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Review Article

Clinical Simulation in Nursing: A Bibliometric Analysis after Its Tenth Anniversary

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Abstract

Background: A single journal study of the journal *Clinical Simulation in Nursing* was performed after its tenth anniversary. Single journal studies aim to analyze journal bibliometric indicators to assess journal characteristics and history, as well as to support possible authors in deciding if the journal might be appropriate to publish their papers.

Methods: The corpus was harvested from the Scopus bibliographical database (Elsevier, Amsterdam, The Netherlands), using the search string *Clinical Simulation in Nursing* in the Source title field for the period 2006 till 2016 (inclusive). The bibliometric analysis was performed with Scopus built-in services and MS Excel 2007 (Microsoft, Rochester, NY). The thematic, chronological, cooperation, and hot topic analysis was performed on scientific landscapes induced by VOSviewer software version 1.6.5 (Leiden University, Leiden, The Netherlands). Sleeping Beauties were identified by our own software developed at the Faculty of Electrical Engineering and Computer Science, University of Maribor, Maribor, Slovenia.

Results: The volume of the literature production is increasing as are the yearly average number of pages, authors, references, interorganizational cooperation, and Impact Factor. The most productive country is the United States and also all top ten productive organizations are located there. The thematic analysis revealed six themes namely simulated clinical experience in health care, education, interprofessional simulation in teams, research in human patient simulation, simulation centers, and debriefing. Additionally, one Sleeping Beauty was identified. The hot topics seem to be experiential learning, self-efficacy, interprofessional education, and debriefing.

Conclusions: The research literature production is increasing, together with publication quality indicators, like yearly average number of pages, authors, and organizations. The thematic analysis showed that the Journal themes conform to the Aims and Scope of the Journal; however; some research gaps exist. Chronologically, the publication's content went from practice, through theory development to the use of the theory in simulation design.

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Single journal studies have been performed for almost as long as general bibliometric studies. They, in general, deal with bibliometric analysis, citation analysis, content analyses, and other bibliometric aspects of a single journal in the manner to present the journal's characteristics and inform possible authors (Zainab, Anyi, & Anuar, 2009). Most single journals' studies are devoted to sciences and technology, medical sciences, library and information science, humanities, and the social sciences. The majority of analyzed journals are published in the Asian and African countries, followed by those from the United States and Europe. They are indexed by major databases, such as Web of Science (WoS), Scopus, or Medline (Anyi, Zainab, & Anuar, 2009).

Key Points

- The *Clinical Simulation in Nursing* bibliometrics' quality indicators as well as productivity are showing a positive trend.
- Authors are affiliated mostly to the United States and US-located organizations.
- More than one-third of affiliated countries established a collaboration based on co-authorship.

Studies on single journals present various types of bibliometric measures like productivity of authors and their affiliations; author's gender, profession, and rank; degree of collaboration among authors, affiliations, and countries; analysis of subject content, keyword analysis, keyword co-occurrences, Impact Factor (Rao, Sharma, Devi, & Muralidhar, 2014), thematic analysis, Sleeping Beauties (SBs) (Blažun Vošner, Kokol, Bobek, & Železnik, 2016); and characteristics of Editorial Boards and citation analysis (Anyi et al., 2009). Some recent examples of single journal studies include the *Journal of Nursing Regulation* (Benton & Alexander, 2016), *Computers in Human Behavior* (Blažun Vošner, et al., 2016), *Journal of Clinical and Diagnostic Research* (Jain et al., 2015), and *Historical review* (Taşkın & Akça, 2016).

Clinical Simulation in Nursing (*CSN*) is a peer-reviewed international journal, which is published monthly in an online form. It is the official journal of the International Nursing Association for Clinical Simulation and Learning (Elsevier B.V., 2016a). The journal considers manuscripts dealing with topics like innovative teaching/learning strategies using simulation; guidelines, regulations, and legislative policies that impact simulation, leadership for simulation, simulation operations, and real-world practice; and academic uses of simulation for publication. According to the Thomson Reuters Journal Citation Reports, the *CSN* reached an Impact Factor of 1.360 in 2015. Journal's Source Normalized Impact per Paper Impact Factor (SNIP IF) is 1.037 (Elsevier B.V., 2016b).

