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Visual Analysis of Research Hotspots on Near Miss in the Nursing Field

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Abstract: Objective To analyze the current research status, hot spots and dynamic frontiers of literature related to near misses in nursing using visual knowledge mapping, in order to provide a reference for the future development of near misses in nursing. Methods The literature related to near misses in nursing was searched in the Web of Science core collection from its establishment to August 2022, and visualized and analyzed in terms of the number of articles, journals and keywords. Results A total of 289 papers were included, and the annual publication volume showed a trend of year-on-year growth, with the United States taking the first place in terms of publication volume and the initial formation of a core author team, and the hotspots of proximity research in the nursing field were mainly focused on patient safety, safety management, and identification reporting. Conclusion The research related to proximity errors in nursing started late, and the current research on proximity errors is not comprehensive enough. Since the occurrence of proximity errors can have adverse effects on patients, nursing staff and medical institutions, it is suggested that nursing managers should increase the importance of this issue, pay attention to the frontier development, and conduct in-depth related research.

Keywords: Nursing Field; Near Miss; Visualization Analysis.

1. Introduction

A near miss is an event in which a miss occurs but no harm to the patient ultimately occurs due to chance or timely interception, and is considered to be an early warning event before harm occurs [1]. Near miss has a late start in domestic research, and was officially translated as "near miss" by the China Hospital Association in 2017, and regulated near miss events in the group standard in 2018 [2]. Near misses and adverse events have the same path of occurrence, but their probability of occurrence is much higher than that of adverse events, but they are often ignored because they do not yet cause substantial harm, and most healthcare workers are reluctant to report near misses for fear of being criticised or punished [3]. In this study, VOSviewer software was used to visualise and analyse the research related to near misses in the nursing field, and to explore the research hotspots and trends in this field.

2. Objects and Methods

2.1. Literature Search and Screening

The "Web of Science Core Collection" (hereinafter referred to as WOS) was used as the data source, and the search date was set as the build date to 2 August 2022 with (TS="near miss "OR "near-miss "OR "near miss*"OR "near- miss*") AND

(TS="nurse*"OR "nursing "OR "nurse care "OR "nurse care "OR "nursing care") as the search formula for the search, and the inclusion criteria: 1) the study was the literature of near-miss in the field of nursing; 2) the language was limited to English. The exclusion criteria were: 1) duplicate publications; 2) conference abstracts, reviews, letters, and other types of literature. Finally, 289 pieces of literature were included.

2.2. Research Tools

VOSviewer 1.6.18 visualisation tool was used to conduct econometric analysis of the retrieved literature. VOSviewer is based on the principle of citation and co-citation of literature, which can extract and analyse the key information of the included literature in order to draw a visual knowledge map [4].

3. Results

3.1. Analysis of the Volume of Published Articles

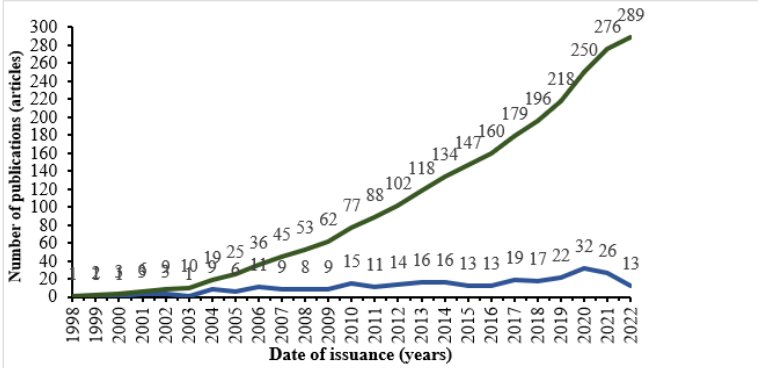

Figure 1. Distribution of near miss postings in nursing

The 289 articles included in the regression analysis were analysed with publication time as the independent variable X and annual literature volume as the dependent variable Y. The linear regression equation Y = 0.96X-1924.22 (F = 82.94, P < 0.01) indicated that the volume of publications showed an increasing trend year by year, Figure 1.

