old and the web hadn't yet been invented.

And yet, medical librarians today would not find topics presented in 1987 unusual, such as "Teaching Information Retrieval Skills to Medical Students".

DOI: dx.doi.org/10.5195/jmla.2025.2159

Liz Kellermeyer: Or "The Contribution of Hospital Library Information Services to Quality Patient Care."

Emily Vardell: But I think we can ALL agree that we have been blessed with better design sense in 2024! Many thanks to our MCI USA designer, Aubrey Dockery, for her brilliant and award-winning work for this conference.

Liz Kellermeyer: Please join me in giving a heartfelt welcome and thank you to our sponsors and exhibitors who have demonstrated their support for this conference, and for the value they see in information professionals.

They contribute to our organizations in so many ways and help us thrive

Exhibitors and sponsors also engage and collaborate with our members on multiple initiatives and provide education and knowledge sharing sessions that advance our profession.

We are grateful for their support and invite you to take time to personally thank them for their support throughout the meeting and afterwards.

I'd like to welcome to the stage, representing our gold-level sponsor, Michael Crossman, Vice President, Account Management at Elsevier, to share a few words with us.

Michael Crossman: I was going to introduce myself, but she took care of that for me. Elsevier, we really do appreciate the opportunity to be here with you and face to face in person to learn and hear, and learn from you over the course next couple of days The team is always ecstatic to come here to join this conference and to support our MLA, as we know that you're vital in the role of supporting your clinicians, your faculty and students, and providing the most evidence based information possible.

Throughout this week or the next couple of days our team is focused and really excited to engage with you, to learn more about your priorities, your successes, and your challenges. We're really just thankful for being here. So, thank you and have a great rest of your conference. Thank you. [Applause]

Emily Vardell: Thank you so much, Michael.

We are grateful to our Platinum-level sponsor Wolters Kluwer, who is sponsoring multiple areas of this conference.

Please welcome Rafael Sidi, Senior Vice President & General Manager of the Health Research segment of Wolters Kluwer, to the podium to share a few words with us.

Rafael Sidi: Thank you! Good morning, esteemed medical librarians. I'm Rafael Sidi. On behalf of Wolters Kluwer, it is my honor to welcome you all to MLA 2024. As the platinum sponsor for MLA, we are thrilled to be part of this significant event. This year, Wolters Kluwer is celebrating a milestone that is very close to our hearts: its 40th anniversary. Yes, we were here 37 years ago!

For four decades it has embodied the MLA mission, demonstrating that quality information and trusted information is essential to improve healthcare outcomes. As we develop the next generation Health Research Solutions, you, our dedicated medical librarians, are always at the forefront of our minds. Your unwavering dedication to your profession, your pursuit of excellence in medical research, your commitment to training the next generation of clinicians and your tireless efforts to advance patient care evidence-based practices inspire us daily. With your collaboration, we can ensure that Ovid continues to meet the needs of the ever-evolving medical information landscape. In line with this year's MLA theme, we truly are better together.

I invite you to visit our Wolters Kluwer booth. We would be delighted to meet you and hear your thoughts, and if some of you were here thirty-seven years ago, we would like to hear now your feedback on Ovid.[laughter] You are cordially invited to join our sunrise session tomorrow, where we will be discussing evidence based practice research and quality improvement, presenting our exciting new expert solution of its synthesis. Additionally, we have a lunch and learn session tomorrow afternoon, where we will take you on the journey of medical research, from boolean operations to Gen AI copilot, exploring the future possibilities of Ovid and how we can enrich research and discovery for our end users, on behalf of Ovid and Wolters Kluwer, I want to express our deepest gratitude for your ongoing support, for the invaluable work that you do. I wish you a very successful MLA, thank you and have a great day. [Applause]

Liz Kellermeyer: Thank you Rafael and thank you to the very supportive Wolters Kluwer team.

We are so energized by the enthusiasm of our members, presenters, speakers, MLA staff and technology partners who have been so committed in preparing this meeting. We salute the hard work and vision of the full NPC team for their creativity, building on the success of last year's hybrid conference to design yet another new and improved experience for all of us.

Our NPC team has been extraordinary in selecting programming to appeal to the diverse needs of all of our members. You can find all names on page 10 of your official program. Please join Emily and me in recognizing them and the dozens of content reviewers who reviewed the hundreds of submissions for this meeting. If you are on the NPC this year, please rise to be recognized or comment in the chat if you are [attending] virtual and if you are a content reviewer this year, please rise or comment in the chat to be recognized. Thank you! [Applause]

DOI: dx.doi.org/10.5195/jmla.2025.2356

Emily Vardell: We also want to recognize the four special content committees who assembled impressive symposia and the AI Summit for this conference. We look forward to seeing all these sessions being held here in Portland over the next few days, with six symposia sessions being live streamed to virtual attendees and a summary of the AI summit being presented during our closing plenary. You can also find the names of these hard-working planners on page 10 of your official program. If you were part of planning one of the special symposia, if you could also stand to be recognized. [Applause]

Liz Kellermeyer: Those of us here in Portland have been amply prepared by our extraordinary Local Assistance Committee, led by LAC Cochairs Laura Zeigen, AHIP, and Sola Whitehead, AHIP. From blog posts to dining guide, from transportation advice to volunteer wrangling, the LAC has done an awesome job in sharing information about our host city. Laura and Sola, many thanks to both of you and your whole team.

Emily Vardell: We were delighted this year to inaugurate a new NPC subcommittee, the Virtual Assistance Committee, ably led by Chair Shalu Gillum, AHIP. We appreciate the virtual tips they've provided for our virtual attendees, and the upcoming virtual networking sessions later today and on Monday.

Please join us in thanking the whole group for their ideas and sessions. If you're attending virtually, add those emojis and shout outs to the chat! Thank you. [Applause]

Liz Kellermeyer: When you work so closely with the MCI staff conference team to organize this hybrid event, you get a real appreciation for the breadth and complexity of the task. This year, not only have they learned new software for this conference, they've been doing that at the same time as they are designing, building, and migrating MLANET to a new home.

Please join us in showing our appreciation for what they do. Thank you. [Applause]

Many of you have already been exploring the virtual portal and connected app. The portal and the app are the easiest ways to navigate and keep track of the large number of sessions at this conference.

For our virtual and in-person attendees alike: ALL sessions reflect the time zone your browser, tablet, or phone is currently in. Those of us who arrived from different time zones and who worked on our schedule ahead of time will notice that sessions now reflect Portland time. For our virtual attendees who haven't traveled, the times noted in the schedule will continue to be unchanged and accurate for your time zone.

Emily Vardell: The app will also let you play MLA '24 Quest – whether virtual or in-person–and keep track of everything onsite you want to see. The app or virtual portal also hosts session chat and Q&A, so you can ask questions throughout many sessions, whether virtual or in person. Look for icons at the bottom of the app, or on the right sidebar of the virtual portal.

There's no doubt: MLA '24 has a LOT of programming–I know I've seen comments on the [MLA '24 conference] padlet bemoaning the choices we all have to make–but I can't wait to get started later this morning!

We really thank our speakers and contributed content presenters for being so flexible and for going the extra mile to make this conference a success for both our virtual and in-person attendees. Your participation is essential to strengthening our community–and it's why we are "Stronger Together".

And a final few words: make sure to NOT overdo, please take breaks, have snacks, or visit the Recharge room, and make sure to spend time with your "frolleagues"!

Liz Kellermeyer: It is now our great honor and pleasure to transition to the next and highly anticipated segment of today's program: Amy Blevins' Presidential Address.

Amy is the Associate Director for Public Services at the Ruth Lilly Medical Library, Indiana University School of Medicine, Indianapolis, IN. She is also a teaching faculty member in charge of two required medical school courses.

Amy's career has focused on teaching evidence-based medicine and critical appraisal as well as partnering on systematic reviews and meta-analyses. She has been involved in several continuing education initiatives as an instructor/facilitator and during the pandemic, used her skills in information retrieval and critical appraisal to support the WISE COVID-19 Expert Review of Relevant and Emerging Literature, COVID-19 Expert Responses to Key Questions, and as a member of the WISE Indiana Internal Advisory Team.

Emily Vardell: Amy's service to MLA has been wide-ranging. She has previously served on committees like the Professional Recruitment and Retention Committee and Annual Meeting Innovation Task Force, as a Rising Star mentor and Colleague Connection mentor, on the MLA Nominating Committee and on the Board of Directors and as MLA Treasurer.

She has been active in the Technology in Education, Public Services, Leadership & Management, and Medical Informatics caucuses and the Midwest Chapter of MLA.

As liaison to this National Program Committee, Amy embodies our theme, "stronger together." During her election year, Amy called herself a servant leader, saying our members are our greatest strength. She continued, "My overarching vision for MLA involves giving people the right resources and authority to create meaningful change for the association…I strongly believe that the role of a good leader is to listen to those with greater knowledge and understanding of different issues rather

DOI: dx.doi.org/10.5195/jmla.2025.2159

than trying to solve problems in a vacuum or be an expert in all areas."

Amy, it has been a pleasure to have you as our Board liaison–and we really DO apologize that we couldn't find a Sasquatch costume in your size, and my Ewok costume just didn't fit in my carry on, so we'll have to do with you looking great.

Please join me in welcoming my colleague and our 2023-2024 MLA President, Amy Blevins.

## PRESIDENTIAL ADDRESS

Amy Blevins: Maybe we'll have costumes in Pittsburgh next year!

So I'm going to do something a little different, if you don't mind, I wanted to give you all a choice this morning. How many of you would like to see the presidential address that I prepared for this morning? Raise your hands. How many of you would prefer to do a round of karaoke? All right, if I could get tenacious D's tribute queued up real quickly. [laughter] No, I'm just kidding. I told people I wouldn't really do it. I thought about it, maybe next year in Pittsburgh. Thank you everyone. Although it would have been epic. Also, I know we couldn't find a Sasquatch costume, as much as I was hoping that I would get here and they would have one ready. So if at any time during this presentation, you find yourself feeling a little bored, or you're starting to fall asleep, which I know would never happen. I want you to imagine that this is what I look like while I'm speaking to you.

So if you're not familiar, [slide] this is Bigfoot Bae. I follow her on Instagram, and she started posting these videos where she does all these fun dances in a Bigfoot costume, and I love it, so I put the Instagram handle here for you. This is her in Portland, so I felt like it was perfect. So yeah, that's kind of like what I was going for. But I do want to say thank you for being a friend all of my—Oh no, I'm going to get choked up—to all of the people who check in on me all the time and love me and look out for me, like Ryan [Harris], who's up front, who brought me my Diet Mountain Dew, because he knows that's how I like to start my day, in the classiest way possible. For Brandi [Tuttle], who's always checking in on me, and sometimes is my roommate at the conference. And I know that, you know, if I get nervous standing up here in front of all of you, I can be like, there's Brandi, she's got my back.

Shannon Jones, who I saw. Where are you? Shannon? There you are, front and center, who's been a mentor to me since my very first health sciences conference at the MAC [Mid-Atlantic Chapter] chapter meeting in 2006 in Atlanta. It's been wonderful following in your footsteps, except for that one time I was treasurer before you. I really appreciate your wisdom, your kindness, your advice and your support as I've been on this MLA presidential journey. Many thanks to Brenda Linares, who is the incoming president for this year, we meet every other week as an executive board to talk about how we can best support our membership, be strategic in how we're running the association, and solicit and receive feedback from all of you.

So many thanks to my boss and good friend Gabe Rios, who also ran the AI symposium. I picked the best photo I could find, Gabe, there is a photo booth this year too, so that you can also wonder if people are going to put your pictures in front of everybody on a big screen the following year. Many thanks to Tony Nguyen and Emily Vardell. I can say Emily Hurst, sorry, thanks Emily Vardell, for being on NPC. There's a lot of Emilys in this association! Emily Hurst and Tony Nguyen, who, you know, helped me with some back channel thinking during our board meetings. I mean, we never talk in the back channel. Don't worry about it.

Thanks to Dale Prince, thanks to Andy Hickner, who's on the board. Thanks to Dr. Joey Nicholson, who would have been here this year, but he decided to go to Sweden for a Taylor Swift concert. I guess that's fine. I still love him. Many thanks to Beth Ketterman and Jason Cottle, my colleagues from East Carolina University, who I got to see a while ago, for always being there for me and asking me questions about what I'm going to wear to MLA prom, medical librarian prom, also known as the Medical Library Association meeting.

Thanks to Rebecca Graves, who I know I've seen in here, who's been my roommate for years, and I've known (Hi Rebecca!) since back when I was in grad school at University of Missouri Columbia, who's mentored me in teaching and leadership and has just been a wonderful, fabulous, hilarious person.

Thanks to Liz Kiscaden, the Dean of Libraries in Cincinnati, she's too important to be here today, but I know she loves me, and she's thinking about me. And last year she had her "platonic life partner of the future MLA President" t-shirt on which is in that photo there for you [slide]. And to Michelle Malloy, I don't know if she's here this year.