The aim of this article is to analyze the journal's 10 years' publishing history. The analyses will focus on descriptive bibliometric measures, thematic analysis, co-authorship cooperation, and the identification of hot topics and SBs.

Methods

The search was conducted on September 3, 2016, in the Scopus bibliographical database (Elsevier, Amsterdam, The Netherlands), using the search string *CSN* in the Source title field, for the period 2006 till 2016 (inclusive). For the descriptive and thematic analyses, the publications from the year 2016 were excluded, due to the fact that the year is not yet completed; therefore, the results for this year might be misleading. The hot topic identification was performed for the period 2014 to 2016 because we were interested in the most recent topics emerging in 2016.

To perform the descriptive bibliometric analysis (distribution of types of documents, most prolific and cited articles, organizations, and countries), we used the Scopus built-in analysis services. For the trends' analyses of *CSN* publication characteristics (average number of pages, references, authors, organizations, and citations per publication per year), we exported the publication meta-data to Excel 2007 (Microsoft, Rochester, NY) and calculated the averages with the Excel built-in text and statistical functions. Yearly *CSN* SNIP and ranks were obtained from the SciMago Web page (Elsevier) (Scimago Lab, 2016).

To analyze different aspects of *CSN* literature production, we induced different scientific landscapes, as well as co-authors and co-occurrence networks, using VOSviewer software version 1.6.5 (Leiden University, Leiden, The Netherlands) (van Eck & Waltman, 2010). We analyzed publication titles and abstracts; however, we omitted general/common terms, such as introduction, argument, debate, author, scope, significance, baseline, and timestamps (e.g., month). The thematic analysis was based on the clustered scientific landscape, whereas terms were analyzed from the historical and citation context perspectives, using timeline and citation density—annotated scientific landscapes. We assessed the country cooperation on the basis of the country co-authorship network. To identify current hot topics, we decided to analyze author keywords appearing in publications published in 2014 and later. The identification was based on the average number of citations of a publication in which keywords appeared.

In addition, we also aimed to identify SBs (Van Raan, 2004). Each publication that was cited less than once on average in the period of at least the first five years after it was published and had more than three citations per year on average after awakening was identified as an SB. SBs were identified by our own software developed at the Faculty of Electrical Engineering and Computer Science, University of Maribor, Maribor, Slovenia.

Results and Discussion

In Figure 1, we present the dynamics of *CSN* literature production (solid line), whereas the dotted line is representing its trend. Altogether, there were 568 publication published in the *CSN* journal till September of 2016. Among them,

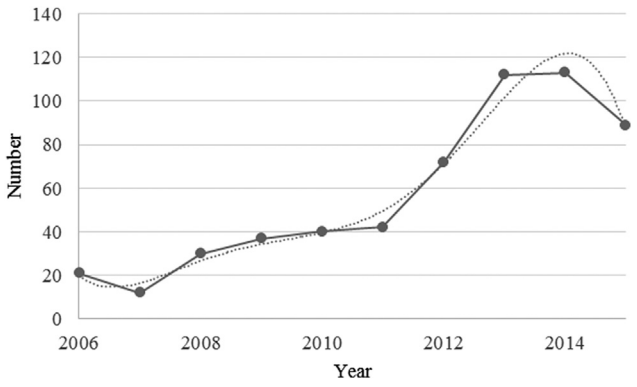

Figure 1 The dynamics of *Clinical Simulation in Nursing* literature production.

there were 366 articles (64%), 94 editorials (17%), 88 review papers (15%), and 20 other publications (4%). The first publications were published in 2006. The trend in the number of publications was increasing till 2014, when a slight decline can be observed (Figure 1). Same trend can be observed in the dynamics of the journal SNIP IF (Table 1). The *CSN* SNIP was first recorded in 2008 (SNIP = .025) and then it increased to its maximal value in 2014 (SNIP = 1.190). The *CSN* is categorized in two categories, namely *Modelling and Simulation* and *Nursing (miscellaneous)*. The *CNS* rank was improving steadily in both categories, reaching first place among 16 journals in 2012 in the category *Nursing (miscellaneous)*. The steady increase of the number of publications and SNIP IF might reflect the growing interest in the field of clinical simulations, maturation of the field that leads to more targeted research, increase in the number of simulation centers, and the advancement of the quality of the *CSN* journal.

