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Co-word clustering analysis for nursing safety management research focuses by PubMed

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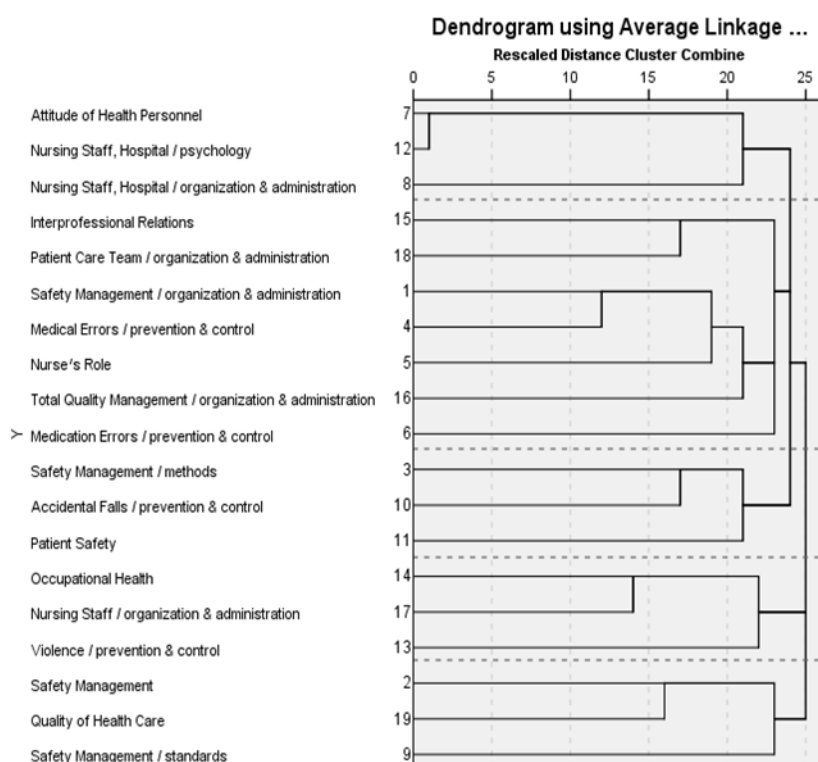
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Highlights

PubMed was searched using "safety management" for the literature on nursing safety management to analyze hot research areas and the present research status of nursing safety management.

Editor's summary

Medical safety has become one of the focus issues in hospital management. As an important part of medical safety, nursing safety plays an essential role in hospital service quality management.

ABSTRACT

Objective: To analyze hot research areas and the present research status of nursing safety management in PubMed. **Methods:** PubMed was searched using "safety management" for the literature on nursing safety management. BI-COMB 2.0 and SPSS 20.0 software were used to analyze high-frequency keywords and conduct co-word clustering analysis. **Results:** We searched for totally 2353 articles related to our topic and extracted 19 high-frequency keywords (27.50%). Five research focuses were concluded, including: study on nursing safety culture; team work to promote nursing safety; practice of nursing safety management; workplace violence against nursing staffs; nursing safety and quality evaluation standard. **Conclusion:** Analysis of the hotspots of nursing safety management in the past 10 years will contribute to understanding the research emphases and trend of development, and provide reference for the study and practice of nursing safety management.

Key words: Nursing safety management, Cluster analysis, Co-word analysis, Research focus

摘　要

目的：基于 Pubmed 数据库分析护理安全管理研究的现状及热点。
方法：以"safety management"为主题词，检索 2007 年 9 月至 2017 年 9 月 PubMed 数据库中有关护理安全管理的文献，并使用 Bicomb 软件、SPSS 20.0 对主题词进行共词聚类分析。
结果：共获得文献 2353 篇，提取高频主题词 19 个，占总频次的 27.50％，通过对高频主题词词篇矩阵进行共词聚类，得到 5 个研究热点：护理安全文化的研究、团队协作促进护理安全、护理安全管理实践、护理人员工作场所暴力以及护理安全质量评价标准的相关研究。
结论：对近 10 年护理安全管理研究热点的分析有助于了解该领域研究重点及发展趋势，为随后护理安全管理研究及实践提供参考。

关键词：护理安全管理；聚类分析；协同词分析；研究重点

1. Introduction

With the continuous development and innovation of medical technology, the demand for health care is continuously growing and new medical risks are gradually increasing. Medical safety has become one of the focus issues in hospital management. As an important part of medical safety, nursing safety plays an essential role in hospital service quality management. Nursing safety refers to the whole process of the implementation of the nursing service, patients do not have any psychological, structural or functional impairment, obstacle, defect, or death beyond the scope of the law and statutory regulations, it involves all the personnel and links in the nursing activities [1]. Continuous and effective nursing safety management is the key to patients' security, and it is also an important part of the stable development of the hospitals. However, the nursing safety management started relatively late in China without scientific and consummate nursing safety management system [2]. The purpose of this study is to analyze the literature about nursing safety management in PubMed database from September 2007 to September 2017, and to understand the research hotspots and trends of nursing safety management, so as to provide reference to nursing safety management practice in China.