I know there are more people I should be thanking so you can send me all of your angry comments on Twitter later, and I'll be sure to look at them while I can't sleep at night. And so many "frolleagues", I went back through all of my photos from all of the MLAs and tried to pick the ones that were decent enough quality to put up here. So I've got pictures with so many of you. I hope you enjoy finding yourself in them. M.J. Tooey, who coined the term "frolleagues" for friends and colleagues, she sent me a photo that she said reminded her that we were together, and I put it in there, M.J., so there you are, and I always think of frolleagues whenever I think of MLA.

As Emily was saying before I came up here, our members are the most important part of our association, not only

DOI: dx.doi.org/10.5195/jmla.2025.2356

because we can't accomplish our goals without volunteer work, but also because we can't succeed in our lives and our careers without frolleagues, colleagues and friends who can support us, who can give us advice and who can tell us things like, "maybe don't do karaoke instead of a presidential address". I guess sometimes the advice is good.

And thanks to all of you who I've served with on with different committees, different groups throughout the years. I know I've said this at the new members breakfast, and I've said it many, many times, but this is our association, and I can't say that enough. Like, look at the people who are sitting at the table with you today. If there are things that are missing from the Medical Library Association that you want to see happen, you don't necessarily have to wait for somebody else to do it. You can do it. You can reach out to people and say, "hey, who wants to start a new initiative for webinars, who wants to start a new program related to AI?", and you can make it happen. So I truly want you to feel empowered. Don't wait for somebody to ask you, because they might not know that you have that expertise.

I would be remiss without thanking my colleagues at the Indiana School of Medicine's Ruth Lilly Medical Library. I know I saw Beth over here. She offered to feed me donuts earlier. Thank you, Beth. Here they all are, pictured [slide]. Some of them are at the meeting today, and some of them are back home. Again, I wouldn't be able to do the things that I've been able to do as MLA President without their support, without them stepping in when I'm feeling a little overwhelmed, and I wouldn't have even run for president if I didn't know that I had their support to back me up. So thank you. I won't cry again or get choked up probably, but I appreciate it.

And thank you to MLA headquarters and staff. I only had really blurry photos, so I'm sorry there aren't photos up here. So that's my reminder that as I'm attending these meetings, I just need to take all kinds of secret photos of people, in case I ever have an opportunity to flash them up here. But Kevin [Baliozian], we've met every other week since I took on the role of president, with the Executive Board, which includes me, Brenda Linares, Tony Nguyen, Shannon Jones and Kate Corcoran and Kevin, If I didn't already say that. We've met every alternate week to talk together. Many thanks to Deb Cavanaugh and Tomi Gunn and Barry [Grant] and Jim [Westwood] and all of you who've been so helpful. Again, we would not be successful without our MLA and MCI colleagues to help us.

This year, I got the opportunity to attend four different chapter meetings. A lot of chapters have moved to having online meetings to be more inclusive, and I think that's wonderful, but I was sad that I didn't get to meet as many people in person. But I did go to the Mid-Atlantic Chapter in person, and it was fantastic. They really rolled out the red carpet. So thank you to all of you in the Mid-Atlantic Chapter, which was my first chapter when I started back way back in 2006, not quite the late 1900s but getting close. Chapters are also important to our association. So find out what your chapter is. I have an image here for you get involved. It's another way to meet people.

So I went through my Presidential Inaugural Address, and I went through my presidential update, and I looked at some of my chapter meeting things, and the first thing I wanted to talk about is the MLA bylaws updates, because it was a truly memorable experience for me. I think Kate [Corcoran] told me that that's the longest business meeting that we've ever had that she can remember. Is that true? It was a long meeting, and while it was hard to talk to everybody for four and a half hours while I was sick, an engaged membership is a caring membership, right? Or an active questioning membership is important. So I think everybody who came with questions, hopefully all of your questions were answered and your situations were resolved. But don't ever stop asking questions. I think it's really important. If we have a 10-minute business meeting because nobody cares, I think that's much worse than four and a half hours. And Brenda, I'm thinking of you, because we have our business meeting coming up on June 5. I'm sure it'll be just the hour and a half that has been scheduled.

I worked on an RFI on public access to NIH supported research as a Board Liaison. I worked on an RFI on Interagency Technical Working Group on race and race and ethnicity standards. So we actually gave feedback to help improve medical subject headings because those are influenced by the demographic standards that have been set by a different organization. We worked on the MLA Role in Societal Issues Task Force to give people more guidance on how you can work with MLA on some of those pressing issues that are happening all around us constantly, more and more every day. And I will say, and I'll say this many times, like Emily and Liz were saying, we are stronger together, and now is the time when we need to support each other and protect each other as we go through these difficult times. I worked with the Censorship and Library Practices Work Group who put a toolkit that's online to support you, if you have questions about things that are happening in your state that might influence your ability, or affect your ability to provide quality health information to your folks.

Be Well MLA was established as a formal committee. This is something that Shannon [Jones] started during her presidency. Nobody told her to do it. She saw a need for us to think about wellness. She saw people suffering, and she was like, "I'm going to do it now". It's an official committee that you can volunteer for. I'm very excited about this, because those of you who know me know that education is one of my many passions.

DOI: dx.doi.org/10.5195/jmla.2025.2159

We have a new MLA/AAHSL Education Task Force, which will be looking at identifying and adopting standards for both conducting and reporting on educational research, and I will give a slight plug for the AAHSL Competency-Based Medical Education Task Force, who wrapped up their work later last year, earlier this year. We have a presentation on the scoping review that we did, and we're really good at partnering with folks at our institutions, but we're not as good at reporting back on the impact that we have on those people.

So the start to a beautiful new task force. Every task force can lead into a new task force, is what I'm trying to tell you. The fun is never ending! And we have a new MLA platform that's coming at the end of June. And I can't say this enough. I know Kate loves it. Every time I bring this up, it is going to solve all of our problems. So I'm excited to see it, lots of exciting things coming, I think document sharing is going to be on there, so it'll be great. So that's where we've been.

Where are we headed? So yesterday, we had our MLA board meeting. We were together from eight in the morning until noon, hashing out what kind of strategic initiatives we want to roll forward for MLA; thinking about what are the things that we have done in the past, that we continue to do, and where are the gaps where we need to respond strategically? And the things that we were thinking about is, where are we going to suffer if we do nothing, and where are we going to benefit the most if we do something?

So the two things that we were talking about at that time were creating a new leadership track that's focused on leadership at all levels. Because no matter where you are in your library, you are a leader. You are doing projects, you are influencing the strategic needs of your external stakeholders, and we want to give people more of the skills that they need to influence those around them. The other thing that we talked about, are there external audiences that would benefit from being part of MLA that we would also benefit from? So there are things that we do in the health sciences that are unique to us, but there are a lot of things that we do that are not unique to us, like collection development, leadership, data, artificial intelligence. So how do we bring those folks to the table so that we can collaborate with them to better our profession?

How many of you yesterday were at the AI symposium? Raise your hands. Looks like a fair amount. So we had five hours yesterday, which sounds like a lot, but there were interactive panels and table discussions, and AI was recording all of our conversations that were into the microphone, we were told ahead of time. So we started off with talking about this at last year's MLA at the board meeting. And then we put together a working group of folks who Emily and Liz recognized, including Gabe, with the captain's hat. They started with a fireside chat for survey results in the spring of 2024; it's recorded so you can go back and watch that. We had the MLA AI symposium, and for those of you who weren't able to attend, we are going to summarize that at the end of this meeting. And, there's a new working group that's been established to create strategic initiatives around AI, so we're not done with it yet. I believe the bottom line I heard yesterday is that AI is here to stay, and that Terminator 2 is a good movie when you're thinking about artificial intelligence. Did I get that right, Gabe? Okay, good, good. I don't want to misspeak. [Laughter]

I already told you a little bit about this, but I put it here twice, I guess because I'm super excited about it, the joint MLA/AAHSL Education Taskforce. It's being chaired by Dr Joey Nicholson, who wrote his dissertation on the impact that librarians have in medical education. We're going to be more expanded to health sciences, not just medicine.

On May 20th… tomorrow? What day is it tomorrow? I don't know. It's three hours earlier than I'm used to! We're celebrating "a Decade of Doe." So we're bringing [Janet] Doe lecturers from the last decade, who will address how MLA's core values can serve as the foundation to build the future of our profession and our association. So basically, building upon the lectures that they gave us over the years, and talking about how things have changed and what we can do to be proactive in initiating more change. Because you know what I like to say, if you're not growing and changing, you're becoming stagnant. And I don't want to be stagnant. I don't know about you guys. I won't tell you what to do.

We have MLA Be Well things happening throughout the conference. So how many of you got to see some of the slides with the pictures of the pets and the plants as you were sitting here? Yay. Those are all your babies. And you know what I like to say? Plants are the new pets, and pets are the new children, and I guess children are still children. I don't know if you noticed, but my "daughter", Wednesday, who I left behind to be here today, is a three year old Mountain Cur cocker spaniel mix, and she's really improved every aspect of my life, but I didn't think she would want to ride on a plane, because she's kind of scared of things.

MLA Reads was started by AAMLA [African American Medical Library Alliance caucus], which Shannon Jones was involved with as well, getting that kicked off. And I know Ryan's worked on this as well. So there's a virtual book club, but they do have a presence here at the meeting where we're going to meet in person. It's Tuesday, May 21, from noon to 1pm in room A105 and the book that they've been discussing is discussing is Algorithms of Oppression: How Search Engines Reinforce Racism, which is tied into our John P McGovern lecture, which is taking place tomorrow (because I know what day it is), May 20 from 10:20, to 11:45, right here in this room.

DOI: dx.doi.org/10.5195/jmla.2025.2356

So last year, when I gave my Presidential Inaugural Address, I came to you with a call to action. I had just gone to the EAHIL meeting in Oslo, Norway, and got to hear from Dr. David Lankes, R. David Lankes, who was the keynote presenter, who talked about radicals, rebellions and saving our communities, and how we can deal with the challenges and sometimes attacks that we face as librarians and information professionals. And I want to remind you, We Are MLA. We need to think about what we want to do; we want to think about what we can do; and what we should do and how we will do it. And I say how we will do it, because a lot of times I think we have really great ideas, but we don't think about how we're going to put it into action. And I know that's something that we're trying to do as an association. Words are beautiful and fine, but when there's no action behind it, it feels empty and performative.

So what can we do to inspire and enact change and build our futures? Don't let the future happen to you. Don't be scared of AI stealing your job. Think about how you can leverage your expertise in AI to show people that you're invaluable. There are things that are out of our control, but there's a lot of stuff that we can still influence. I like to think of myself as an optimistic realist anyway, so that's my call to action as I'm wrapping up my presidential year, but still serving on the executive committee for another year. As Beverly Murphy says, who I know is right here in front, "I am MLA, you are MLA, we are MLA". So every time you're like, "why is MLA doing this?" — You're part of MLA. You have a voice. Make sure that it's heard.

And then I had to put Wednesday in here again [slide].

Thank you for your time. Sorry we didn't really do karaoke. I hope you don't feel too horribly misled by that. I know we're ending a little bit early, so if you want, I could make up some other things to say. But otherwise, I appreciate seeing all of you this morning. Use this extra time to network, drink water, take breaks and feel empowered. [Responding to audience comment] Be well? Is that what you said? Bev, be well, and I'll see you throughout the rest of the meeting! [Applause]

Emily Vardell: Amy, thank you for updating us on the state of MLA!

And thank you all for joining us today to kick-off MLA '24. We look forward to spending time with you this week for a variety of fun events and engaging learning sessions!

## OTHER PLENARY SESSIONS

### May 15, 2024, Joseph Leiter NLM/MLA Lecture: "Responsible AI in Healthcare: A Practical Approach"

**Keynote Speaker:** Dr. Maia Hightower

The Joseph Leiter NLM/MLA Lectureship was established in 1983 to stimulate intellectual liaison between MLA and the National Library of Medicine (NLM). Lectures are chosen for their ability to discuss subjects related to biomedical communications. The lecture is presented every other year at NLM and in alternating years at the association's annual conference.

Artificial intelligence (AI) has the potential to transform healthcare and improve health outcomes, but it also poses ethical, legal, and social challenges. Dr. Maia Hightower, founder of Equality AI and former EVP, Chief Digital Transformation Officer at University of Chicago Medicine, discussed some of the principles and practices of responsible AI in healthcare, drawing on her experience as a CEO and a physician. Dr. Hightower shared some examples of how AI can be used to enhance patient care, clinical decision making, and health equity, as well as some of the risks and pitfalls to avoid. She also offered some recommendations on how to foster a culture of trust, transparency, and accountability in the development and deployment of AI in healthcare.

View the lecture online: https://videocast.nih.gov/watch=54584.

### May 20, 2024, John P. McGovern Lectureship

**Keynote Speaker:** Dr. Safiya U. Noble

The McGovern lecture series was established in 1983 in honor of John P. McGovern, MD, noted physician, educator, author, medical historian, and honorary member of MLA. Through the years featured speakers have addressed topics relevant to the health sciences information profession. The 2023 McGovern Lecture was a structured conversation with Dr. Noble speaker and the 2024 National Program Committee Cochairs Liz Kellermeyer and Emily Vardell.

