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Electronic Whiteboard in the Inpatient Care Management: Nurses' Perceptions About the Use

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Abstract. In the hospital setting, the traditional method of information for nurses is to consult the Electronic Health Records (EHR) on several occasions to check the continuous updates of the prescriptions. This process, in practice, involves time and multiple setbacks such as: availability of equipment (there is no computer per nurse in the office), number of patients assigned (it involves entering each EHR one by one). This is how the implementation of the tool known as electronic whiteboard (e-whiteboard) came about. The aim of this study was to explore perceptions of nurses after implementation of e-whiteboard, recently introduced at Hospital Italiano de Buenos Aires. A Qualitative study, which consisted of 5 group interviews with a total of 27 participants. A convenience sampling was used (selection of nurses from different shifts), corresponding to 4 sectors of adult patient admissions and 1 sector of pediatric patients. The main findings were positive aspects such as: it was a simple, intuitive and easy to navigate interface, it allowed communication with other health professionals (physicians, nutritionists and kinesiologists), and it facilitated the visualization of real time information that favors the fulfillment of tasks in scheduled time. This tool is considered of great clinical importance for coordinated patient care because the visibility and availability of clinical information improves communication between professionals, streamlines workflow, and consequently accelerates shared decision making.

Keywords. Perceptions, nursing, electronic whiteboard, inpatient

1. Introduction

Advances in health have led organizations to incorporate technologies for patient care planning [1]. In the hospital setting, during the hospital stay, nursing work regarding patient care planning requires continuous updates. The traditional method, which consists of accessing the Electronic Health Records (EHR) involves multiple setbacks [2] such as: availability of equipment (there is not one computer per nurse in the office), or the number of patients assigned (it implies gaining access to every EHR one by one). Unlike EHR, electronic whiteboards (e-whiteboards) are being used as a tool to monitor [3,4] and improve the quality and safety of care [4].

Previous research has shown that e-whiteboards have certain advantages over traditional dry erase white-boards [5,6] (which have been and continue to be used in

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our local environment). These advantages include automated updating of patient information, the ability to visualize information in real time, and integration with other clinical information systems, and reduction of the workload of nurses [2,7]. While the use of tablets and mobile solutions in hospitals is currently being discussed, in our environment we are using more precarious tools and are just introducing e-whiteboards [4]. The aim of this study was to explore perceptions of nurses after implementation of e-whiteboard, recently introduced.

2. Methods

The Hospital Italiano de Buenos Aires (HIBA) is an institution with more than 1200 nurses and 750 beds in Buenos Aires, Argentina. The e-whiteboards, large electronic screens located on the nurse's station wall and out of sight of patients and visitors, were implemented in October 2017. This implementation were restricted to the adult and pediatric inpatient wards.

The e-whiteboard was developed with a user-centred design methodology, with a system that makes "retrieval information" in real time, addressed to nursing care staff. Categorization of information are displayed in around 84 icons in a horizontal distribution. The categories are: hospitalization data (patient's patronymic data, bed number, gender, age), alerts (for example: new prescriptions and/or changes in medication, isolation status, allergies), risks (pain scale assessment, pressure ulcers) and tasks (laboratory requests, patient transfers). The system interacts with the data from the admission, discharge and transfer (ADT) system, operating room agenda, EHRs, medical prescriptions and Computerised Physician Order Entry (CPOE) for complementary tests, nursing e-chart. (See Figure 1).

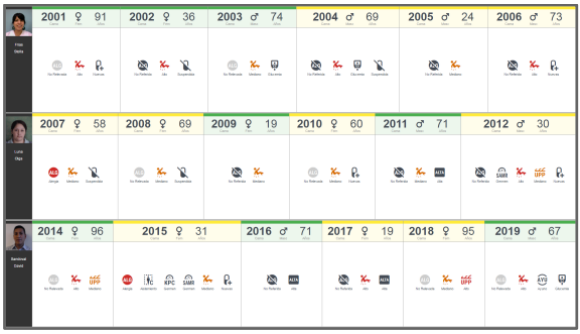

Figure 1: e-whiteboard screen

2.1 Design

A qualitative study to explore perceptions of nurses after implementation of e-whiteboard [8] was performed using group interviews. The data obtained, were homogeneous in terms of the institutional hierarchical position, there were not an inhibition of free expression by power relations and / or hierarchy, and it was achieved a greatest diversity of possible opinions.

A convenience sampling was carried out that included the selection of nurses from different shifts (morning, afternoon, evening and Saturday, Sunday or holiday). These Nursing staff belonged to four adult wards and one pediatric ward. From March to April 2018, 5 group interviews were conducted, with a duration of 90 minutes each one following an open-ended questionnaire. Grounded theory was used to analyze the transcribed data and build convergent themes. The relevance and importance of themes was constructed by examining frequency, convergence, and intensity. The presentation of results is oriented by these categories.