2. Methods

2.1 Data sources

The term "safety management" was used to retrieve literature about the nursing safety management in the PubMed database. The specific literature retrieval strategy is as follows: safety management [MeSh]; "Species" option was limited in "humans", "Journal categories" was limited in "nursing journals", the document type and language were not restricted. Moreover, we set the publication date from September 2007 to September 2017, 2353 bibliographies were retrieved and saved as the XML format.

2.2 Data Analysis

We imported the XML file into the BICOMB 2.0 software, which counted the frequency of each MeSH term, and according to the frequency from high to low order to determine high-frequency MeSH. Then, we used these high-frequency MeSH terms to generate a co-word matrix using BICOMB 2.0 software [3]. SPSS 20.0 was used to perform a cluster analysis of the co-word matrix, and the cluster analysis diagram of the research hotspot of nursing safety management was drawn.

3. Results

3.1 High-frequency MeSH terms

we identified high-frequency MeSH terms based on the Donohue formula [4]. The formula is: $T = (-1 + \sqrt{1 + 8 * II})/2$, where "$II$" represents the number of MeSH terms indexed only once in the articles. T is the term frequency critical value of high-frequency and low-frequency words. After calculating, The value of T is 56, which identified

MeSH terms with a frequency greater than 56 as high-frequency words. Ultimately, 19 high-frequency MeSH terms were extracted, accounting for 27.50% of the total frequency, as shown in Table 1.

3.2 Co-word cluster of high-frequency MeSH terms

By calculating the Ochiai coefficient in the system cluster and the between-group linkage method, we have carried out the clustering analysis to the word matrix. We obtained a coword cluster diagram of the high-frequency MeSH terms, which indicated the research hotspots, as shown in Figure 1. With professional knowledge, 5 clusters were summarized. There are 5 research hotspots: study on nursing safety culture (including 7, 12, 8); team work to promote nursing safety (including 15, 18, 1, 4, 5, 16, 6); practice of nursing safety management (including 3, 10, 11); workplace violence against nursing staffs (including 14, 17, 13); nursing safety and quality evaluation standard (including 2, 19, 9).

4. Discussion

This study carried a co-word clustered analysis about nursing safety management based on the literature in PubMed database in recent 10 years, combined with professional knowledge and specific literature, and summarized 5 research hotspots in the area of nursing safety management.

## 4.1 The study on nursing safety culture

The MeSH terms in this group include "Attitude of Health Personnel", "Nursing staff, Hospital/organization& administration", "Nursing staff, Hospital/psychology". The safety culture is a kind of organizational culture, it refers to nurses' common values, beliefs and codes of conduct for patients' safety in nursing area [5], and can be embodied by nurses' safety behavior. At the organizational level, support and attention of leaders and organizations are essential for improving nursing safety culture, Vaismoradi has adopted the qualitative research showed that nursing leaders can implement better safety nursing by creating better working conditions, defining and assigning common responsibilities and obligations, encouraging cooperation and implementing hierarchical management [6]. Hershey pointed out that non-punitive response to adverse events, close cooperation among various departments, and implementation of humanistic care for nurses are three important measures to enhance organization safety culture [7]. However, in China, there is still a lack of systematic risk management system. The hard-driving culture of blame and punishment has not been broken,and the atmosphere of reporting safety incidents without accountability also has not been fully formed, leading to the lack of awareness of nurses' participation in the construction of patient safety culture. At the individual level, the researchers put their perspective on the health care personnel safety competency. The United States, Canada and Australia carried out the research of patient safety competency and brought out the competency framework of nurse safety [8], after that professional education is developing on the basis

of it. However, in China, the research on nurses' safety competence is only about the construction of the clinical nurse's safety competency framework [9] and evaluation tool [10], but facing a situation of the lack of intervention research. As a result of that, the construction of safety competency framework for nurses of different levels and positions and the development of continuing education of nurses based on patient safety competency suitable for China's national conditions will be the next research directions for nursing researchers.