3.2. Analysis of Country Distribution

A total of 54 countries published literature, among which the United States published a total of 137 pieces of literature, accounting for 47.4% of the total number of publications. Among them, there are 10 documents in China included in WOS, Figure 2.

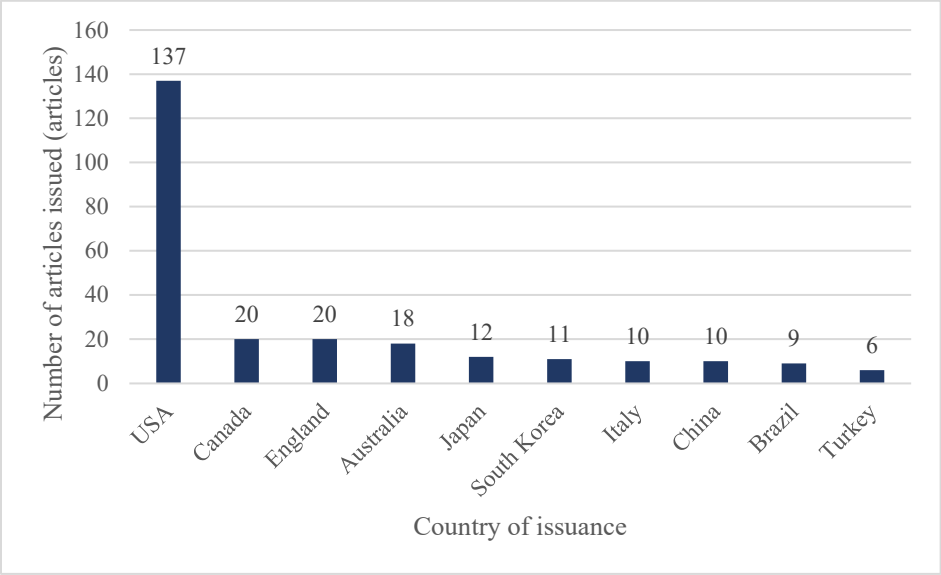

Figure 2. Nursing near miss posting countries

3.3. Analysis of author collaboration

The literature contains a total of 1213 authors, the author with the largest number of publications is Bakken Suzanne, with a total of 6 papers, according to Price's law [5] calculates that the minimum number of core authors' publications is 2. there are a total of 70 authors with 2 or more publications, with a total of 166 publications, which accounts for 57.4% of the total number of publications, and is more than half of the number of publications in the field, and the core The number of publications by authors should account for 50% of the total number of documents, indicating the initial formation of the core author team in this research field, Figure 3.

