The role of clinical dashboards in improving nursing care: A systematic review

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ABSTRACT

Introduction: Advances and increasing technology adoption in the field of health have made it possible to implement tools such as clinical dashboards to assist nursing staff in providing better, more effective and safer care. The aim of this study was to investigate the role of clinical dashboards in providing nursing care.

Material and Methods: This was a review study. For this purpose, the keywords Nursing, Nursing care, Clinical Dashboard, Health Dashboard, Evaluation were searched in the database of PubMed, Google Scholar, science direct. Criteria for inclusion in this study were studies that examined the role of clinical dashboards in the field of nursing and were published between 1990 and 2020. The necessary information was extracted using a researcher-made checklist and analyzed and reported in a descriptive manner.

Results: A total of 2749 articles were retrieved. After reviewing by title, abstract and keywords, 7 studies that had appropriate content validity were selected for the present study. The intensive care unit had the highest frequency of dashboard use in nursing processes (n=3, 42%). The findings of this study showed that improving the quality of care, reducing medical errors and increasing patient safety are the most important benefits of using clinical dashboards in the field of nursing. Improving nurses' awareness of important patient issues and supporting clinical decisions were next in line.

Conclusion: Clinical dashboards in the field of nursing care can reduce errors and possible negligence in the treatment by integration patient information and providing a comprehensive visual view of important patient information and as a suitable tool for evidence-based clinical and nursing decision support.

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INTRODUCTION

Nurses are considered as one of the most important elements of health care systems and play a major role in providing continuous and quality care to patients [1]. Along with the advancement of science, nursing has also gone through its developmental stages rapidly and has changed the role of nurses from passive and dependent to independent and decision-making [2].

One of the unique challenges that nurses always face is the breadth, complexity, diversity and multiplicity

of clinical information. Nurses are faced with a large amount of clinical data that in most cases do not have the right tools and processes to manage and use this information optimally [3]. Since nurses have an important role in providing care to patients due to their greater interaction with the patient, they should not be kept away from patient health information. Loss of their knowledge of the doctor's instructions and important patient information can lead to negative consequences in the patient's treatment process [4, 5].

One of the new technologies that can change the

planning, documenting and providing clinical nursing services and create a suitable environment for decision-making and implementation of evidence-based nursing is clinical dashboards [6, 7]. Clinical dashboards are considered as a data-driven clinical decision support tool that can search multiple databases and provide a comprehensive visual representation of key performance indicators [6, 7]. The main purpose of creating dashboards is to provide an overview of large volumes of data; As a result, there are different types of dashboards that are designed for different applications [7]. One of the main features of the clinical dashboard is the presentation of a summary of the patient's clinical data, which uses data visualization methods to provide valuable information to provide feedback to the health care team, managers and patients [8]. This powerful user interface allows users to easily read and understand information [9].

Studies have shown that the use of any type of information and communication technology to provide services directly or indirectly to patients, may change the daily performance of nurses [10]. Some studies have examined different types of information communications technology (ICT), such as electronic health records [11], computerized nursing records systems [12], or clinical decision support systems [13]. With the research done, so far no study has investigated the effect of clinical dashboards on the nursing profession in Iran, so this study was conducted to investigate the role of clinical dashboards in facilitating and improving the provision of nursing care.

MATERIAL AND METHODS

The present study was conducted as a systematic review method to investigate the role of clinical dashboards in providing nursing care. The keywords studied included nursing, nursing care, clinical dashboard, health dashboard, evaluation, which were searched in PubMed, Google Scholar, Science Direct databases. These keywords were combined with the Boolean "AND" and "OR" operators. Criteria for inclusion in this study were studies that examined the role of clinical dashboards in the field of nursing and were published between 1990 and 2020. Exclusion criteria were studies that were published in a non-English language or the full text of which was not available. A total of 2749 articles were retrieved. After reviewing the titles and abstracts, 7 articles were included in the study (Fig 1). The studies were studied and the necessary information was extracted using a researcher-made checklist and analyzed and reported in a descriptive manner.

RESULTS

Studies have shown that the United States has the most studies in the field of clinical dashboards in nursing care, so that more than half of the studies have been done in this country. The trend of publishing studies is also scattered in this area (Table 1). Also, the results of reviewing studies showed that the intensive care unit had the highest frequency of dashboard use in nursing processes ($n=3$, 42%). Home nursing care, mental health, and the cardiac, respiratory, and surgical wards were other areas that designed and implemented clinical dashboards to improve nursing care (Table 1).

Fig 1: PRISMA flowchart

The findings of this study showed that improving the quality of care, reducing medical errors and increasing patient safety are the most important benefits of using clinical dashboards in the field of nursing. Improving nurses' awareness of important patient issues and supporting clinical decisions were next in line. Advantages such as performance improvement and drug management were less common among studies (Table 2).

The results of this study showed that dashboards with features such as integrated display of clinical data, visual features, dashboard functions, time focus and clinical staff monitoring processes are more involved and the information it provides is more understandable to everyone.