Geographical Distribution of *Clinical Simulation in Nursing* Publications

The 568 publications were coming from 19 countries. By far the most productive country, publishing more publications than all other countries together, was the United States (n = 466, 82%), followed by Canada (n = 23, 4%), Australia (n = 17, 3%), the United Kingdom (n = 10, 1%), and Norway and Qatar (n = 5, 1%).

The most productive organizations from a total of 171 are shown in Table 2. They together contributed 173 publications, which is about one quarter of all publications published in *CSN*. They are all located in the United States. The University of San Francisco was the most productive organization with 33 publications and Texas Tech University the least productive one among the first ten with ten publications. The fact that the *CSN* is the official journal of the International Nursing Association for Clinical Simulation and Learning, which was established in the United States, might be the reason that most publications come from North American authors.

Bibliometric Characteristics of *Clinical Simulation in Nursing* Publications

Figure 2 shows positive trends in the number of authors, pages, organizations, references, and citations. As the *CSN* was inaugurated, the average number of pages per publication was less than four pages; after that, the number increased steadily till 2012, reaching the maximum of almost seven pages in 2013. The number of pages stabilized at slightly less than six pages. The increase in the number of pages per publication might show an increase in publication quality (Falagas, Zarkali, Karageorgopoulos, Bardakas, & Mavros, 2013).

The starting average number of authors per publication was two authors. Then the number was increasing till 2011 and stabilized at three authors in 2013. In the beginning, the publications were written mostly by authors from single organizations, but, after 2010, the research seemed to become interorganizational, reaching on average of almost two-and-half organizations per publication. Finlay, Ni, and Sugimoto (2012) showed empirically that co-authorship cooperation affects the quality of publications positively.

Table 1 The *CSN* SNIP IFs and Ranks by Year

Year	SNIP IF	Modeling and Simulation	Nursing (Miscellaneous)
2008	0.025	153/157	6/7
2009	0.317	144/173	6/11
2010	0.261	161/199	9/15
2011	0.770	122/210	3/16
2012	1.207	69/216	1/16
2013	1.136	78/221	1/16
2014	1.190	67/224	1/16
2015	1.037	70/223	1/16

Note. *CSN* = *Clinical Simulation in Nursing*; SNIP IF = Source Normalized Impact per Paper Impact Factor.

Table 2 The Ten Most Productive Organizations

Organizations	Number of Publications
University of San Francisco, USA	33
Washington State University Spokane, USA	28
Boise State University, USA	26
University of Washington-Tacoma, USA	26
Robert Morris University, USA	22
Villanova University, USA	14
Bryan LGH College of Health Sciences, USA	13
University of Texas at Arlington, USA	12
Cleveland Clinic Foundation, USA	12
University of Alabama in Huntsville, USA	10
Texas Tech University Health Sciences Center at Lubbock, USA	10

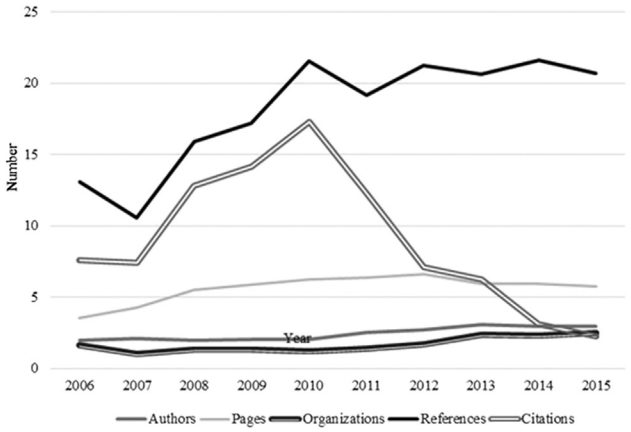

Figure 2 The yearly averages of *Clinical Simulation in Nursing* descriptive bibliometric indicators.