3. Results

A total of 27 nurses, with no age limit, from both genders, and from the general hospitalization area, participated in different shifts. Those nurses who carried out administrative management tasks (not patient care) were excluded. Six dimensions emerged from this study: use, communication, workflow, data quality, training and technical support. Each dimension is detailed with its respective findings (See Table 1).

Table 1. Dimensions and findings

Dimension	Description	Example
Dimension one: Use	Two components were identified: interface design and information availability. Nurses' perceptions were positive in relation to a simple and intuitive interface, simple navigation based on user-centered design guidelines, and the interaction with other systems of the institution. Likewise, it was highlighted that the iconography used facilitates its interpretation and use. In this sense, the most used icons were: assessment of pain scale, fall risk, isolation status, early warning, diet and the status of pharmacological prescriptions (new, modified, and suspended).	*"I use the e-whiteboard to visualize the pending tasks and for patient care planning"* *"It's very complete, because it shows everything you need to plan patient's care"*
Dimension two: Communication	Four structural elements of communication were determined using group interviews: the e-whiteboard properties, its physical location, permanent visualization, and the health personnel that must interact with the e-whiteboard (nurses, nutritionists, kinesiologists, stretchers, physicians, among others). Although they expressed positive perceptions related to the communication established with other health professionals (physicians, nutritionists and kinesiologists), it was not useful for the communication between them (nursing staff) to perform the shift pass.	*"It is very useful for communication with nutritionists and kinesiologists who come to evaluate patients"* *"Allows easy identification of the nurse in charge of the patient"*
Dimension Three: Workflow	A perception of a workflow improved was identified, related to: decrease of constant EHR access, visualization of relevant information and pending tasks in real time, and facilitates fulfilling tasks in scheduled time (without delays, improving timely patient care).	*"When there are changes in medical indications, they are immediately visualized, this helps to better plan our routine"*
Dimension Four: Data	The interviewees expressed positive aspects related to: the accuracy, reliability and quality of the information	*"It is reliable and secure data that are displayed on*

quality	displayed. They emphasized the capability to carry out patient care planning (due to the accessible and timely information), without generating complex processes to understand and assimilate the meaning of the data through iconography and colors.	*the e-whiteboard"*
Dimension Five: Training	The nurses mentioned as a positive aspect, the brochures provided with the information of the e-whiteboard. However, they consider negative the lack of training or follow-up during the implementation.	*"The information displayed is easily understood, but I would have liked accompaniment in my hospital sector"*
Dimension Six: Support	They mentioned as a negative aspect the lack of a help desk support that would allow the resolution of problems related to the e-whiteboard, and difficulties when the board failed.	*"When a e-whiteboard failed, we didn't know what to do"*

4. Discussion

This research proposed to explore the perceptions of nurses in relation to the implementation of the e-whiteboard. The main findings were positive aspects such as: the e-whiteboard was a simple, intuitive and easy to navigate, allowed communication with other health professionals (physicians, nutritionists and kinesiologists), and facilitated the real time visualization of information that favors the fulfillment of tasks in a scheduled time. The most used icons were: pain scale assessment, fall risk, isolation, early warning, diet and the status of pharmacological prescriptions.

This system is considered important for a coordinated patient care because the visibility and availability of clinical information improves communication between professionals, streamlines workflow [8], and consequently speeds up shared decision-making. Consistent with other studies [3,9], the e-whiteboard represents a technology that improves communication and coordinated patient care. On the other hand, the interviewees expressed certain negative aspects such as: it was not useful for communication between nursing staff to carry out the shift pass, the lack of training or coaching in its use, or the lack of a convenient support. In view of these findings, training and information dissemination should be planned in order to proceed in case of failure or to mitigate the risk.

The e-whiteboard could not be incorporated in the nursing pass workflow due to its physical location in the nursing office. The system could be viewed from the corridors by family members. Because information that must be hidden to maintain patient confidentiality (for example: sex, gender and other important clinical history), and after a consultation with the legal department, it was decided to use the bed numbers instead of the patient's name or initials.

Despite this is a unicentric study, the user-centered design methodology used facilitated the resolution of some specific needs of the end user, providing satisfaction and a good experience [10]. Post-implementation, the acceptance of the system by the staff is decisive [11], which has a direct impact on its use.

We believe that our findings can provide an approach to the understanding the complex factors related to the implementation of health technology, looking at staffs needs and concerns that are still present post-implementation [12], and which will be

worked on in future studies. This information is useful and can be expanded through a multi-hospital study.

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