DISCUSSION

The aim of this study was to investigate the role of clinical dashboards in providing nursing care. The results of this study showed that clinical dashboards in the field of nursing care can reduce errors and possible negligence in the treatment process by integrating patient information, evaluating them and providing a comprehensive visual view of important patient information and as a suitable tool for Support clinical evidence and evidence-based nursing.

Table 1: Details of studies included in the research

References and author's name	Year	Goal	Country	Areas under study
Egan [14]	2006	Investigating the effect of clinical dashboards on workflows and quality of care	America	Intensive care unit and operating room
Koch [15]	2012	Identify information needs and provide advisors to increase nurses' awareness using the dashboard	America	Intensive care unit
Tan [16]	2013	Create an electronic dashboard to improve nursing care	Singapore	General nursing care
Jeffer [17]	2014	Investigating the insights of nurses and nursing managers on the performance of clinical dashboards	Canada	General surgery, lung, emergency, heart, outpatient care departments
Henry [8]	2017	Investigating the effect of clinical dashboards on improving the quality of nursing care and patient safety	Ireland	Mental health
Khairat [18]	2018	Investigating the effect of clinical dashboards on the quality of care and staff satisfaction	America	Intensive care unit
Dowding [19]	2019	Assess the usability of the dashboard designed for home nursing care	America	Home nursing care (heart failure)

Table 2: Benefits of using clinical dashboards in nursing care

Row	Benefits of using clinical dashboards in nursing care	Frequency
1	Improvement in decision making [19]	1
2	Improve workflows [8, 16]	2
3	Improving evidence-based nursing [8]	1
4	Improve the quality of care [8, 14, 16, 17, 18]	5
5	Reduce medical errors and increase patient safety [8, 14-16, 18]	5
6	Performance improvements [17]	1
7	Drug management [15]	1
8	Increase efficiency [16, 18]	2
9	Improve nurses' awareness of important patient issues and provide feedback [14-16]	3

The results of this study are consistent with the findings of Khairat et al. who stated that clinical dashboards reduce data collection time, reduce errors, and improve evidence-based safety guidelines and usability [18]. Interactive clinical dashboards can be a useful tool for improving patient day care when properly integrated with a computerized physician order entry (CPOE) system [16]. In a study, Kech et al. evaluated nurses' completion time using a dashboard compared to traditional information displays. It was reduced by half, which confirms the effect of clinical dashboards on improving nursing work processes [20].

The findings of this study also showed that clinical dashboards can improve nurses' awareness of important patient issues and can be considered as a suitable tool to support clinical decisions. Consistent with the results of this study, in other studies, nurses had stated that clinical dashboards have increased their awareness and with the feedback it provides has caused them to feel more control and satisfaction in performing their duties [21]. The feedback mechanism in dashboards plays an important role and can help improve employee performance by providing appropriate feedback to employees.

Dashboards work with the capabilities that make

clinical staff more involved, the information they provide is understandable to everyone, and it motivates people to improve their performance. Based on the results of studies, these capabilities are:

1. Integrated display of clinical data: Patient data may be available in different formats as well as in different databases (radiology, laboratory, pharmacy information system, etc.). Clinical dashboards can provide an integrated display of this information [14, 18].
2. Visual features: Dashboards are typically presented in simple graphical formats and provide visual evaluation of key performance indicators in a way that improves evidence-based decision making [22, 23].
- 3- Dashboard functions: The functions of clinical dashboards include (1) determining performance criteria, (2) providing notifications and warnings, (3) forecasting to guide future management decisions, and (4) summarizing and analyzing data for presentation. Feedback is appropriate [23, 24].
- 4 - Dashboard time focus: Clinical dashboards can be used both to collect retrospective data in electronic health records and to monitor real-time current patient care [25].

5- Monitoring processes: Clinical dashboards can implement different types of monitoring processes in health care organizations, such as patient safety management [26, 27].

There are also restrictions on the use of clinical dashboards. The information in a dashboard contains past performance and should therefore be used with caution to predict future processes and decisions. It should be noted that depending on how long the dashboards and the information contained in it are updated, the information extracted should be consistent with the patient's current situation. It is recommended to update the dashboards on a weekly basis to prevent the obsolescence of the information in the dashboards and the greater efficiency of its reports [28, 29].

Studies show that there is currently insufficient cognitive and informational support for nursing activities and processes, and in existing cases it is not provided as a whole, so there is a need for a tool that can meet the information needs of nurses.

CONCLUSION

The results of this study showed that the use of

clinical dashboards as a decision support tool in nursing care can be an effective step in improving the quality of patient care.

Clinical dashboards in the field of nursing care can reduce errors and possible negligence in the treatment process by integrating patient information, evaluating it, and providing a comprehensive visual overview of important patient information. And be considered as an appropriate tool to support evidence-based clinical decision making.

AUTHOR'S CONTRIBUTION

All authors contributed to the literature review, design, data collection and analysis, drafting the manuscript, read and approved the final manuscript.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest regarding the publication of this study.

FINANCIAL DISCLOSURE

No financial interests related to the material of this manuscript have been declared.

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