Table1: Descriptions of the high-frequency MeSH terms

MeSH term	Number	Total frequency of the term	Percentage (%)	Cumulative Percentage (%)
Safety Management/organization & administration	1	712	6.51	6.51
Safety Management	2	320	2.92	9.43
Safety Management/methods	3	295	2.69	12.13
Medical Errors/prevention & control	4	184	1.68	13.81
Nurse's Role	5	182	1.66	15.47
Medication Errors/prevention & control	6	156	1.42	16.89
Attitude of Health Personnel	7	129	1.17	18.07
Nursing Staff, Hospital/organization & administration	8	121	1.10	19.18
Safety Management/standards	9	117	1.06	20.25
Accidental Falls/prevention & control	10	112	1.02	21.27
Patient Safety	11	97	0.88	22.16
Nursing Staff, Hospital/psychology	12	92	0.84	23.00
Violence/prevention & control	13	89	0.81	23.81
Occupational Health	14	84	0.76	24.58
Interprofessional Relations	15	70	0.64	25.22
Total Quality Management/organization & administration	16	68	0.62	25.84
Nursing Staff/organization & administration	17	65	0.59	26.43
Patient Care Team/organization & administration	18	61	0.56	26.99
Quality of Health Care	19	56	0.51	27.50
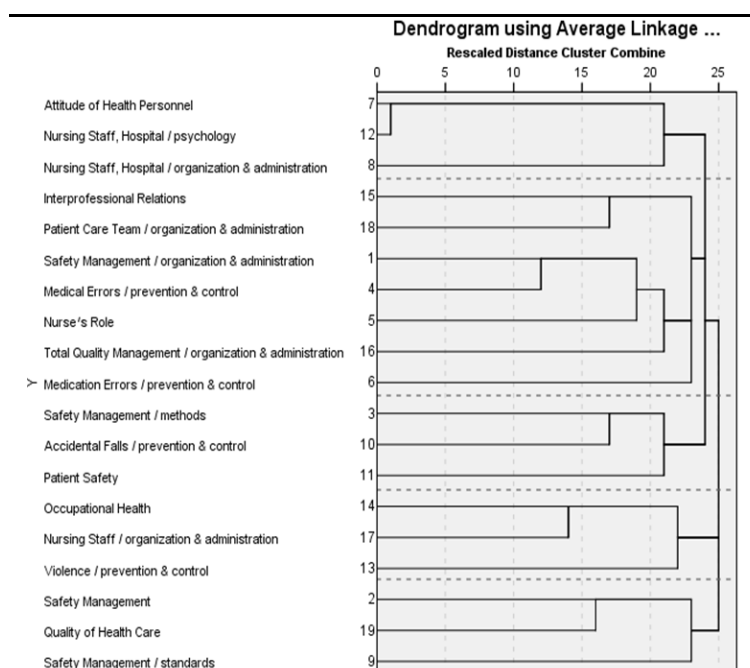
Figure 1: Cluster diagram of high-frequency MeSH terms.

4.2 Team work to promote nursing safety

This co-word cluster consists of MeSH terms of number 1, 4, 5, 6, 15, 16, 18. The Joint Commission on Accreditation of Healthcare Organizations conducted a statistical analysis of 5546 adverse events from 2004 to 2012. The results showed that the cause of more than 60% of adverse events

was the noneffective assistance and communication between teams [11]. Nevertheless, effective teamwork can reduce the incidence of nursing adverse events [12]. Lemetti, through literature review, concluded that competency, role orientation and interaction are major elements of cooperation, the team cooperation can be improved through following the three aspects [13]. Interdisciplinary ward round mode is an effective way to promote the communication between doctors and nurses. The joint ward round between doctors and nurses can increase the self-confidence of nurses, enhance communication between doctors and nurses, and promote cooperation between both sides [14]. McCaffrey carried out an 6-month training project in the hospital, the main contents included the influencing factors of cooperation, communication skills, body language *et al.*, the project effect was evaluated through group interviews.Result showed that the team training program helped to promote friendship, enhance staff communication skills, improve trans-positional thinking and achieve better cooperation [15]. Medical care service is the interaction between doctors, nurses and patients, and all the three sides need to participate in teamwork and supervise each other. To solve security problems in medical care needs not only the participation of the medical team, but also the positive cooperation of the patients. Therefore, the team cooperation in nursing safety should not only involve both doctors and nurses, but also should emphasize the participation of the patients to form a team of three sides coexisting with doctors, nurses and patients. The active participation of patients could be included in the nursing safety management system in China. The three sides participate in the management of medical care safety, and actively create new channels for safety management, so as to improve the effectiveness of safety management. This will be the research trend of nursing safety management in the future.