Dr. Safiya U. Noble is an internet studies scholar and professor of Gender Studies and African American Studies at the University of California, Los Angeles (UCLA) where she serves as the faculty director of the Center on Race & Digital Justice and co-director of the Minderoo Initiative on Tech & Power at the UCLA Center for Critical Internet Inquiry (C2i2).

She is the author of a best-selling book on racist and sexist algorithmic bias in commercial search engines, entitled *Algorithms of Oppression: How Search Engines Reinforce Racism* (NYU Press), which has been widely-reviewed in scholarly and popular publications.

National Program Committee Cochairs Liz Kellermeyer and Emily Vardell talked with Dr. Noble about her information sciences degrees, her research journey, her book, how her background in library and information sciences offered a lens to understand and address complexities and nuances around algorithmic bias, how bias should be approached, and how search engine algorithms translate to AI applications. Audience

DOI: dx.doi.org/10.5195/jmla.2025.2159

members were also able to ask questions via the conference app.

The conversation was streamed for a virtual audience and is available to attendees on demand.

### May 20, 2024, Janet Doe Lecture: "A Decade of Doe"

**Moderator:** J. Dale Prince, AHIP

Panelists: BarbaraA. Epstein, AHIP, FMLA; Sandra G. Franklin, AHIP, FMLA; Michelle Kraft, AHIP, FMLA; Michael R. Kronenfeld, Ahip, FMLA; Margaret Moylan Bandy, AHIP, FMLA; Gerald J. Perry, AHIP, FMLA; Elaine Russo Martin, FMLA; Chris Shaffer AHIP; M.J. Tooey, AHIP, FMLA.

During this special event celebrating the 125th anniversary of our association, Doe Lecturers from the past 10 years were asked to share their thoughts on how MLA's core values as an association can help sustain our impact and help us thrive as health information professionals in the decades to come.

The panel was streamed for a virtual audience and is available to attendees on demand.

### May 21, 2024, National Library of Medicine (NLM) Update

**Speakers:** Dianne Babski, Director, User Services and Collection Division, National Library of Medicine; Martha Meacham, NNLM Project Director, National Library of Medicine.

Since its founding in 1836, the National Library of Medicine (NLM) has played a pivotal role in translating biomedical research into practice and is a leader in information innovation. As one of the twenty-seven institutes and centers at the National Institutes of Health, NLM advances research in bio-medical informatics and data science and is the world's largest medical library.

Dianne Babski discussed the new 3C framework (Collect, Curate, Connect) and organizational restructuring, including the launch of the Data Set Catalog and the Center for Clinical Observational Investigation (CCOI). She noted PubMed and PMC improvements, such as expanded proximity searching and updated indexing algorithms and emphasized NLM's commitment to open science and women's health research, along with the integration of Gen AI in various projects.

Martha Meacham highlighted the NNLM's regional network, training programs, funding, and efforts to support rural and tribal health.

## SYMPOSIA SESSIONS

May 19-21, 2024

Symposia sessions were held in person throughout the conference; with several streamed for virtual attendees.

### Collection Development & Resource Sharing Symposium

- Getting to Open: Everything You Need to Know about Crafting Open Access Agreements
- Collective Collecting and the Challenge of Preservation
- Getting Started with Collection Development: An Interactive Workshop on Selecting Resources for Your Library Community
- AI, Machine Learning, and Collections: New Approaches and Tools for Description and Discovery

### Leadership & Management Symposium

- Inclusive Library Leadership: Empathy, Care, and Compassion as Leadership Strengths
- Building Culture and Community in a Hybrid Workforce: A World Café Conversation
- Leading and Serving in an Unscripted World: Leadership, Librarianship, and Improv
- Inside and Out: Supporting and Empowering Your Staff by Promoting Their Achievements

### Data Management Symposium

- Data Equity: Exploring What It Is and Why It Matters
- Data Partners: Fostering Librarian-Researcher Partnerships
- Data Instructors: Providing Data Literacy as Part of Information Literacy
- Data Allies: Building Institutional Support Networks

## PROGRAM SESSIONS

May 19-21, 2024

During the MLA '24 conference, there were 18 immersion sessions, 120 papers, and 75 lightning talks. The live immersion sessions included interactive breakout sessions, Q&A, and virtual chat with presenters.

The final version of the presentation abstracts is included as an online-only supplemental file to the October 2025 issue of the Journal of the Medical Library Association (see Appendices).

DOI: dx.doi.org/10.5195/jmla.2025.2356

## POSTER SESSION

May 20, 2024

The main MLA '24 Poster Session featured 127 posters, of which 14 were available on-demand (electronic-only).

### MLA Research Training Institute Ignite Poster Session

The MLA Research Training Institute had a dedicated in-person poster session. The sessions featured fast paced and engaging "ignite" talks by the RTI fellows about their research projects that are making meaningful contributions to their communities and expanding our health information research knowledge base.

The final version of the poster abstracts is included as an online-only supplemental file to the October 2025 issue of the *Journal of the Medical Library Association* (see Appendices).

## OTHER SPECIAL EVENTS AND RECEPTIONS

May 19, 2024

- New Member and First-Time Attendee Program and Breakfast
- Speed Date Networking
- Leaders' Recognition and International Visitor Reception
- Welcome Reception & Opening of the Hall of Exhibits

May 20, 2024

- Communities Lunch
- Research Training Institute (RTI) Poster Session
- MLA Fellows Luncheon

May 21, 2024

- Living Library Session

## EXHIBIT HALL AND EXHIBITOR PRESENTATIONS

The Exhibit Hall was home to 65 booths and 222 exhibitor representatives who presented various demonstrations of their products. The Exhibit Hall began with an opening reception on May 19, 2024, 5:30-7:30 p.m. with Entertainment provided by the Portland Unipiper. The Exhibit Hall was open on May 20, 2024, 9:00 a.m. - 5:00 p.m. and May 21, 2024, 9:00 a.m. - 1:30 p.m.

Exhibitors held both sunrise seminars, lunch and learns, as well as technology showcases to highlight new products.

### May 20, 2024

Sunrise Seminars

- Wolters Kluwer - Excellence in Evidence-Based Practice: the Library as a Catalyst in Optimizing Healthcare Outcomes
- Elsevier

Technology Showcases

- Elsevier Clinical Key - ClinicalKey AI and the Library: Advocating for Better Clinical Decision Making at the Point of Care
- TDNet - TDNet AI – A New Era of Knowledge Discovery
- Covidence - Covidence: Systematic Review Technology Now and for the Future
- BMJ - Understanding the Impact of US Medical Research at the Point of Care

Lunch and Learns

- Wolters Kluwer
- Springer Nature - Empowering Scientific Collaboration: Unveiling Protocols.io

### May 21, 2024

Sunrise Seminar

- American Psychological Association

Technology Showcases

- National Library of Medicine - Enabling Discovery of Biomedical Research Data: Introducing the Dataset Catalog
- Clarivate - EndNote, Clarivate, and the Systematic Review Lifecycle
- BMJ: BMJ sneak peek - Rising to the Comorbidities challenge
- National Library of Medicine - PubMed and PubMed Central Update

Lunch and Learns

- JOVE

## RESOURCES AND SERVICES

The online conference scheduler allowed the public audience to peruse programs and events online. Registered attendees could use the conference app or virtual portal to identify favorites to attend and receive tips and reminders onsite in Portland and use the virtual portal to view streamed or on-demand content. Individual messaging was available on Twitter using the hashtag #mlanet24. Conference blog posts are available on the MLA website. The MLA Professional Recruitment and

DOI: dx.doi.org/10.5195/jmla.2025.2159

Retention Committee (PRRC) sponsored the in-person MLA ’24 Virtual Resume Clinic.

## CLOSING SESSION, AI SUMMIT REPORT

May 21, 2024

Amy Blevins, 2023-24 MLA President
Emily Vardell, AHIP, MLA ’24 Cochair
Liz Kellermeyer, AHIP, MLA ’24 Cochair
Brenda Linares, AHIP, 2024-25 MLA President
Emily Brennan, 2025 NPC Cochair
Mary Beth McAteer, AHIP, 202 NPC Cochair
Gabe Rios, Chair, AI Leadership Summit Working Group

Amy Blevins: Hello, everyone! If you forgot who I am, (which you can soon, because I'll be done with my presidency), I'm Amy Blevins, your 2023 2024 MLA President. Thank you all for coming to MLA ’24 in Portland or virtually. It's been a really great time connecting with all of you.

It has also been a jam-packed conference with content contributed by MLA’s talented members, and by content experts in new areas. I have really enjoyed seeing how all of you have shared your experiences and your research.

Nothing points more to “Stronger Together” than to experience the amazing creativity everyone is providing in institutions across the globe to our users and stakeholders.

But I think that right now we all are experiencing both exhaustion and exhilaration! Let’s see a raise of hands in the room: how many of you heard or found at least one idea you want to take back to your own institution? Oh, my goodness, it's very dark, but I think everybody raised their hand. How about our virtual audience? Please let us know in the chat within the app what you learned and what you're taking back after the conference.

Any conference involves complex interactions between presenters, volunteers, staff, and venue – and that takes good leadership. Please join me in a round of applause for our extraordinary MLA ’24 National Program Committee Cochairs, Liz Kellermeyer and Emily Vardell!

Emily and Liz, from the bottom of our hearts, thank you for leading your NPC team to bring us this extraordinary conference–and to bring us back to Portland after 37 (log or short, depending on how you feel about time) years–and a 2020 “false start”. [Applause]

We have a very busy session ahead of us today with lots of information to share–but we’ll hear more from Emily and Liz a bit later. [Aside:] So don't get too comfortable on that couch.

We began this conference with traditional continuing education options, but also a focused Saturday afternoon summit on Artificial Intelligence and how we as health information professionals are using or can use AI (as a general term) in our workplaces to help share, help serve our stakeholders. I was forgetting what we were doing to our stakeholders, it's serving them. Don't worry. AI is, I'm sure, benevolent.

To review the progress of that session, helped by generative AI, please welcome Gabe Rios, chair of the AI Leadership Summit planning group, and director of the Ruth Lilly Medical Library, and consequently, my boss and sometimes friend.

Gabe take it away!

Gabe Rios: Thank you. Amy, well, so I heard we have two and a half more hours, right? So I'm going to fill that time. Let me go ahead and… I'm kidding! We're not going to do that.

But we did have a five-hour summit on Saturday. You know, it didn't seem like five hours until maybe the four-and-a-half-hour mark. Then I was kind of like, is this five hours? It took a second. So let's talk a little bit about the AI Summit.

First off, AI activities that we've been doing since November 2023: there is a committee. This was sort of an ad hoc committee that was put together in August, and we've been meeting since then. Back in the fall, there was a free webinar, which was a tool kit for evaluating AI tools. We also had a survey that we put out, this committee put out, and that went out November, December. We distilled some of the results of that. We did a fireside chat that was in March. We were planning February. Wanted a kind of cold and sitting around a fireplace sort of feel but, you know, we were a little late. It's still cold some places in March, so we kind of got the idea, but that was around how librarians are already implementing AI and supporting AI in their environment.

So it was kind of showing us like, these are folks that are already using AI. It may not be generative AI, it may be machine learning, but they're already using it in their environments. There was also another webinar. And then finally, we're to where we are this week, which is we had an AI Summit this last Saturday.

The committee is Michelle Cauley; she's the interim director at UNC Chapel Hill. Sarah Jewell from Weill Cornell University. Shannon Jones from MUSC. Amy Chatfield from University of Southern California. Lauren Jones from BMJ, as we also had vendor representation on this committee, because we want to see how librarians can work with vendors to make these products better. And then MLA staff, you know, Kevin [Baliozian] and Barry [Grant]. And actually, Kate [Corcoran] is not mentioned in there, but she was also on the committee with us.

So what we did again, five hours, is actually kind of a good amount of time. We broke the day up into three sections. The first section was a panel, and it was level setting, and set that sense of urgency we've all been starting to feel, I mean, last, last year at MLA, I would say

DOI: dx.doi.org/10.5195/jmla.2025.2356

there was a very different perspective on AI. There were some AI posters and papers out there this year. There definitely were as well too, and we've seen that perspective evolve over the past year.

So a little bit of a summary from that first panel. The speakers talked about the importance of ethical and responsible AI development in health care. They talked about how human oversight is needed, transparency in the development of AI, addressing bias in AI models. NLM talked about leveraging data science and Gen AI to provide tailored health information and infrastructure to global users. NLM also developed a generative AI Community of Practice, and I actually saw that in several presentations, they're developing these community of practices at different institutions around AI.

The speakers also discussed the potential for natural language processing and using synthetic data to improve data quality and accessibility in healthcare. So for synthetic data was new to me about a month ago. I had not read up on it and heard of it, but basically, synthetic data is data that's artificially generated. It's created through simulations, algorithms and models, rather than being collected from real world sources. So think about how handy that would be, instead of using real patients, real patient information, if you're working on a cure for a rare disease, and you're able to build a much larger sample set using synthetic data, being able to solve problems that way. That is just one example we heard during the summit.