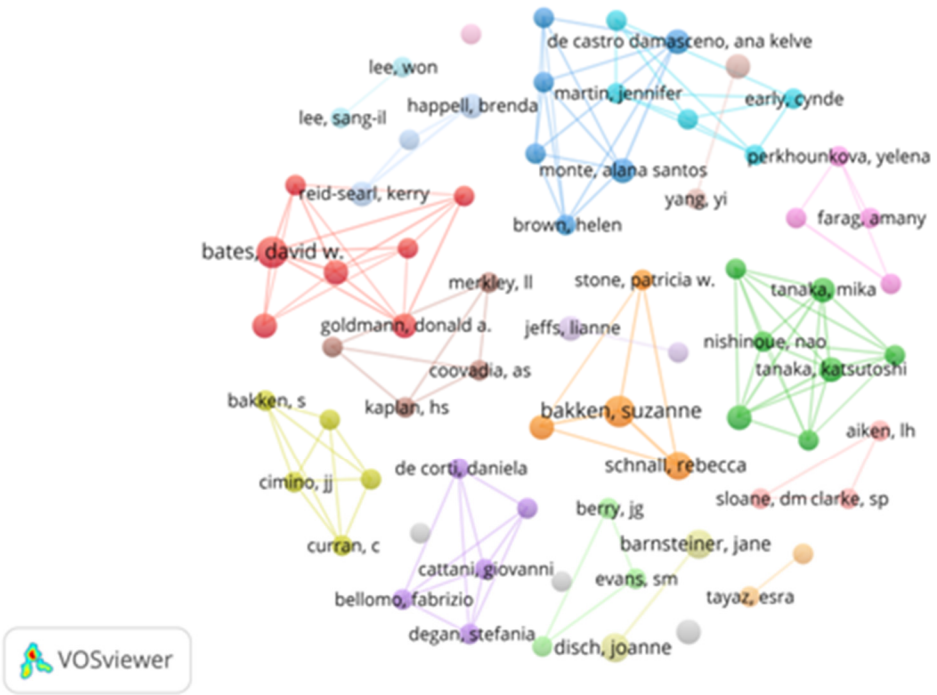

Figure 3. Collaborative mapping of near miss authors in nursing

3.4. Distribution Analysis of Journals

A total of 194 journals were distributed, and the journals ranked in the top 10 in terms of the amount of articles carried are shown in Table 1.The number of journals in each district was calculated as 26:68:100 according to Bradford's law [6], which did not conform to the law that the ratio of the cumulative amount of journals in each district was approximated to be 1 : $n:n^2$, which indicated that the journals in this field had not yet formed a stable group of core journals, and that the core journals had been distributed in a relatively scattered manner.

Table 1. The top ten journals in the nursing field in terms of the number of articles carried by near misses

Sort	Name of the journal	Number of publications	Impact factor	Partition (Q)
1	Journal of Nursing Care Quality	7	1.73	3
2	Journal of Patient Safety	7	2.24	4
3	Journal of Advanced Nursing	6	3.06	1
4	Nurse Education Today	6	3.91	1
5	Journal of Clinical Nursing	5	4.42	1
6	Aorn Journal	4	0.83	4
7	Bmj Quality & Safety	4	7.42	1
8	International Journal of Nursing Studies	4	6.61	1
9	Journal of Nursing Management	4	4.68	1
10	Safety Science	4	6.39	1

3.5. Keywords

3.5.1. Keyword Analysis

A total of 1078 keywords were obtained. The more times the same set of keywords co-occur in the article, the greater the association strength, and by analysing the co-occurring keywords, the hot issues and research directions in this research field can be explored, Table 2.

Table 2. Distribution of high-frequency keywords for near misses in nursing field

Sort	Keywords	Frequency	Total connectivity
1	patient safety	98	581
2	nurses	93	568
3	near miss	55	348
4	medication errors	47	268
5	adverse events	39	244
6	care	38	241
7	safety	38	227
8	medical errors	37	253
9	errors	34	219
10	adverse drug events	23	170

