

## Sleeping beauties in pediatrics

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Sleeping beauties (SBs) in science have been known for few decades; however, it seems that only recently have they become popular. An SB is a publication that “sleeps” for a long time and then almost suddenly awakes and becomes highly cited. SBs present interesting findings in science. Pediatrics research literature has not yet been analyzed for their presence, and 5 pediatrics SBs were discovered in this research. Their prevalence was approximately 0.011%. Some environments or periods are more “SB fertile” than others: 3 of 5 SBs were published in the journal *Pediatrics*, 4 originated from the United States, and 4 were published in the period from 1992 to 1993. No institutions or authors published more than 1 SB.

Sleeping beauties (SBs) in science have been known for few decades; however, it seems that only recently a paper published in *Nature* [1] popularized this phenomenon to the wider scientific community. An SB is a publication that goes unnoticed (sleeps) for a long time and then almost suddenly turns out to be interesting (awakens) and become highly cited. SBs present interesting findings in science, and their specific characteristics makes searching for them “not just an exotic whim, but a necessity in order to have an answer to Mendel-like claims” [2]. Among other disciplines, SBs have been found in physics, chemistry, metallurgy, and statistics [3], but pediatrics research literature has not yet been analyzed for their presence.

### METHODOLOGY

Four main variables characterize an SB. Different criteria for these variables have been used. In this study, the authors decided to apply the “lightest” van Raan criteria, meaning that an SB has to be cited at least 100 times in total; the minimum length of the sleep (in years) after publication has to be 5 years; the maximum depth of sleep, in terms of a maximum average citation rate during the sleeping period, has to be less than 1; the minimum awake period (in years) after the sleeping period has to be 5 or more; and the minimum intensity of wakefulness, in terms of an average minimum citation rate during the awake period, has to be more than 5 [2].

The corpus of SB candidate publications was harvested from the Web of Science (WoS) Core Collection (Thomas Reuters, USA) from the period 1938–2015. The search string term used was *medic\**. The search was performed in titles, abstracts, and keywords on March 30, 2016, and was limited to the research area of pediatrics. The corpus metadata (publication title and abstract, publishing year, source title, authors and their affiliations, citation history, and citing publications) were exported to Excel software (Microsoft, USA), where SBs were identified with our own algorithm implemented as an Excel macro written in Visual Basic.

### RESULTS

The WoS search resulted in 42,681 publications, including 815 papers cited more than 100 times. Records were excluded if they did not involve complete citation history. Information regarding citation history was first sought in the WoS database. In cases in which the required information was not found in WoS or was not available from the local medical library, the record was excluded, and the next one on the list was moved up to fill the void. Five SBs were discovered:

- **Low birth weight SB:** Balcom R, Helmuth W, Beaumont E, Sutton D, Vollman J, Kantak A. The Vermont-Oxford Trials Network: very low birth weight outcomes for 1990. *Pediatrics*. 1993

Mar;91(3):540–6 (length of sleep=5 years, depth of sleep=0.4 citations/year)

■ **Transition SB:** Blum R, Garell D, Hodgman C, Jorissen TW, Okinow NA, Orr DP, Slap GB. Transition from child-centered to adult health-care systems for adolescents with chronic conditions. a position paper of the Society for Adolescent Medicine. *J Adolesc Health*. 1993 Nov;14(7):570–6 (length of sleep=5 years, depth of sleep=0.8 citations/year)

■ **Medical home SB:** Dickens M, Green J, Kohrt A, Pearson H. The medical home. *Pediatrics*. 1992 Nov;90(5):774–5 (length of sleep=6 years, depth of sleep=0.2 citations/year)

■ **Pediatric vesicoureteral reflux (VUR) SB:** Medical versus surgical treatment of primary vesicoureteral reflux: report of the International Reflux Study Committee. *Pediatrics*. 1981 Mar;67(3):392–400 (length of sleep=17 years, depth of sleep=0.2 citations/year)

■ **German children SB:** Reinken L, van Oost G. Physical growth of normal German children from birth to 18 years—longitudinal study of height, weight, height velocity. *Klin Pädiatr*. 1992 May–Jun;204(3):129–33 (length of sleep=5 years, depth of sleep=0.4 citations/year)

SBs in pediatrics are rare. Their prevalence is approximately 0.011%, which is comparable to the prevalence of SBs in physics [4]. It seems that some environments or periods are more “SB fertile” than others: 3 of 5 SBs were published in the journal *Pediatrics*, 4 originated from the United States, and 4 were published in the period from 1992 to 1993. Pediatric VUR SB was the longest sleeping SB, with the sleeping period lasting as much as 17 years. On the other side, there were no institutions or authors publishing more than 1 SB.

The SBs are important publications by definition. They are highly cited, and their citation patterns are rare. In our study, we learned that pediatrics has SB presence and their prevalence is as “scientific” as natural and statistical sciences.

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## CONFLICT OF INTEREST

The authors have no conflicts of interest to disclose.

## CONTRIBUTORS' STATEMENTS

Jernej Završnik conceptualized and designed the study, drafted the initial manuscript, and approved the final manuscript as submitted. Peter Kokol designed the data analysis software, carried out the analyses, reviewed and revised the manuscript, and approved the final manuscript as submitted. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

## REFERENCES

1. Cressey D. ‘Sleeping beauty’ papers slumber for decades. *Nature News*. 2015 May 25.
2. van Raan AFJ. Sleeping beauties in science. *Scientometrics*. 2004;59(3):461–6.
3. Williams A. Some of the best science can slumber for years. *Scientific Am*. 2016;314(1):80.
4. van Raan AFJ. Dormitory of physical and engineering sciences: sleeping beauties may be sleeping innovations. *PLOS ONE*. 2015 Oct 15;10(10):e0139786.

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