Our second session—this was fun. This was basically a time for librarians to talk to each other and share challenges and opportunities in AI. There are several slides, and the way we set it up is we had people sitting at tables. They were generating responses to questions, they were feeding them into a Google form. It went into a closed AI system that MLA has, so it's not just going out into the wild. The AI system that MLA is using is called otter AI. That information was distilled down…This session was facilitated by Michelle and Sarah. I went ahead and highlighted some key points in here, because even that distillation, it was, it was a lot of information. Again, think about it, we had over 100 participants in this and each participant probably answered several questions, so hundreds and hundreds of responses went into the distillation here.

So the first thing was, what's happening with Gen AI at different libraries and institutions, a lot of faculty training and workshops, using cleanup for institutional data and institutional repositories, research assistance. One phrase I heard that stuck in my mind is we are the the original or OG prompt engineers, Michelle Kraft said that she always has a catchy phrase, I think, so—systematic reviews. You've already seen some examples of that.

Add to the fireside chat we had earlier this year, some education support, employing AI to develop lesson plans, to create rubrics, clinical trials. I'm just going to, like I said, I'm going to flip through some of these, because I think some of these [examples] get a little bit redundant and in the weeds. These slides will be available in the program, I'm assuming? So, yeah, Kevin just gave me a nod.

As far as library initiatives, there were several things that we can start out doing, so hosting AI literacy events or creating AI guides. I know that is something that we do. We create guides all the time. That's usually the first step.

Vendor collaborations and testing. That was the reason we invited vendors to this summit. We wanted to have some vendor input, we really need to have that relationship go both ways. Let's see. We've talked about a lot of these issues, like data privacy and security. I'm not going to go into all these, because, again, even the summary, when I tried to shorten the summary, it gave me a really long run on sentence. So I'll just let you know there's a lot of information here we'll be sharing. All right, let's go the last panel.

Kristi Holmes moderated the last panel. Dianne Babski spoke on that. Dr. David Doher from OHSU—he is a clinician who has developed a training framework on upskilling staff at OHSU and Seymour also, also was part of that panel from Hopkins, and then Natalie Bucha Smith, she's from LC labs, Library of Congress labs. They're doing a lot in the AI space. If you Google LC labs, there are some great links. There are some GitHub links to ways to evaluate AI tools, whether you need them or not. How should you do go about evaluating AI tools, etc?

But again, in general, not to go through another 10 slides. Here's one slide. So this panel, we focused on skills and expertise and roles that are coming out for librarians as a result of Gen AI. We continue to emphasize the importance of critical thinking and education as AI systems becoming more prevalent in healthcare, this is something they're doing at OHSU, the LC labs. They're using AI to generate cultural context for audio and video. We heard a lot of a lot a lot about that at the McGovern lecture, too, if you were attending that, we discussed some new roles that are created by new technologies and AI, and how these roles would require library leadership, but also would require librarians to be project managers. So if that is a new skill set for you, or a skill set you're thinking about, this is a good time to do it, especially with projects related to AI.

And then, just in general, AI can outperform humans in big data tasks, but humans are still, you know, better, I would say, at personal care and therapy. And I know that's going to be up for debate, because I know there are AI chatbots now that are helping with mental health issues, just because our health system, our for mental health care, is not quite up to what the needs are in our population. So this is the slide. So everybody you know get up and stretch and pay attention. This is the last slide. This is the slide I really want you to look at if anything.

DOI: dx.doi.org/10.5195/jmla.2025.2159

Take away from here. These are some action items that we came out with after this summit. Develop a guide. And I know again, that sounds kind of funny, but we always develop guides. But this is a good place to start that we are a player in this sphere.

Attend webinars. Continue to educate yourself. Gen AI is evolving so quickly. This is, though, a lot like most other revolutions that I've encountered in this field in the decades I've been in it. Experiment, we heard that throughout the AI Summit, take the time to download those tools you hear about, whether you hear about them from your fellow librarians, or if you attend other AI webinars that are not from librarians, you may hear about different tools that are out there. Hold events in your spaces that promote responsible AI use. We know our students are using it, at least in an academic health center. We know they've been using it. We know that sets off some alarm bells for our clinician educators, but we know it's here to stay, and they're already using it. Consider your research support services in a new light. Again, within the context of Gen AI, promote your knowledge. That's back to what I said, even starting to create the guide, you are inserting yourself into the sphere of AI. Find out what's going on around campus. Collaborate with people around campus that are doing AI projects.

Investigate impact on licensing agreements. You might have some of your patrons already using data that you have and putting it within closed AI systems, which they're not supposed to do without permission. So there are librarians that are working on navigating licensing agreements around that. Then, if you really have resources and have a larger shop, test large language models and develop prototypes. So again, that's probably out of the reach for most of us, but there are some institutions that have that.

There is an AI imperative strategic goal. This came out in March, was voted on by the board and approved. I don't know if you read it. I'm not going to read it today. It is on the website, though, so keep that in mind. And then my last words. I am excited. I'm also cautiously optimistic about this. You know, I know, if I think about all the things that happened in the decades I've been a librarian, and how excited we were about, oh, web 2.0 or whatever—hey, this is the next thing. So here we are, here's the next thing. I would rather jump on it than be on the sidelines. I'd rather participate. Because if we don't participate, there's going to be another entity within our institutions that is going to rise to that occasion, and we will be cut out of this.

That would be my advice. Remember yesterday what the McGovern lecturer said about the librarians role in technology advocacy and critical thinking. Critical thinking is really most important when you use these tools. Even during the Decade of Does, a lot of them mentioned AI and they were doing reflections. If you didn't attend that session, that is also recorded, and I would take a look at that and remember the importance of distinguishing between data and evidence. We're generating a lot of data, and even just looking at the tool we used in generating these summaries, it's not a perfect tool, and still it generated. Kevin sent me a lot of information and trying to distill that down into a short amount of time--daunting.

That's sort of why I said I need the next two and a half hours, because it was still a lot of information. Throughout that summit, we talked about the need for critical thinking. That is something we do. We also teach that of our students, and that's something we need to teach our patrons and our faculty. Faculty, student, staff, and then remember, this is pretty much the Wild West. This is, again, another innovation is created where there's not policy, there's not governance that's behind this. Listening to the news this morning, Sam Altman, ChatGPT, had released a voice for ChatGPT, and it sounded very much like Scarlett Johansson, which she didn't approve of, and she was asked by him to use her to license her voice. So there are a lot of issues.

There's a lot of policy and governance that is not there yet, and we have a chance to be a part of this--not necessarily all the creative endeavors, but creative endeavors within our own sphere. So I will stop there. Otherwise, I will keep running until and Amy, Amy works with me, so she knows I will keep a meeting going to the bitter end, so No, I won't do that.

Amy Blevins: I think we're supposed to high five now. Well, thank you very much, Gabe, for that extremely extensive summary of what happened on Saturday. Do you guys feel like you were there? I was there, so I feel it. Thank you very much.

And now an area near and dear, I think to all of us, is a new technology solution for MLANET So those of you who've heard me talk about this know that it is going to solve every single problem that we've ever had or could imagine. So I'm very excited about that. I know every time I say that, Kate [Corcoran] thinks, thank you, Amy, thank you for making these promises that we can definitely uphold.

In this we are partnering very closely with our association management company MCI USA, because we are both investing financially in the solution. So MLA is partnering with MCI. We're not the only organization or association that's using the new tool. We've been on the current system since way back in September of 2015 and lest we forget, that system enabled us to bring most of our communities under a single roof, introduced easier management of the website and allowed us to integrate our membership system, communities and website under a single system. How many of you were around for the platform coming out in 2015? Yeah, and it solved all of our problems.

DOI: dx.doi.org/10.5195/jmla.2025.2356

But then we, I guess, got new problems. The board and staff began this process several years ago by looking strategically at what we wanted to accomplish with the new technology. The why? Because despite what the system could do, it has aged, shall we say, not so gracefully. Unlike all of us aging like fine wines, we saw four critical areas of focus for the new technology.

Is this the right slide? First is improving your user experience with the website, with interactions with MLA and with information you need to know front and center. Second was to improve and increase your engagement with MLA, and by that we mean with other MLA members, whether they're AI or real people, communities, and easier processes to do well, everything. For example, your education's transcript can inform your AHIP or specialization application and committee members are notified automatically when your application is submitted and ready for review. Third is to increase our staff's productivity, and by that, we mean to take them out of highly manual data operations or needing to support you on confusing forms or processes and instead give them the opportunity to focus their attention on ways to improve MLAs value to our membership, and fourth is to have all of these things improve MLAs bottom line and overall sustainability.

So how do we get there? To be clear, MLA is not using AI, but we spend a lot of time talking with members about processes and workflows as well as pain points and communications. So anytime you have a problem, you just submit that to somebody, and we will look at it and see how we can improve the process. Staff have taken that information to review Association business rules, user journeys, taxonomy, and data authority to better solve your experiences with all the things MLA offers. And let's be clear, all of this is happening now. So if there's a delay in staff getting back to you, they are not ignoring you but are probably stretched a little thin with both the meeting and the website build. We've had the benefit of MCI design staff in developing wireframes design and navigation and appreciate the members we've consulted to get initial feedback. So now, how about a quick pick at a few things? Do you guys want to see a quick peek? Oh, thank goodness, because you were going to get that anyway.

So, a primary objective that has been to reduce the clutter in a more modern and accessible site. If you're an active member, you may have to-do lists in your personal dashboard, like voting in the election or reviewing jury applications, or you might just want to see your communities and the latest posts in one place to decide if you want to read or respond or pretend you never saw it. We also want to provide seamless access without extra logins all the time to all of the services that MLA offers. We want to provide easier access for members to join public or caucus communities. And you can see a First Data Migration example here from a while ago. And this is not going to be your view, your view will depend on your login status and what communities you're already associated with, whether committees, councils or caucuses. Keep in mind you are only seeing pieces of the new site because the build is still in progress. Our timeline is critical. The current site will go offline at the end of June. So we're guaranteed to have a new site in July.

What I'm getting at that means you're going to start hearing from us about things we need from you, and more details about this timeline, the transition will be an orchestration for us all, as we disable current services to make sure we migrate to the latest data from all the sources on MLANET and MEDLIB-ED, migrate, rewrite, archive or retire more than 8000 pages of content and then restore access to you on the new platform. It's as easy as that.

Please watch MLA connect your email and the MLANET home page closely over the next few weeks. Here's some I am MLA stories. Here's the timeline that I told you about that you can pause in the recording later and totally look at.

So that gets us to, what can you do to make sure that we're successful in this new platform migration? As we remind you to make sure your information is up to date, that you're not in mid CE course, that you are approving your EFTS transactions. Your assistance will make the transition smoother for you and for us in MLA. And what are we? Who's MLA? That's right, We Are MLA so we're all, you know, celebrating together in the success of this new platform.

At this point, I would like to ask some special guests to join me on stage. I mean, the podium, they're already on stage, having a good time on the couch. Would you please welcome our NPC cochairs for 2025 Mary Beth McAteer, AHIP, and Emily Brennan.

Mary Beth McAtteer: We would actually love for our 2024 NPC cochairs to join us at the podium as well. Emily, Liz, and you know what? How about our Board Liaison, Brenda Linares, also, we're going to perform some podium choreography for you.

The attendees here in Portland and online have shared how inspired they are by our speakers and by the innovative and creative work of our colleagues and presenters, together, you and your team had created; created extraordinary content in immersion sessions, papers, education sessions, posters and lightning talks, we thank you so much for your selections. Thank you. [Applause]

Brenda Linares: To the four special programming committees. You put together three great symposia on collection, development and sharing, on leadership and management, on data services, and an AI summit that we heard about earlier. We received so many comments about your excellent selection and the topics that we cover with

DOI: dx.doi.org/10.5195/jmla.2025.2159

different speakers and really appreciate the live streaming too for the people attending the conference virtually. We thank you for contributing to the success of the 2024 MLA. [Applause]

Emily Vardell: Thank you so much. We've been receiving such wonderful feedback, and so glad to hear that this has been such a meaningful conference experience for everyone. To the 2024 Local Assistance Committee, thank you for graciously hosting us in your totally awesome and weird city. While we may not have gotten a glimpse of the giant Sasquatch, we do have Amy's tiny Sasquatch available for viewing. We've certainly enjoyed the TriMet passes to easily get around, the recommendations for sites and visits and the amazing interactive restaurant guide. I think we can all agree, we've had a fantastic time in our host city of Portland. [Applause]

Liz Kellermeyer: And new this year, we wanted to give a shout out to the 2024 virtual assistance committee who sponsored the wonderful Padlet, provided information for virtual attendees in advance of the conference, and created networking sessions specifically for our virtual registrants. Thank you for contributing to the success of MLA '24. [Applause]

Brenda Linares: And of course, we couldn't do all of this without the conference staff. You always help plan the logistics and help us have a great, terrific meeting. We all are still impressed by how you figure out what to do when we need to where things need to go. And you always help both the in person conference and also the virtual conference. And so if you saw them, they were all running in different places, here and there, and they were always doing a good job. And at the same time, they knew what they had to do. So if you interrupted them and talked, they would go to where they needed to go. Thank you for all your hard work, and you know it really paid off, because, as you can see, we had a great conference. So thank you. Thank you. Thank you, MLA staff. [Applause]

Emily Brennan: We extend our profound appreciation and gratitude to MLA exhibitors and sponsors and hope to see you next year at our meeting. Our huge thanks to our talented information professionals and people of Portland for this excellent conference: you provided us with unlimited possibilities and a high bar to meet for our conference in 2025. [Applause]

Liz Kellermeyer: Okay, so we know we're going to be in Pittsburgh, and we know that we're going to get the official invite in August. But is there anything you can share with us now?