The average number of references cited per publication increased from around 10 to more than 20. The average number of citations per publication reached a maximum of 17 citations per publication in 2010. The increase in the number of references could be the consequence of the intensified research in clinical simulation and increased research literature production—authors can look for similar research in a larger corpus of publications.

Thematic Analysis

The thematic analysis was supported by the VosViewer program, where default parameters were used. The resulting cluster scientific landscape is shown in Figure 3 where six clusters emerged. Based on the popular terms (in larger circles and denoted with larger fonts), we named each cluster with an appropriate theme (Table 3). The themes conform to the Aims and Scope of the Journal (Elsevier B.V., 2016c). However, some research gaps concerning guidelines, regulations, and legislative policies were noted that impact simulation.

The chronological evolution of terms proceeded through three research periods. In the period before 2013, the research was devoted to simulated clinical experience and human patient simulation, including their integration into education. The research in the second period (2013-2014) was focused on simulation based on mannequins and standardized patients with the aim to reduce anxiety, empower clinical judgment, and improve teamwork. The

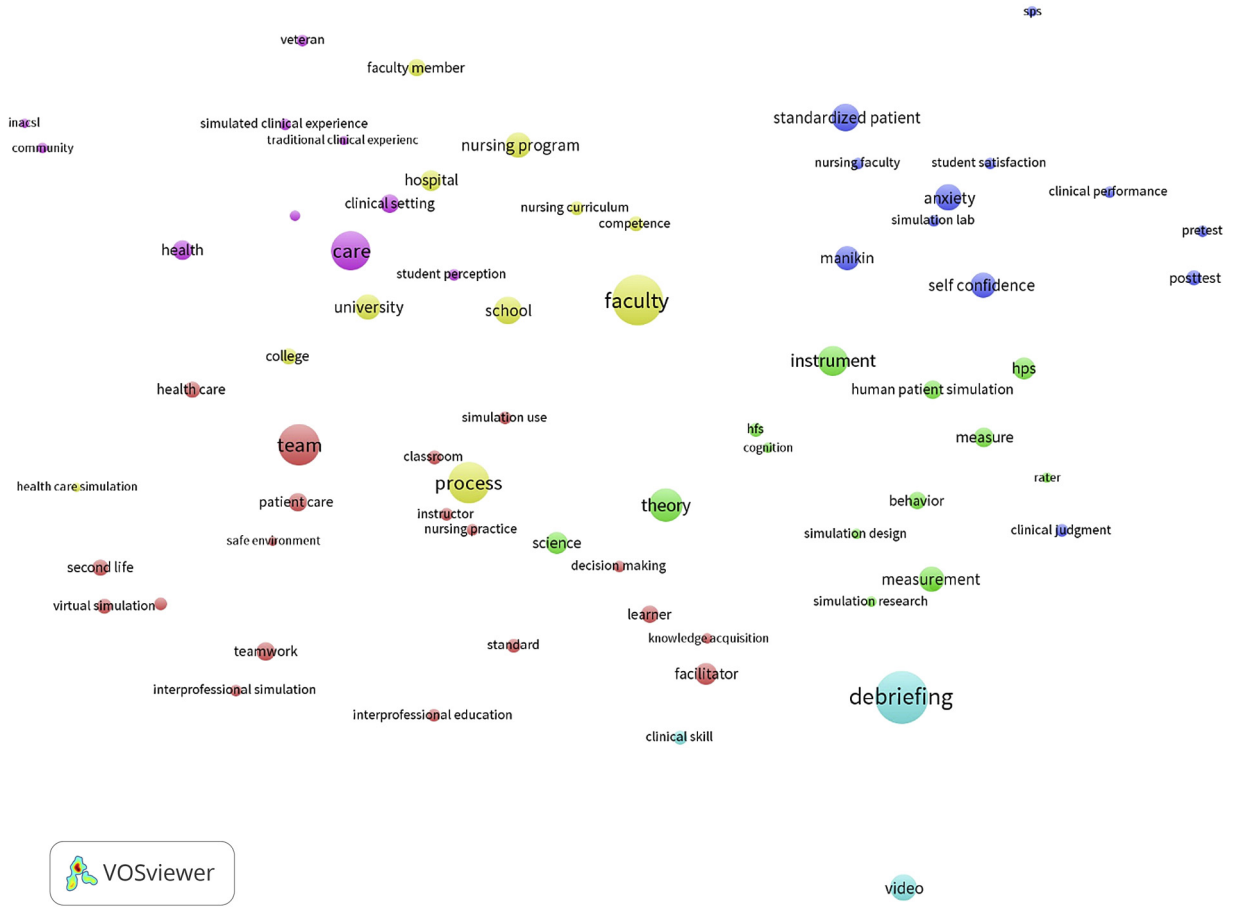

Figure 3 The cluster scientific landscape of terms appearing in the *Clinical Simulation in Nursing* journal.

Table 3 Thematic Analysis

Themes	Representative Terms
Simulated clinical experience in health care (scarlet color)	Simulated clinical experience, health, care, clinical setting
Education (yellow color)	Faculty, process, university, competence, nursing curriculum, nursing program
Interprofessional simulation in teams (red color)	Interprofessional simulation, team, virtual simulation, second life, facilitator, interprofessional education, learner
Research in human patient simulation (green color)	Simulation research, human patient simulation (hps), theory, simulation design, measurement, instrument, hfs (high fidelity simulation)