4.3 Practice of nursing safety management
The MeSH terms in this co-word cluste include "Safety Management/methods", "Accidental Falls/prevention & control", "Patient Safety". Falling down and falling from bed are two important indexes to evaluate the quality of medical care, and the prevention of falling down and falling from bed has also become an important content of nursing safety management. Study has shown that patients individual education with a falling preventive education set is more conducive to avoid falling [16]. With the in-depth study of falling prevention in recent years, evidence-based nursing practice, interdisciplinary cooperation, occupational therapy, and developing projects of different levels are also used for prevention of falling [17]. Francis-Coad has developed a fall prevention course for the elderly and has carried out health education through a network platform [18]. The application of Internet technology for health education can compensate for the shortcomings of medical staffs, but large sample and multi-center tests are needed to evaluate the effect.

4.4 Workplace violence against nursing staffs
The MeSH terms in this co-word cluste include "Vio-

lence/prevention & control", "Occupational Health", "Nursing Staff/organization & administration". Workplace violence has been a global and universal problem. In view of workplace violence, many countries are committed to building a hospital violence risk management system in addition to cross-sectional studies [19 - 20]. In the United States and Japan, risk management systems have been established to prevent and control the occurrence of hospital violence. The training of hospital violence knowledge and coping skills is one of the effective means to prevent and control the violence in the hospital [21]. The popularity of network platform provides a new perspective for workplace violence training. Brann carried out a 4-week workplace violence prevention curriculum through network platform for nursing students,and the nursing students' awareness of violence against workplace violence have been improved [22]. Hamblin pointed out that the structured field drill of medical institutions is a feasible way to reduce the violence in the hospital [23]. In addition, the use of hospital violence assessment and management tools can reduce the risk of violence [24]. Regular training and issuing guidelines about preventing violence in hospitals for nursing staffs, and encouraging the development and use of workplace violence assessment and management tools may be a feasible strategy for nurses to improve nurses' ability to deal with violence.

4.5 Nursing safety and quality evaluation standard
The MeSH terms in this co-word cluste include "Safety Management", "Safety Management/standards", "Quality of Health Care". The quality of nursing service is the core content of nursing management, it is closely related to the health and life of patients. The quality of nursing safety is an important part of nursing quality and the key to ensure the quality of nursing [25]. It is a subject that the nursing managers have been discussing to how to evaluate the quality of nursing safety,find out the factors that affect the improvement of the nursing safety quality and improve it. Most developed countries such as the United States and UK have established professional nursing safety organizations, which are responsible for the evaluation and assessment of nursing safety and quality, and have the clear division of responsibilities [26]. The internationally recognized effective evaluation system for safety management is the standard established by the Joint Commission International, referred to as the Joint Commission International standard [27]. The researchers also tried to build corresponding safety quality indicators combined with specific circumstances. Based on evidence-based evidence, 42 indicators of patient safety evaluation for European medical institutions were constructed through one project which is for patient safety improvement in Europe [28]. Leemans set up a study group by representatives of clinicians, nurses, psychologists, volunteers and patients,and they developed 31 indicators of the palliative treatment minimum data set for quickly and effectively evaluating the quality of hospice care,including physical care, social psychological care, information communication, nursing care plan, nursing type, continuous nursing and so on [29]. The study found that the construction and development of nursing quality indi-

cators is multi-level following the "National overall nursing quality index-Nursing quality index of related departments -Quality index of single disease care".The establishment and application of the multi-level nursing quality index is one of the most important parts to improve the quality of nursing safety management system. At the same time, continuous improvement in the quality of nursing services can meet the growing health needs of the people. Thus, the concept of nursing quality continuous improvement has been the focus of researchers, some scientific quality management tools and advanced management concepts have also been applied in the field of medical management, such as PDCA circulation pattern, root cause analysis, process reengineering and nursing risk management. However, the effective use of these management methods still requires the nursing staffs, especially nursing management leaders, to strengthen the study of management theory.

Several limitations of our study should be noted. The literature source in this study was restricted to PubMed database and did not involve the Chinese database. Future studies can analyze the hotspots and trends of nursing safety management in China, and compare the differences at home and abroad, so as to explore a nursing safety management plan suitable for Chinese medical system.And moreover,We also did not divide the MeSH terms by calendar year; therefore, we could not explore the annual evolution of changes in research hotspots.

5 Conclusions

We found five research hotspots referring to aspects of nursing safety management, and these findings should be helpful for nursing managers and researchers.

Authors' contributions
GMS and YHD conceived the sudy.
HZ and XYH participated in the literature mining.
YHD and HZ collected and analyzed data.
YHD wrote the manuscript.
GMS and XYH revised the manuscript.

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Patient consent
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Not applicable.

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