Emily Vardell: Maybe just a little hint?

Mary Beth McAteer: Well, maybe a few details. We will be at the David L Lawrence Convention Center in Pittsburgh with an attached hotel, and our chosen theme, drum roll, is "Spanning Tradition and Innovation."

Brenda Linares: So I hope to see many of you there, so start preparing, and hope to see you in Pittsburgh to have a lot of fun and enjoy the city. And so you're going to get more information about that conference in in coming months. Please be on the lookout for that information. Without further ado, this is kind of like the sad, happy part of the of the meeting, I would like to turn the podium to our president of MLA. Amy.

Amy Blevins: Oh, thank you so much. Incoming president, Brenda Linares, I can't wait to turn everything over to you. [Laughter]And thanks to all of you for coming up here and sharing that sneak preview of all the exciting things happening in Pittsburgh. Somebody told me in the exhibit hall that there is this thing that moves people up hills, and I was just imagining like this giant hand grabbing people and taking them up a hill. So I can't wait to find out if that's what it is.

I hope all of you who have been in Portland have had the opportunity to visit the displays about MLA's history and to get your photos taken next to the anniversary booth. If anybody right now is thinking, "Oh no, I did not get a photo with the anniversary booth!," if you look back in the corner, it's right there. So you still have the opportunity to take pictures with your friends and find out if they're going to come back to haunt--I mean to enjoy later at future MLAs.

MLA officially started its 125th anniversary year on May 2, 2023, and as we have come to a close with this conference, we are also closing out our 125th anniversary year. Not all of our activities are complete. Our updated milestones and notables will still be in articles this summer, and that will likely be on the new MLANET. It's coming in July, which will be a wonderful transition. Now, before we finish waving our fans around and celebrating the 125th year, I would like to invite Mary Langman to join me up at the podium.

As many of you know, Mary retired officially in January of 2024 but we couldn't let her get off that easily without celebrating her in person in front of everybody. So thank you so much for being gracious and allowing me to invite you up here last minute so that we can all thank you for all of the hard work that you've done throughout the years, for MLA and for kicking off our 125th anniversary and working with so many of us to make things a success. So thank you, Mary. I'm so glad you joined us from Chicago. Would you like to say anything?

Mary Langman: Thank you. It's been a wonderful 35 years, and I couldn't have had a better group of people to work with and make friends with and learn from and mentor and just be part of your community. So thank you.

Amy Blevins: I promised Mary I wouldn't make her stand up here for that long. So for those of you in the room, we have treats. Did everybody find the cake? Yeah, okay, awesome. Is there any left? If you didn't get any cake, or

DOI: dx.doi.org/10.5195/jmla.2025.2356

you want to pretend you didn't, please grab some, go to the back corner, get a picture with the photo booth, and for those who of you who are joining virtually from online, thank you so much for attending MLA. We want to let you know that we missed seeing you in person, in our hearts and in our minds, but we are excited to hear and read all of your chats online, and maybe we will see you in Pittsburgh next year. So is everybody ready to leave the stage? Do you have your fans ready?

Happy sesquicentennial, I can't wait to see you all in Pittsburgh. [Applause]

## OTHER MEETINGS AND EVENTS

*Please note not all meetings are included due to system transition June/July 2024.*

**Academic Librarians**: Academic Librarians Caucus Meeting, September 25, 2024, December 4, 2024, UME Fall Chat, November 13, 2024; **African American Medical Librarians Alliance**: Navigating Disruption in Libraries, January 25, 2024, Strategies for Thriving Amidst Disruption, March 28, 2024, Words of Wisdom, February 1, 2024; **Clinical Librarians and Evidence Based Practice**: Leadership Meeting, August 6, 2024, Caucus Meeting, December 9, 2024; **Collection Development**: Leaders Meeting, February 12, 2024, Business Meeting, April 20, 2024; **Federal Libraries**: Caucus Meeting, January 26, 2024, Business Meeting, April 19, 2024; **Health Association and Corporate Librarians**: HACL Meeting, November 12, 2024; **Health Humanities**: Quarterly Speakers Event, May 30, 2024 Caucus Meeting, October 20, 2024; **Hospital Library**: "Why I Love Being a Hospital Librarian" February 14, 2024, Board Meeting, July 8, 2024, September 9, 2024, November 11, 2024; **Libraries in Health Sciences Curriculums**: Business Meeting, April 29, 2024, Caucus Meeting and Update, September 19, 2024; **Medical Library Education**: Mid-Year Business Meeting, December 13, 2024; **New Members**: October Meeting, October 17, 2024; **Pharmacy and Drug Information**: Caucus Networking Session, February 22, 2024, Business Meeting, April 20, 2024; **Public Services**: Open Forum, October 3, 2024; Science: Business Meeting, September 17, 2024, November 19, 2024; **Systematic Reviews**: Bi-Monthly Meeting, June 12, 2024, August 14, 2025, October 9, 2024, December 11, 2024; **User Experience**: Caucus Session, February 1, 2024, June 6, 2024, August 1, 2024, October 3, 2024, December 5, 2024; **Vision Science**: Business Meeting, April 17, 2024.

## 2024 ANNUAL BUSINESS MEETING, PRESIDENTIAL INAUGURAL ADDRESS

June 5, 2024

Amy Blevins: Good afternoon, everyone.

I'm Amy Blevins, your 2023-2024 President.

It's my pleasure to welcome you to the 123rd Annual Business Meeting of the Medical Library Association.

This is our fifth electronic business meeting. Our first business meeting was in 2020, as a consequence of COVID-19. We chose to continue holding our business meetings virtually instead of at the annual conference. This helps us be more inclusive for this meeting and frees up time for conference content.

It is wonderful that so many of you are participating with us today.

Here is today's agenda:

We will begin with the In Memoriam. I will present my Presidential Address.

We will then move into the business portion of our meeting which will include:

- the presentation of your current MLA board of directors
- reports by the MLA Treasurer and Executive Director
- election results and the presentation of your new MLA board
- and this year we will … not have any proposed revisions to the MLA Bylaws. That should save us about 5 hours!

We will conclude today's session with an Inaugural Address from your 2024-2025 MLA President, Brenda M. Linares, AHIP.

Before we get started, here are a few guidelines:

- All MLA gatherings and interactions need to respect MLA's Code of Appropriate Conduct. Please consult it online. If you need to report a violation, there is a link to do so on the web page.
- We are using Zoom webinar today, with which, by now, you are all likely extremely familiar.
- We will be using the "raise your hand" feature" for official business only. We'll walk you through procedures in a few minutes.
- We will NOT be using the Q&A feature today. During the year, we offer topical open forums on many areas of MLA to invite conversations and questions, and offer a better experience for dialog.
- Feel free to use the chat, but please note that we will NOT be monitoring the chat for questions. If you have a question that you would like addressed after the meeting, please email president@mlahq.org.

DOI: dx.doi.org/10.5195/jmla.2025.2159

MLA upholds a tradition of pausing to honor our cherished members who have passed away over the past year. Their counsel and friendship will be deeply missed.

*Kate Corcoran shared photos and stories of the following MLA members who had died since the last annual meeting. Please watch the JMLA for official obituaries.*

- Ted Thaxton Campbell, 1936-2023
- Rosalind Farnam Dudden, 1944-2023
- Ernesta Eunicia Greenidge, 1951-2024
- Joseph John Harzbecker, Jr., AHIP, 1959-2024
- Gloria Jane Bridges, 1949-2024
- Fred Wilburn Roper, 1938-2024

*Amy Blevins presented an update to her Presidential Address given in Portland for the MLA Business Meeting audience. It is available for viewing on MLANET.*

Amy Blevins: To get us started with the annual business meeting. I would like to recognize Chris Shaffer, MLA's Parliamentarian. Chris will assist us with the business portion of our meeting.

Chris Shaffer: Thank you, Amy. So hopefully, this won't be a five-hour business meeting. We don't have any bylaws this time. Hello, fellow MLA members. As Amy mentioned, this is our 5th electronic business meeting, so my explanation should be familiar to many of you. It'll be a little shorter this time around. Robert's Rules of Order allows business to be conducted by unanimous consent, which removes the need for discussion and a full vote. Any member present may object to unanimous consent, and require the President to open the floor for discussion and put the question to the members for a vote. Today we plan to use unanimous consent, and we'll use the raise your hand feature to allow members to register an objection. Note that all new business must be presented by a member in the form of a written motion, and submitted to the President, and of course members are strongly encouraged to submit motions in advance of the meeting. Back to you, Amy.

Amy Blevins: I am pleased to introduce Linné Girouard, AHIP, FMLA, and MLA 's Sergeant at Arms, who will assist us with the counting of the quorum.

Linné Girouard: I'm happy to be back and here to do my annual meeting duty. As you know the Sergeant arms is responsible for monitoring the logins and the counting of the membership [for this meeting]. We need 200 members for a quorum. You were counted as you logged in with your email address, and your name was recorded. So at this moment the count is 228. We have a quorum.

Amy Blevins: Fantastic! Thank you, Linné. I will now call our meeting to order.

I would now like to welcome Tamara M. Nelson, AHIP, MLA Secretary. Hi, Tamara!

Tamara M. Nelson: Hello! Hi, Amy and fellow MLA members, great to see you all again! I'm excited to be joining today again as secretary, and as MLA Secretary, I get to review board minutes. I also get to present the agenda for the 2024 business meeting which you can now see on your screen. It's also available on MLANET; we've done the first three items already.

And now I will turn it back to Amy.

Amy Blevins: Thank you. Chris, Linné, and Tamara, please don't run away anywhere, because we may need to call on you.

Now please welcome Kevin Baliozian, MLA's Executive Director. Hi, Kevin.

Kevin Baliozian: Hello, Amy! How are you? So it's great to be here, and you know my first duty here is to have the honor to introduce the 2023- 2024 current MLA Board Directors wonderful group of leaders. And certainly this year has been exceptional, and they have steered us through the post pandemic years and other issues of global impact.

So thank you very much to Amy Blevins, AHIP, President; Brenda Linares President-elect; Shannon Jones, Immediate Past President; Tony Nguyen, Treasurer; Tamara Nelson, Secretary; and Tara Douglas Williams, Emily Hurst DeDe Rios, Jana Lawrence, and Keith Pickett. I also serve as a non-voting, ex-officio member. Here are the pictures of your board members, and by now you should be able to match the names to the photos. Back to you, Amy.

Amy Blevins: Thank you, Kevin. Now please welcome Tony Nguyen, AHIP, your MLA Treasurer, who will spend the next few minutes regaling us with an update on our finances. Tony, welcome to our business meeting. It's always great to see you, and I heard that you are dressed up just for us today. Is that true?

Tony Nguyen: Sure, we'll go with that. Hello everyone.

As your treasurer, I share the financial stewardship of our association with Kevin, MLA's executive director, and rely on the insights and review of the Finance Committee to ensure the Board of Directors can exercise its duty of care.

The Finance Committee was very busy this past year. We

- reviewed the budgets and financials prepared by the MLA staff,
- worked with independent auditors to ensure our association's compliance and best practice,
- set MLA's investment strategy with MLA's Independent Financial Advisor,
- examined Key MLA pricing models,

DOI: dx.doi.org/10.5195/jmla.2025.2356

- analyzed contract terms with MLA's Management Company, MCI USA,
- ensured the continued financial sustainability of MLA and our pathway post pandemic,
- reviewed and approved funding requests from caucuses and domain hubs in collaboration with representatives of the Community Council, and
- communicated with members through MLAConnect and financial discussions during the MLA Presidential update earlier this year.

I am grateful to have been supported in my role as treasurer by an experienced group of colleagues. Please take some time to thank the members of the Finance Committee.

- Dr. Shannon D Jones, AHIP, FMLA, MLA's Immediate Past President
- Melissa De Santis, AHIP, an MLA member-at-large
- Andy Hickner, a member of the board
- myself
- Kevin Baliozian, MLA's Executive Director
- Kristie Hammill, MLA's Director of Finance

Let's start by reviewing financial numbers. Yay. [slide]

- 2019 was the last year prior to the start of the global pandemic, so it's useful to include it for comparative purposes.
- 2019 through 2022 numbers have been audited.
- 2023 numbers are pre-audit, so the numbers shown currently may be adjusted later by MLA's audit firm.
- The 2024 budget plan is in the last column to the right.

The top three lines are what we refer to as "operating": that includes all financial activities except investment revenues and disbursements from the MLA endowment for awards and grants.