3.5.2. Keyword Clustering

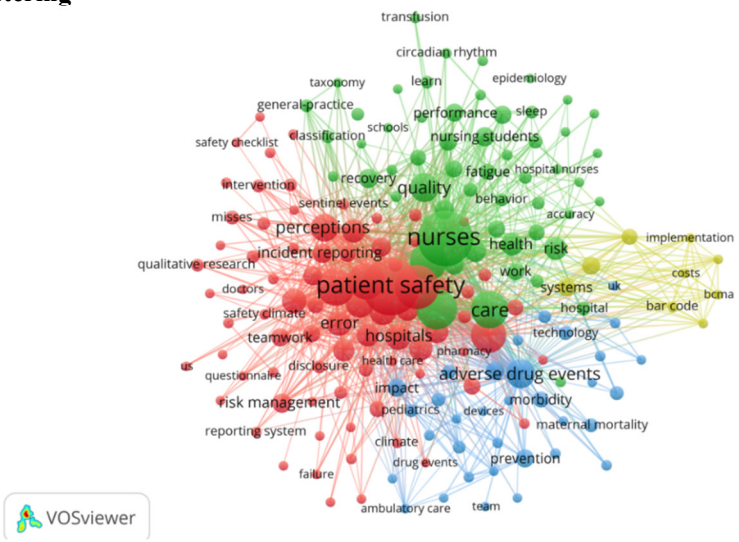

Figure 4. Keyword mapping of near misses in nursing

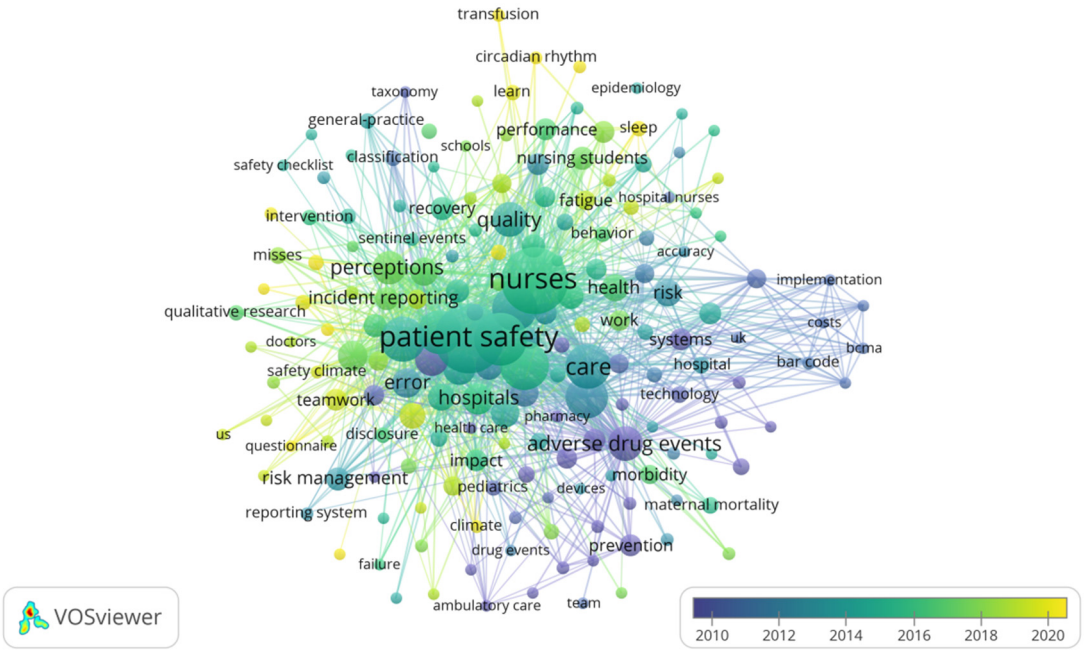

Figure 5. Temporal superimposed co-occurrence clustering mapping of near miss keywords in the nursing domain

Keyword cluster analysis yielded 260 keywords in 7 clusters. The current research content of near misses in the nursing field is divided into 4 clusters, Figure 4. each colour represents 1 cluster, and each 1 cluster represents 1 research hotspot in the field. Cluster 1 (red area): keywords are patient safety, adverse event, errors, etc. Cluster 2 (green area): keywords are nurse, safety, risk, etc. Cluster 3 (blue area): hospital incident reporting, inpatients, etc. Cluster 4 (yellow area): keywords are costs, system, etc.

After superimposing the literature publication time and keyword co-occurrence network, the keyword time superposition graph can be obtained, Figure 5, the node colour is determined by the average time of the year in which each keyword is located, the bluer the colour indicates that the keyword appeared at an earlier time, and the yellower the colour indicates that the keyword appeared at a later time, which can be used to explore the trend of the evolution of the hot spots of the research in the field. Safety climate, risk management, and teamwork in the field of near misses in nursing are the current research hotspots.