Simulation centers (dark blue color)	Standardized patients, manikin, simulation lab, posttest, pretest, self-confidence, anxiety
Debriefing (light blue color)	Debriefing, video, clinical skill

research in this period was also concerned with theory development. In the third period (2015-2016), the research was committed to virtual and health care simulations and a more scientific approach to simulations, based on research, measurement, and simulation design.

Most cited publications (on average cited more than 10 times) focused on terms like *debriefing*, *pre- and posttest*, *self-confidence*, *standard*, *instrument*, and *human patient simulation*. *Debriefing*, *self-confidence*, and *instrument* are also among the most prolific terms. Standard instrument to measure self-confidence of students, together with debriefing, are two of the most important elements of clinical simulations in nursing (Tosterud, Petzall, Wangensteen, & Hall-Lord, 2015; Cantrell, Meakim, & Cash, 2008).

Cooperation Based on Co-authorships

Cooperation based on co-authorships is shown in Figure 4, where the size of the circle represents the number of documents per country and the color corresponds to the average number of citations Among 19 countries, authors from 7 countries cooperated through co-authorships. The United States cooperated with six and Australia with three countries. The remaining countries—with the exception of the Dominican Republic—cooperated with two countries. The strongest cooperation emerged between the United States and Canada, which are also the two most productive countries.

The most cited publications were submitted from Australia with around eight citations per publication. The publications from the most productive county, the United States, were cited an average of four times.

Hot Topics

The co-occurrence network of author keywords is shown in Figure 5. Among 23 most prolific keywords, the most cited keywords are *experiential learning*, *self-efficacy*, *interprofessional education*, and *debriefing*. According to our methodology, they represent the current hot topics published in