- Revenues decreased in 2020 and 2021 because of the loss of the in-person conference, partially recovered in 2022. Revenues are significantly higher in 2023 and in the 2024 budget plan.
- Expenses remain high, because we opted not to cut programs and invest instead. 2024 budgeted expenses are lower than in 2023.
- That in turn, creates a net operating loss for all 6 years, though significantly reduced to nearly breaking even in the 2024B budget plan.
- The non-operating net margin is the difference between the financial revenue of our (endowment and reserves) and the disbursements from the endowment fund. As you can see, MLA had excellent financial performance from 2019 to 2021, more than offsetting the operating losses in those years.
- The financial markets were down in 2022, so the non-operating loss exacerbates the operating loss rather than offsetting it for that year.
- In 2023, the financial markets were back up, with a gain that more than offset our operational loss.
- When you add operational with non-operational, you get to the net change in assets. In the 2019 to 2023 period, the total drop in net assets was $622,000.
- Though this is a large number, MLA's financial strength is more than able to absorb this extraordinary financial disruption due to the pandemic, and we are set for rebuilding net assets in the coming years.

The 6-year operating revenue graph is an exciting slide. We not only reversed the decrease in revenues related to the pandemic, we are breaking records in revenues, now above $3M.

As a reminder, operating revenues are the total of all MLA revenues excluding revenues from investments. Raising operating revenues is the primary measure of growth. Growth is essential to long-term sustainability. Growth was also the strategy set by the board in 2017 and again in 2020 and 2021 during the pandemic.

Where does that revenue growth come from?

- Increase in pricing in line with inflation
- Increase in the volume of purchases from members, as MLA offers more relevant programing
- Increase in the number of individuals participating in MLA programs
- Increase in the number of non-member customers
- New revenues, also known as "revenue diversification"

This pie chart illustrates the diversification of 2023 revenues. You can see that:

- A successful annual conference remains essential to MLA revenues, just under 50%. It is typical of professional associations like MLA.
- Membership contributes only 20% of total revenues.

DOI: dx.doi.org/10.5195/jmla.2025.2159

- Continuing education, credentialing, and specializations are on a steady growth path, at 16%.
- EFTS, the MLA-owned billing platform for DOCLINE transactions, contributes 9% of revenues. It provides an essential service to libraries AND contributes to MLA's bottom line. *This in turn reduces the pressure on dues and conference price increases*.
- Note that vendors contributed 26% of 2023 revenues, which is *significantly lower* than the 35% pre-pandemic. Unfortunately, we expect this trend to continue.

This graph [slide] illustrates the 6-year variations in operating expenses.

Post pandemic inflationary pressures are significant, especially with labor. Labor costs include the cost of the MLA staff and the cost of indirect services at the annual conference, such as AV and hospitality.

In 2024, we reduced the MLA staff team by 1.25 FTEs which explains why total costs are going down.

We have an objective to increase our operating margin by $200k through continued cost management and new revenues.

MLA's turnaround is a result of a multi-year strategy. The bottom line is:

- MLA has a long-term strategy to balance revenues and expenses, and rebuild net assets. Revenue growth remains essential.
- Regarding MLA investments, even taking into account the large $523,000 loss in 2022, the average annual gain over the last 5 years is $207,000 per year. That gives us a small cushion and expands our path for long-term transformation.
- Our cash position is strong. We also applied for and received a $500,000 COVID-19 Economic Injury Disaster Loan in 2021 at a 2.75% fixed interest rate. That increased our flexibility. We are paying it down monthly, and can reimburse it at any time over the 25 years of its term. The last time we used funds from our reserves was in July 2022.
- Our net assets are at $3M as of December 31, 2023. That's one year of expenses and is considered a strong benchmark.

In summary, I am happy to report that the state of MLA finances remains strong. I will add that we could not have gotten this far without the support of MLA's finance committee, the MLA board and staff, and MCI.

Amy Blevins: Thank you, Tony. The board is grateful for your diligent stewardship of the entire financial team. and for those of you who may have missed it. Tony also was kind enough to write an *MLAConnect* article on finances. So if you want to learn more about the way that MLA operates financially, you can go to that link within the chat.

The next order of business is the Executive Director's report, and I believe Kevin is going to talk to us about the new platform, right?

Kevin Baliozian: The one that will solve all our problems.

Amy Blevins: That's right, Kevin. Your words, not mine this time.

Kevin Baliozian: So I really truly recommend everybody looking at the headquarters report, and, in fact, all of the annual reports, and we'll have a slide and a link on that. They are full of great data and activities on programs. On the screen is just a fun selection of some of that data. We have metrics on all of the different levels of participation in all of the programs of MLA. This is a time where we report the number of members and other interesting participation information we have as of May 30 of this year.

[We have] 2,339 members; we're on an annual year, January one to December 31. So we do gain more members [past May]. Last year we had 2,346 at the same time. So essentially the same number, 7 less. Can we say it's even Amy. I think we can. So no change in in in membership counts.

A few things are interesting here, is that twice as many individuals participate in MLA than our members. That's the customer number. That's the number of active individuals who are taking part in things that we do that aren't counted in the 2,339 number. So that's a, that's a big piece. We have a lot of people who are using MLA courses, come to conferences, do various things, but who don't necessarily join as members.

On the right. You see the participation of caucuses, 76% of MLA members participate in caucuses; those who participate in caucuses join 5.2 caucuses on average, and this number is growing each year since we removed the fees to join sections at the time, right when we everything became caucuses. And below, you can see the data for the MLA conference, it was very successful both in person and virtually.

And this next slide here actually shows in blue the in-person attendance of the conference; in orange, the virtual attendance. Clearly, 2020 and 2021 was the pandemic and you can see a gradual return to the in person conference from 2022 through 2024, with still a significant 22 or so percent of individuals attending the conference virtually.

Amy mentioned the board discussions and strategic goal discussions. And the AI [Imperative] has been officially

DOI: dx.doi.org/10.5195/jmla.2025.2356

approved as a strategic goal, and you can see the bullets there of what it is looking to achieve at a very high level.

There are 3 areas that the Board discussed in its main meetings. You mentioned Amy, the leadership at all levels. You mentioned expanding audiences and advocacy with the accrediting bodies was also something that the board MLA could focus its limited resources better. In influencing accrediting bodies, in appreciating the value of health information professionals.

So now the technology sneak peek. These are a couple of screenshots. I hope you speak Latin because some of the text in those were in wireframes, a normal live site that we're putting together. I understand that AI does not understand Latin as a translation language. So we will have things in English that should make things a little easier. Because we are making the live site as we speak. These are to illustrate the 4 areas that we are intentionally looking to improve and how we're doing it.

The first one is clearly improving your user experience. And that means a whole bunch of things which we define on the right. And I'm not going to read them, but improving the experience of customers and members through all of those different things is critical. The second is to improve the user engagement. Of course that's connected with the experience. But the engagement goes further. And there are some very specific items related to how do we keep people engaged. How do we get a new member engaged? How do we get people to participate through reminders to things, etc.?

Staff productivity is a very big piece of what we're looking to improve. We do have pressures and are trying to do more with less. And that's impossible to do without high productivity. We have identified all of the areas that we consider are too manual that could benefit from automation, so that the staff can focus on non-menial tasks and on value building. And we need to improve the return on investment. We define that in 2 ways. One is for you as the individual participating, that you have a much better return on your presence on the website and what your membership provides. And of course, the return on investment on the association that we achieve through productivity gains, and through having more people participate and be more engaged.

Last is the timeline. I don't expect you to memorize this, and we are going to be communicating next week, but because of our limited abilities to do 10 million things at the same time, we are going to switch the current site off on the end of the day of June 26 and move to the new site. But the logins will be disabled for a longer period. So all of the activities that people do such as take courses, renew memberships, join participating caucuses. Those types of things will be unavailable. For 10 days. We realize that that's rather large. It does include weekends and the 4th of July weekend. So I recommend you have a barbecue while we continue to work. But we will be doing this in stages. Obviously, there won't be any dark time for the public side of our website. You'll be able to see the website, but you won't be able to log in for a few days.

It may be earlier than Monday, the 8th but we are giving ourselves enough time. There's a lot of data we're transitioning and we want to make sure that we don't lose anything. Your applications, your history, your AHIP history, all those things and that takes time to get the data. And then, if the data is not in, the things don't work quite right. So it's not just a website transition. It's all our database transitions, including the LMS and all of the satellite databases all being changed at the same time.

There you go. It will solve all our problems. We hope! Back to you.

Amy Blevins: Thank you, Kevin.

The next order of business is to present the 2023-2024 annual report. Our MLA annual reports are valuable for all of us to read, so you may discover parts of MLA you did not know, or incredible things that your colleagues have enabled. Take time to read them, even if it's just the executive summaries, although I'm sure those are so riveting you won't be able to stop yourself from reading the full text. Those reports show the immense diversity of our communities and our programs. They are also part of MLA's archives. So if your name is in there, you are officially recorded for posterity. So basically, MLA famous. This slide shows all of the MLA components that contribute to this comprehensive document. The reports are available on MLANET, along with reports from past years.

Those who are nominated each year as potential members of the MLA Board of Directors are selected by virtue of their experience and reputation to serve the Association, but few can imagine beforehand the level of commitment that election to the Board requires—and it seemed like even more so this year. Directors who have completed their term on the MLA Board have served our association with enthusiasm, dedication, grace, good humor, and perseverance. The Association and the Board of Directors express our appreciation and recognize each of you today for the extraordinary work and thoughtful leadership that you have provided during your term of service. Thank you for a job well done.

I'd like to recognize specifically Tara Douglas Williams and Jana C. Lawrence, AHIP, FMLA. It's been wonderful serving with you on the board. I also want to express my sincere gratitude to Shannon D. Jones, AHIP, FMLA, MLA's 2022-2023 President. And I want you all to know that Shannon has been on the Board of Directors for 6 long years, although I'm sure it flew by for her. Shannon, I'm pleased to thank you on behalf of the MLA. Membership for your leadership. During your Presidential year we were impressed by all the activities you undertook during your year as President, and this year, as Immediate Past

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President. You have been a calm and steady presence, as you encouraged our MLA community to strive for work-life balance during the post Covid pandemic. Your MLA Be Well series has gifted us with refreshment, emotional strength, and resilience. I know I have greatly benefited from participating in these sessions and share my gratitude to you for spearheading this program, which, as I mentioned earlier, is now an official MLA program with its own committee.

Shannon, long before and throughout your presidency you have championed MLA's vision to foster excellence and commitment to diversity, equity, and inclusion in professional practice, leadership of health sciences libraries, and information professionals. We can all learn a lesson from your book by reminding ourselves to be more humble, compassionate, empathetic, and have genuine care and concern for all humanity. You have been described as someone who takes chances on people, valuing those others might not see as valuable. This was visibly transparent when you appointed everyone who applied for a 2022-2023 committee.

And finally, we would be remiss if we overlooked some of the unique challenges you faced during your Presidential year, completing your doctoral degree, Dr. Shannon Jones, and rebuilding your library, all while serving as the director of your library and serving your community through your involvement with the Girl Scouts. Congratulations on a job well done, and thank you.

Shannon D. Jones: So, Amy? Wow! Thank you so much for your kind words it. It was truly a honor and a privilege to be trusted by our MLA members to represent and to serve them over the last six years, so to speak, and especially during the three for the Presidential term.

I am so proud of you. I am very confident that you will do a wonderful job as past President. And thanks to everyone who supported me throughout the year. And I did, I brought the gavel out because I've been waiting to receive this thing for 3 years, because it's so beautiful and I will cherish it. I had to work real hard to get it home, because Homeland Security said it was a weapon, and so I had to work hard to get it from Portland to here, and so I will cherish it forever. I also want to thank Amy for the beautiful cake set that you sent as a parting gift. if you were at the conference last year, you probably saw the interaction between Amy and I with the cake, and there's a picture circulating on the MLA website with Amy pointing a knife at me and the picture caption should say, "Shannon, either get your stuff together, or I'm going to cut you with this knife." And so she sent me the most beautiful knife, and it's engraved with MLA on it, but every time I cut a slice of cake I'll think about you, Amy, and I'll make sure that I always get myself together.

But no, thank you all so much, and thank you again, Amy. Thank you to Brenda. I'm looking forward to supporting Brenda from the audience next year. Thank you all to the MLA Headquarters staff, who also make the job of being the President so worthwhile, but also, they allow us to be able to do it because they really support us in the background. So thank you all so much, and I will hand it back to Amy.

Amy Blevins: Thank you, Shannon, and I will say I knew we had it under control that whole time, and people doubted us because it was a heavy cutting board under that cake, but we had it. We were not going to drop that cake! I was gesturing, you know, triumphantly at how well we were doing by managing the cake.

Shannon D. Jones: That's not what the picture tells. [Laughter]

Amy Blevins: Can you imagine if we dropped that cake? Oh, my goodness! So to get back to business!

The MLA 2024 election was conducted from March 4 to March 18 of 2024. Voting statistics can be seen on your screen, and election results were announced on March 28, 2024 in *MLAConnect*. Following are the election results.

Nine individuals were elected for a one-year term to the nominating committee. Their names appear on your screen:

- Nell Aronoff
- Lindsay E. Blake, AHIP
- Elisa Cortez, AHIP
- Diana Delgado, AHIP
- Kenya Iverson
- John Mokonyama, AHIP
- Joey Nicholson
- Michele L. Mason-Coles
- Shannon Shaunette Glover, AHIP

Heather N. Holmes, AHIP was elected to serve as president-elect. Welcome back to the board, Heather. Heather actually served on the board from 2020 to 2023, but it seems she could not get enough. Congratulations also to Kate Flewelling, AHIP and Liz Kellermeyer AHIP, who were each elected by the membership for a three-year term to the MLA Board of Directors.