4. Discussion

4.1. The Interest in Near Miss Research in Nursing has Increased Year on Year

Studies related to near misses in nursing began to be reported in 1998, and the number of publications increased significantly year by year until 2004, and regression analysis predicted that the literature would continue to grow in 2022. The World Health Organization only formally determined the definition of near miss in 2012, and researchers in China mostly cite foreign translations and definitions of near miss, which is not conducive to the localised development of the field, and should further deepen the domestic standards of relevant definitions and connotations. The U.S. occupies a core position in this field, with a far-leading number of articles issued and a wide range of influence. Although a core group of journals is not formed at present, the quality level of journals carrying articles is high on the whole, and the research hotspots in this field can be tracked in time by paying attention to the latest developments of these journals. Through the visual analysis of author cooperation, it can be found that there are multiple author cooperation sub-networks in the study, and the top three authors in terms of the number of publications are all from the U.S. The exchange and cooperation between scholars from different countries can complement each other's strengths and weaknesses, and achieve the sharing of disciplinary resources to promote the progress of scientific research in this field.

4.2. Knowledge Mapping and Research Hotspots of Near Misses in Nursing Field

From the keyword mapping, it can be seen that patient safety, adverse events, medication errors, risk management, nurses, accident reporting, etc. constitute an important support point for research on near misses in nursing.

Near misses first originated in the research of accident cause analysis and safety management in high-risk industries such as geological exploration, aerospace, industry, and transport [7]. Subsequently, medical workers began to recognise the importance of near misses in clinical work, and drew on the development of related research, and in the study of Barach et al [8], near misses were defined as any event that could lead to an adverse outcome but did not occur and was not distinguishable from an adverse event except for the outcome. Our scholars, such as Shi Zhenxian [9], interpreted near miss as "attempted event" and defined it in their study as a criminal or negligent action that could have caused harm to the patient but did not due to accident, prevention, or mitigation. For a long time, there was no uniform definition and classification of near misses in the healthcare field, which was not only detrimental to the identification and reporting of related events by healthcare professionals, but also to the statistics, analysis and development of coping strategies by administrators, which hindered the rapid development of the field [10].

With the formal definition of proximity errors by the World Health Organization, research hotspots gradually focus on

adverse events, reporting systems, risk management, and other aspects closely related to patient safety, etc. Scholars such as Van Spall [5] believe that proximity errors are an important opportunity to improve patient safety by collecting proximity events in the field of healthcare and having experts identify solutions to manage the situation and implement corrective actions. Jeffs et al [11] identified the definition of proximity lapses in the course of mental health care through interviews with mental health care facility staff, while proposing education, research, and related policies for early identification and response to proximity lapses. Tian Yunwei et al [12] who found that although nursing staff were aware of the importance of proximity lapses, they lacked awareness and sensitivity to the events involved, and also identified problems such as inadequate proximity event management systems.

As the importance of proximity errors in healthcare is gradually being recognised, research is focusing on how to ensure the accuracy and standardisation of proximity event reporting. Oren [13] and his team found that nurses' actual reporting of proximity errors was less than their stated willingness to report, and that willingness to report was positively correlated with patient safety, suggesting that effective measures should be taken to increase nurses' willingness to report in order to improve patient safety. willingness to improve patient safety. Our scholars Xu Dongmei et al [14] studied the reported near miss events and adverse events in the department, and found that the development trend of the two types of events has event variability, presenting heterogeneous correlation, so it is recommended to strengthen the monitoring and analysis of near miss events, with a view to reducing the incidence of nursing adverse events.

The current basic consensus on the management of near misses includes identification, reporting, cause analysis, proposing and implementing improvement measures and tracking the effect of improvement with feedback and sharing. Researchers such as Crane [15] designed an anonymous near miss reporting system based on a web-based information system, and found that each organisation undertook continuous safety and quality improvement based on the reports, which demonstrated the effectiveness of a near miss reporting system when implemented in the clinical workplace. effectiveness of implementation in clinical work. The keyword time clustering diagram shows that in recent years, research hotspots have tended to explore the impact of teamwork and safety climate on reducing the incidence of near misses. Enhanced collaboration and communication between nursing staff and the team is part of their role and is essential to patient safety as it contributes to the reduction of proximity errors and adverse events.

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