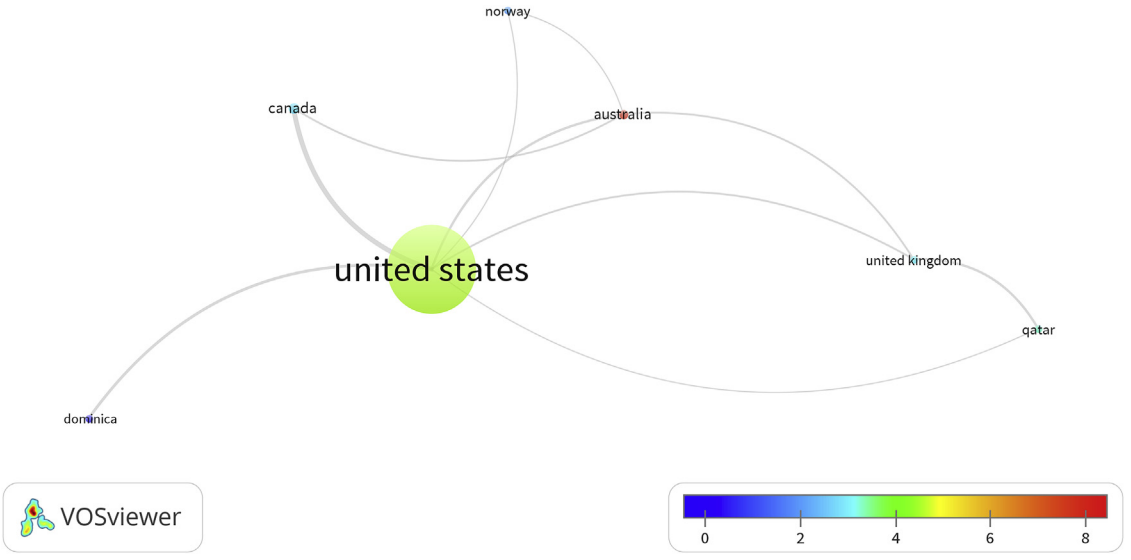

Figure 4 Cooperation based on co-authorship between countries.

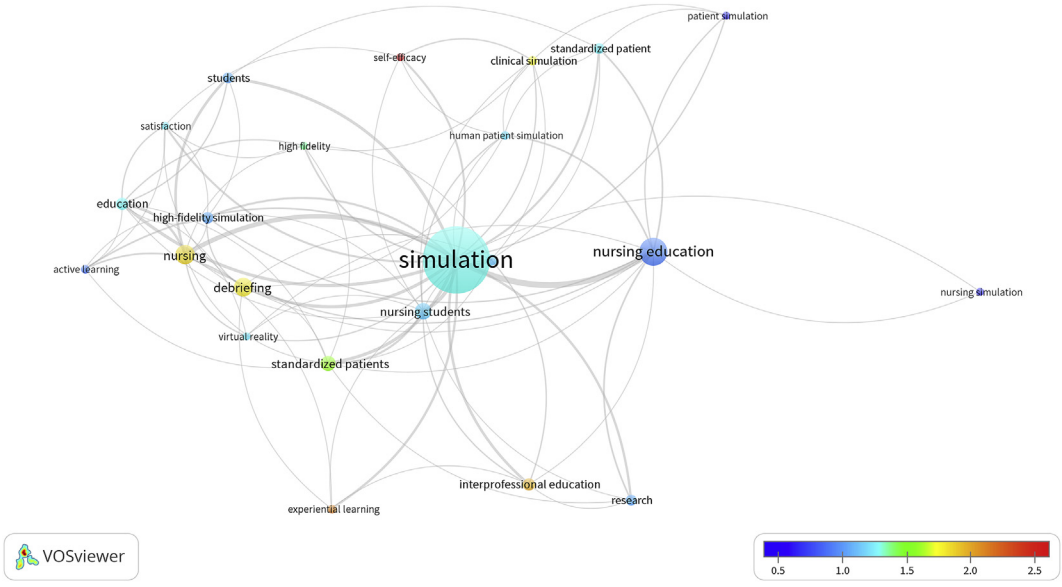

Figure 5 Author-supplied keywords' co-occurrence network for the period 2014 to 2016.

CSN and might be the candidate topics for future in-depth research.

Sleeping Beauties

The paper entitled *Student Satisfaction With Simulation Experiences* (Abdo & Ravert, 2006) was the only SB identified. It slept for five years with an average citation rate of 0.4 in the sleeping period and reached 20 citations altogether. The reason no more SBs emerged might be in the fact, that the journal *CSN*, at the time of the study, was only ten years old, and that recently clinical simulations have been gaining increased popularity and importance.

Conclusions

Our study results showed the increased productivity of publications in *CSN*, together with the increase of "might be" publication quality indicators, like yearly average number of pages, authors, and organizations. The thematic analysis showed that *CSN* themes conform to the Aims and Scope of the journal; however, some research gaps exist. Chronologically, the publications' content went from practice (human patient simulations), through theory development and employment of mannequins and virtual simulations to the use of the theory in simulation design. Simulation experience measurements and the debriefing process seem to be the key elements in students gaining self-confidence. Despite the fact that the *CSN* is a young journal, the existence of an SB indicates the similarity of editorial policies to the editorial policies of older journals. The hot topics seem to be experiential learning, self-efficacy, interprofessional education, and debriefing.

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