And now it's time for my year as MLA President to come to a close. It's my honor and pleasure to introduce your 2024-2025 President, Brenda M. Linares AHIP, Associate Dean of Library Services at UMKC Libraries, University of Missouri-Kansas City, Missouri. Brenda is dedicated to fostering an inclusive and innovative environment that supports the academic and research needs of the university community. Her leadership emphasizes collaboration and continuous improvement, ensuring that

DOI: dx.doi.org/10.5195/jmla.2025.2356

KC Libraries remain a vital resource for students, faculty and staff.

Brenda has been actively involved in various capacities within MLA at the national level. She's been a member since 2008 and served on the board of directors from 2020 through 2023. Her contributions include participating in the continuing Education Committee, the *JMLA* Editorial Board and several juries, such as the Lucretia W. McClure Excellence in Education Award Jury, and the MLA Scholarship for Minority Students Jury.

Brenda is also a co-founder and co-convener of the Latinx Caucus (which just celebrated their 10-year anniversary!) and has been actively involved in the Leadership and Management Caucus.

In addition to her MLA activities, Brenda has engaged with other professional organizations such as Reforma and the Association of North Carolina Health and Science Libraries. Her contributions to the field have been recognized through several awards, including the NNLM R3 Emerging Leader Award in 2021 and the MLA President's Award in 2020. Brenda's work has also earned accolades such as the MCMLA Annual Conference Viewers' Choice Award Winner Poster in 2020 and the Majors/MLA Chapter Project of the Year for the Mid-Atlantic Chapter Diversity Task Force in 2018. These honors reflect Brenda's commitment to advancing library science and supporting diversity and inclusion within the profession.

On a personal note, I've known Brenda for a long time, and she is one of the kindest and most welcoming people I've met at MLA. It's been lovely to see her and Emily welcome Clara into the world and see them introduce her to MLA, and I've enjoyed serving on the Executive Board of Directors with her. I know that she will do wonderful things during her upcoming presidential year.

And now I am thrilled to pass the gavel to my distinguished colleague Brenda M. Linares, AHIP.

Brenda, are you ready for me to throw the gavel to you?

Brenda Linares: Got it.

Amy Blevins: Oh, good catch. I was worried you weren't going to!

Brenda Linares: I got it. That was a good throw.

Amy Blevins: I'm thrilled to pass the gavel to my distinguished colleague, Brenda M. Linares.

Brenda Linares: Amy, on behalf of the membership and headquarters staff, thank you for your strong leadership and countless hours of service this past year. I felt so fortunate to get to know you as a colleague, as a friend, and work closely with you on the board last year, and, as you can see, your cheerful demeanor and steady presence have encouraged a lot of our MLA community to make sure they pursue a work and life balance in the post pandemic era. We all can learn a lot of lessons from you and your patience.

You kindly guided us through that extended four-hour 2023 business meeting, encouraging all our members to make sure that they voiced their opinion if they had something to say, because our membership voices matter. And so you made certain that everybody was heard, and that we listened to them, and were able to accomplish all that we needed to do in making changes to the bylaws. So thank you for that, and your effective leadership facilitated the bylaws vote which successfully passed last Summer.

Knowing that there may not be enough opportunities for people to learn how to conduct educational research and assessment, you spearheaded the creation of a joint MLA/AAHSL Education Assessment Task Force. And we look forward to seeing what they do and seeing how that's going to make a big difference in our profession. And so also, as we learn more about AI, and how important it is to our profession, you were also leading voice in effectively guiding us, in making sure that we had that as part of our strategic plan and goal. And I look forward to hearing how that working group is going to do that. And so we are very pleased to have your leadership, your proactive, engaging leadership; how you led our board and your commitment, your energy, your positive attitude. Your commitment to the members making sure that we all had a voice in every discussion, not just with the business meetings or last year, but also in the MLA Board meetings that we've had. So we definitely enjoy working with you and having that encouragement when we had those meetings.

so, as part of your service to the MLA Board, I know that we at the meeting in May were delighted to present you with a silver cup as a token of our appreciation. So if you can show it to our members so they can see it, and they can see how grateful we are for your service. And I know that your service is not done yet, because I look forward to working with you as past president in the incoming year as a as we as I as I work in the MLA Board. So I look forward to doing that. A I hope that you would display that cup, probably in your office, which symbolizes a year of when you did a lot of great things for MLA. So thank you again for your leadership. I really enjoy working with you. I'm so glad to call you a colleague, a good friend, and I know that I have someone out there to reach out if I have any questions. Now that I'm President of MLA. And the same thing with Shannon. So thank you so much for your leadership.

Amy Blevins: Thank you, Brenda, and I'm very excited to have my silver MLA President's Cup in my office. And thank you so much to all of our MLA community who made this possible. It's been wonderful working with all of you, and I'm going to turn it over to Brenda.

DOI: dx.doi.org/10.5195/jmla.2025.2159

Brenda Linares: MLA members. I'm very pleased to present you the 2024-2025 Board of Directors. These are the members. Congratulations to all of the directors on being elected.

If our names are not yet familiar to you, especially those who were elected this year, I hope that you can go up and look at their names and their backgrounds, and be able to get to know them better. And here's our photos. So you can have a picture of what we look like and know that hopefully, you'll get to see many of us in future forums, and committee or caucus meetings or chapter meetings, and be able to reach out to us if you have any questions or ideas that you want to provide about MLA as a whole, because again, we want to hear your voices and your ideas. And then here's our group photo o the Board of Directors with the outgoing and incoming members that we took in Portland last month. It feels like it's so long ago. But here's your leadership group. And I really have enjoyed working with all of them and look forward to working in this new year. So now I have the honor to finish the remaining item of business before we adjourn this business meeting.

So next are resolutions. We have no resolutions at this time, so I will move to new business. I'm very grateful to see that there is no new business in our agenda. So let's welcome again our board secretary, Tamara Nelson, for the final item of business today.

Tamara M. Nelson: Thank you, Brenda, and congratulations on your presidency. I'm so excited to be working with you. I moved to adjourn the 2024 MLA annual business meeting.

Brenda Linares: Thank you. It has been moved to adjourn. I propose to approve the motion by unanimous consent. Any member may object, in which case we will call for discussion on the vote. Please raise your hand if you have any objection.

Since there's no objection, the motion is passed and the meeting is adjourned. Thank you for attending the MLA Business Meeting. But wait, there's the last item to go through, and that is my space right now to share with you my presidential address. I'm hoping that you all can see my slides… Okay, great.

Well, thank you so much. To start with, I'd definitely like to thank all of the people that voted for me to have this opportunity to be your MLA President. I'm really excited about this opportunity. I'm looking forward to working with many of you. But before I get started on some of those things that I would like to do, as I'm working with MLA Board is some of you know me, but some of you might not. And so here's actually a picture of me that I was able to find from my first MLA that I attended in 2008 in Chicago, and it's interesting to think about it, that is, connections bridging the gap and I remember how excited about the conference I was because it was my first MLA. And just to think about where I am right now, many years later, it feels like such an honor. And I'm very humbly accepting this responsibility that you all have been telling me.

So here's what you are going to be hearing about me today. Many of you know me, but some of you might not. And so here I'm going to tell you who Brenda is, share with you some of the values that I intel with my professional life. But I definitely want to make sure you know that we're good. What are the things that we're going to be working on together? And then, two things that I would like to work on that are part of our core values and our strategic planning as a whole, and something that I brought up when I was running for President two years ago.

So who is Brenda Linares? Well, as many of you know, I'm a Latina woman. But many of you might not know that my family and I are from a small country in Central America, Guatemala. Some people might not even know where that is located. So here's a map of that beautiful country where I was born. I'm very proud of that culture, very proud being "chapina" we call ourselves. That's how some of my personality has been influenced by where I was born and where my family is from. Many of you might know it, because it has a very famous location, Tikal, which is the Mayan ruins; or Antigua, where a lot of people tend to go for Holy Week because they have this beautiful procession. I haven't been to it, but I hope to go one day, and I'm actually part of the country that borders El Salvador. So I'm actually from part of the southeast area of the country itself. I'm very proud of that heritage. So that's where my family is from.

Some of you might know, some famous people that you might know from Guatemala are Rigoberta Menchú, who got the Nobel Peace Prize for her work with peace Guatemala with the Mayan community. And there, so it was really great that she worked on that. So I'm glad to have a strong woman from Guatemala doing that. And then, of course, we claim Oscar Isaac, because his mom was from Guatemala. So I'm really proud that he's someone that's well known from Guatemala, and if you're a Star Wars fan like I am, you might have seen Star Wars episode 4 A New Hope, and you can see the ruins there. So if you go back to the movie, you can see that that's basically they went to Guatemala and that's basically the minor ones that I'll just show you in the previous slide. So that's really cool a little bit up with the Guatemalan background.

So I said I was born in Guatemala. I came to the United States when I was 10 years old, and my sister was 7 years old, and so my parents brought us to this country for a better future, more opportunities for, for our family, and we were very grateful for that. But it was also a lot of change that we had to go through because it was a new culture, a new country, a new language. And I had gone to

DOI: dx.doi.org/10.5195/jmla.2025.2356

school in Guatemala, and I was at the top of my class. And when you come to another country with a new language, you need to work hard to reach what you need to do. I'm very grateful for my parents wanting my sister and I to have a better future in our lives.

Another place that I call home and dear to my heart is California, because I grew up there, and I have a little star there because I grew up in the San Fernando Valley. And some of you that are from Cali know where that is, it's in Los Angeles County. So I'm really proud of being a Valley girl. I have a picture here of myself at the sixth-grade graduation with Dr. Deborah Neal. She, if you're thinking about one of the things that I'm really fortunate is to have mentors and people that throughout my life have influenced me … and guided me to reach for the stars and never give up, no matter what people said or what got in your way.

And Dr. Neal is one of the people that I'm always grateful for. She knew that, you know, when I came to this country that I was learning this second language. She knew that I was bright, she knew that I was smart, and she told my parents, "You know what, Brenda is a bright student, she has a bright future, and we'll put her in the right direction with the right resources that she needs."

And so she helped my parents fill out forms so I can go and attend honor classes, go to a magnet unit high and magnet high school and the rest as you said is history. So Dr. Neal was very influential in seeing that potential in me, as this little immigrant girl that was trying to fit into this new country, this new culture. And she has been such a great influence in my life that I'm still in touch with her. She came to my graduation from college when I got my master's in library science. I'm very fortunate that she has even met my family. And, so she's still part of my life, because she played a, a key part in who I am and leading me in that path of success. So Dr. Neal, you know, thank you for that.

Then, of course, I did, my undergraduate, Cal. State Northridge—again, Cali girl, and here's Karin Durán. She was my supervisor in the library. And I didn't think I was going to go to library school or be a librarian, but I enjoyed working in the library, and when it was time for me to think about a different career path, Karin was the one that told me, "Why don't you think about library school? You were so great at helping people, you enjoyed what you were doing, you should think about that—I can see a lot of potential in that."

And so I followed her advice and I went to library school, and everything worked out so well. Because that summer I met with her, she told me about an information session at UCLA, I went, I took my GRE that fall, and early next year I was accepted to UCLA. I was one of the ALA spectrum scholars and that was able to help me with my library degree.

Karin Durán is always in my heart. Unfortunately she passed away in 2010. But I always think about her because she's the one that told me, "You should be a librarian."

So, went to UCLA. And here's, you know, the Louise Darling Biomedical Library is also dear to my heart because on my last semester of library school I did an internship there and that's when I found my calling as a health sciences librarian. And because I knew that once I worked there, I liked helping people, I liked that I didn't have to have an MD to help researchers do their work, to help physicians work on patients, to help the community. There were so many things that you could do as a medical librarian that I really fell in love with that profession. And here's also where I learned about the NLM Associate fellowship—and that, of course, takes me to that year in my life.

I was really proud to be an associate fellow and I met so many great people. There were seven of us in that class who I still am in touch with. They came to my wedding. They're some of my best friends, and of course, when I tell everyone my story I always tell them that NLM changed my life professionally, but also personally, because that's where I was when I met my beautiful wife, Emily. And so I'm always grateful for the experience and the memories and the relationships that I built there. As you can see we were fortunate that Dr. Lindburg actually invited us to his home and we were very fortunate to have a group picture there, and I have so many great memories of that year. That led to another foundation of me, of being a health sciences librarian.

So I'm telling you all this, so you know how my road has been and how my path has come to where I am right now. I was fortunate after the fellowship to have had experiences in different libraries that built my skills, my experiences; I was able to get grants to do outreach projects, do research and collaborate with a lot of colleagues.

I worked at a Louis Calder Memorial Library in Florida. I had the opportunity to work as a school of nursing liaison in UNC Chapel Hill, in North Carolina; I had the opportunity to work as a school of nursing liaison at KU MED and currently in my job, the University of Missouri, Kansas City, I have the privilege of being in administration with the academic library but also working with the health sciences. And so all of those experiences, through my journey, as an immigrant little girl, through my schooling, my jobs, have made me who I am and where I am right now. Because I think through all of them, I've learned so much in my different experiences and that's my story that I'm here to tell.

But of course, you know, there's people that I met through MLA, through leadership training, through colleagues. And I'm really proud that I've been blessed to have people in my life that have seen that potential in me, and have spent the time to advise me, mentor me. And if I had

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issues about any career decision to make, I had those people to ask them questions about it because they were there for me in many different ways. And so I'm very blessed to have had people in every different level of the health sciences profession that I can call my colleagues, my mentors, and my friends.

And of course there's so many other people that I've met through the years. I have so many pictures that I couldn't put a lot of them in here, so here's some of them. But I'm so grateful that I've learned so much from my colleagues in the conferences. When we presented, see classes, we did research together. We even have written, I've had the opportunity to read papers and present posters and even book chapters. So MLA is about relationships, collaborations and working together. And I definitely have had the opportunity to have so many people that I learned from as I've gone through my career. There's so many, you know, people that I'm grateful to have in my life as colleagues and friends and to learn from, because I think that's the important thing: that we know that we can all learn from each other, from our experiences, from our differences and from our similarities, because it's really important.

And of course, one of the things that Amy mentioned I have been involved with MLA since I started in 2,008 in different caucuses, committees, juries, the MLA Board. But one of the things that I'm really proud of is being one of the co-founders of the Latinx caucus. It was Co. It was called the Latino SIG when we started, and just to see this group, and how far we've come in the last 10 years. It makes me very proud of the work we've done in the past 10 years, and I look forward to seeing all the work that we are. We're going to be doing in the future. And so it's great to see this community. It's great to see those librarians getting together, and I was really happy that in this conference last month I got a chance to meet a lot of new librarians, reaching out and saying, "You know, I have been intimidated to be in MLA. But meeting you, or seeing this group, or seeing the other people, I know I can do it."

And I'm hoping that my story tells those people that they can do whatever they can. The sky's the limit, and there's a lot of resources available for them from colleagues and from the organization. So I'm really proud of that.

And of course you know that my family is really important and precious, and I couldn't be here without their support, their love, and their sacrifices. I think, I always tell people, that my work ethic comes from my dad. He was a truck driver for most of his life, and so he always, both of my parents have been caring, and had told me that I can do anything as long as I work hard. So I really thank them for the support. My sister, you know she's definitely my best friend. We're close, and of course I can't, you know, say enough about Emily, my wife, my colleague, who has helped me through my career—we both, you know, being involved with MLA.

She did a great job at the conference last month, so that has helped me a lot to keep going in my goals, in my profession, when I know that there have been instances that there have been obstacles or people that have tried to block that path. But I'm glad that all this, that I'm showing you, has been a great support system that I have throughout my life. And so this is what makes Brenda Linares, and of course Clara our daughter you know, our miracle baby that I'm so blessed to have. And Mickey our puppy, he's precious, so I value that a lot, and I'm so grateful to have them in my life.

I want to thank my staff, of course, because without them and their support, I wouldn't be taking on this role. So definitely, I'm really grateful to have a library supporting me and my staff for sure. And as I go through my speech I can never forget the people that have, you know, built that path for us to be here, or for me to be here. You know Beverly, the first African American president. I have reached out to her for advice. She's a great mentor, a great friend, and I'm so grateful to have her in my life because she has been a great mentor when I've had tough decisions to make so I'm very grateful that I had her, and I'm trying to follow her footsteps. And of course, you know, Naomi Cordero Broering, our first Latinx. President.

I stand here because of everybody else that has gone through being president of the organization. But I know that I really look up to these two people because they were the firsts and you know, I'm continuing to follow the path. And I know that I'm not going to be the last one. So I want to thank them for the hard work that they've done in the organization and for leading the way. I'm so glad that I got the chance to have both of them and know them.

And of course, working in the board. Thank you, Amy, for your leadership. Like I said, I'm going to do my best to lead my own way. But I definitely know that there's a lot of great foundation that the past [MLA] presidents have led for me to follow. And I look forward to working with the board as I start my new year, so now that you know who I am. I call myself the first immigrant Latina MLA President with a lot of honor because I see that as one of those America dreams that I'm here, as a success story, that anything is possible. If you work hard and are dedicated, and follow your dreams, and don't let anybody get in your way.

So, as the first immigrant Latina MLA President, here are some of the values that I mentioned before. I value teamwork, collaboration, inclusivity, and innovation. And I hope that that's what you'll see in my presidency this new year, because we can't do anything alone. We have to work together, and everybody has their own unique skills and experiences that make the team work. Everybody has to be part of that discussion at that table, and that's why I value inclusivity, because my goal is to not leave anybody behind.

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And of course, as we think about the future in the next 125 years, innovation is very important. The profession, you know, what we do, the foundation is the same, but how we do it changes, and we need to be proactive. That's one of the things that we're doing as an organization which I'm proud of.

So what are we doing in the next year and in the future as part of my presidency?

So, of course, you heard some of those things that we've done already. I'm definitely going to be more involved with the AI initiative. I know that's really important. That's a thing that is not going away. And so we need to be proactive in making sure that we know what our users are doing we know what our colleagues are doing and that we keep ourselves relevant. So that's definitely going to be part of the next year.

Leadership. You also heard that mentioned in the previous speeches from Amy and from Kevin. We can be leaders from any part of our institution. You don't have to be a director to be a leader, to make a change, to make a difference. We know that we all have that skill and those talents. And so what do we want to do? We want to make sure we as an organization have the resources and the training you need for that to happen. So you're going to be hearing more about that. And as we're talking with the Board, with the staff, with our members, we want to make sure we have the resources and the training. You need to be the leader you need to be in your institution because a lot of times there's budget cuts. There's, you know, organizations trying to not let you have a voice.

So how can we, as an organization, provide that training? You need to make sure that you have the resources to do your job from any role you're doing in your institution. Because we are leaders. We all can be mentors. We all can be people that influence other people and so be in the lookout for that. So that's another of the things that we want to focus on, advocacy.

We know that's important in our role health literacy, information—some of that is being threatened by misinformation, misguided facts. And so I think as an organization, we want to work together with our members, with our chapters. And, like mentioned earlier, with other organizations, to make sure that we're advocating for each other, that we're not alone, and that our profession is heard, and we support the people that need us, and our users, our communities. And so that's one of the things that I want us to work on together in the incoming year. And again—we're going to do it together.

I'm going to put this here because it's been heard a lot. And so as part of this new incoming year. I'm probably going to be part of that communication and part of sharing some of the training about the new website and how great it is and how it's going to solve with our problems. But being serious about it, we hope really, that this new website will be more user friendly, and we'll be able to provide a tool for us to be able to collaborate better. And so I look forward to that transition and also getting feedback from all of you about the website itself and how it is solving your problems, or how we can even make it better, so that it's better as we do our work with MLA. So you've heard about those things.

So here are two key initiatives that I call to share with you that it's part of our core values. But it's also back to one of the things that some of the things that I mentioned when I ran for President of MLA. And I hope that we work on this together.

I wanted to go back to the MLA Diversity and Inclusion Task Force and the 2019 Survey report and looking at our membership. Now keep in mind those that's in 2019 things could have changed a bit, you know, now in 2024. But something to keep in mind is we really need to think about the membership of our organization and how it's changing, how the people that we work with and the people that we provide services to, it's also different. And how I mentioned before, being innovative, being creative, being collaborative and having team work. If you have different ideas and different people that have diverse backgrounds, diverse skills, it creates a better future for the profession itself.

And so what I'm what I'm trying to see with some of these statistics is thinking about, how do we want to see our organization moving forward. We want to have more of that inclusivity. We want to see our membership as us. It's aging, too. How can we make it more inclusive and get more members involved?

We also think about the composition of it, too, you know. Being different kinds of sexual identities, sexual expressions. How can we provide support to our members? Knowing that some of the states that we are part of, unfortunately taking some of those rights away. So we definitely have to think about that. And how can we provide support to our members?

And of course, the different abilities. We definitely, you know, when we think about diversity, equity, and inclusion, there's so many things that that includes—it's not just race and ethnicity, there's so many other things. And so my commitment to you is saying we need to think about our membership together, and that there's so many concepts that that includes.

So what is on me?

I think, as part of, as you see, the statistics and how that is really important, and one of the things that we want to do. This was also part of the some of the conversations we had with the MLA Board, we know that there's a bit of a timeline with some of the DEI committee timelines within MLA and MLA chapters. I always find myself really proud of being part of the MAC [Mid-Atlantic] MLA Chapter, because we were the first chapter that started a

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DEI taskforce in 2015, and I was fortunate to be the chair of that task force because we wanted to see what the membership was. And based on the work we did, as you can see, we became a committee and we got the chapter award for that work that we did with our members, and that chapter, in 2018.

And then, as you saw, MLA created their DEI Taskforce in 2016-2017. Then it became a DEI committee in 2020, and I'm really proud to see that in 2024 we have a lot of chapters that have their own version of the diversity, inclusion, and equity type of committees, and I feel fortunate to have been part of three of those. I was part of MAC as a co-chair of the task force, and then when I moved to Kansas, I was part of MC-MLA [Midcontinental Chapter of MLA] and was part of that task force also, based on my experience from the previous chapter. And currently, I'm part of the South Central Chapter working with a group to have that task force become a committee.

Because I think we definitely know that it's important for us to have our organization feel inclusive to our members, but also to the people that we serve and represent, when we go into our work. And so there's a lot of work that we can do there. And why? Why do it separately? You know MLA is doing so many great things with a committee nationwide. And I know that the chapters are doing great things where they're programming and what's happening in their States.

I reached out, you know, to Michael about the MLA DEI Committee, and how we wanted to work together, and reaching out to the other chapters and saying, "Hey, what can we do and work together, you know, in terms of advocacy, communicating the resources we have, MLA as a whole organization? What kind of resources do our members need for them to have, support and information and working together so that we are not reinventing the wheel and the chapters feel supported by the big organization?" And so I look forward to having those conversations with our different MLA chapters and also our big MLA DEI committee, because I think there's a lot of things that we can do together, and a lot of communication that will happen. And so I'm looking forward to that work in the following year.

And then, of course, we think about recruitment and retention because we want to make sure that our organization is retaining the new the new members that we get or staying relevant. We pursue stories of some libraries that feel like you know what I'm not getting, what I need from MLA. I need to go to another organization. Well, what is it that you need? We want to make sure we provide that. That's why we're focusing on AI, that's why we're focusing on leadership. That's why we focus in on inclusivity.

My goal is to hopefully work and do more recruitment and outreach for our organization. I know that some of the committees, such as the Recruitment and Retention Committee, Education Steering Committee, the Medical Education caucus. I know that even the Latinx caucus, AAMLA [African American Medical Alliance], and other groups have had those conversations within their small groups. Well, I want us to have that conversation nationally and say, what can we do to recruit more members into our organization?

Do we need to go to library schools? Do we need to join other organizations like ALA and recruit people to be health sciences librarians. They need to know that "health sciences librarian" is not something to be intimidated by. It's a great opportunity. There's a lot of difference that our profession makes. And also maybe reaching out like Amy and Kevin mentioned earlier, to other professions. We can create relevant resources and training for other professionals to join MLA. I think there's a lot of potential and I look forward to working with many of these committees and caucuses. And if you have other ideas of how can we do more recruitment and outreach to MLA, I look forward to having that conversation because I think there's a lot of potential for that. Because our profession is aging, what we do is hanging, and we need to be proactive and be able to retain and recruit people into our organization.

And what else am I looking forward to in this new year?

I also look forward to meeting many of you that I haven't had a chance to meet on, and so I'm hoping to be able to attend some chapter meetings, either in person or virtually. So please, if you see me, say Hi, or send me a message, because I'm all about building relationships, building community, working together. So I want to meet you and get to know you. And if you have ideas, share them. Send me an email because we're all in this together, and it's a team effort. I cannot do this alone. The MLA board cannot do this alone. We need everybody to do it together, because we have so many skills, so many experiences and resources that we all can combine so that we can, you know, think about the future.

We've had a great 125 years of MLA, we've had our ups and downs. Well, let's think about the next 125 years of what we want to see in terms of our membership, our core values, our profession as a whole. And that requires a lot of work—but not just from the MLA board or myself or the MLA staff. It comes from all of us together.

And know that I'm here as a team player. I'm here as your servant leader. I am here to make a difference as much as I can, but I cannot do that alone. And so I look forward to getting to know a lot of you and working on these initiatives together. You'll be getting more information about that in the incoming year. But please reach out if you have any questions, and so I look forward to working with all of you and for you.

Thank you so much for attending this business meeting. Thank you so much for listening to my presentation, for

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your vote, for your support, and I look forward to seeing all of you in Pittsburgh, Pennsylvania, for MLA 2025.

Enjoy the rest of your day, and I'm so glad that you were able to stay to hear this presentation. And again, we are all MLA, like Beverly said, and we can make a difference if we work together.

Thank you so much.

## SUPPLEMENTAL FILES

**Appendix A:** MLA '24 Program Session Abstracts
**Appendix B:** MLA '24 Poster Session Abstracts

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*Received September 2025; accepted September 2025*



ISSN 1558-9439 (Online)