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Looking for the Best WOW: Understanding the Nurses' Needs

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Abstract

The effective use of nurses' time for providing increasingly safe, efficient, and patient-centered care is a major concern for healthcare managers as well as for nurses themselves. Different solutions have been used aimed at improving those times by providing nurses with mobile and 'on wheels' alternatives for bedside care. Nevertheless, the selection of solutions is still a complicated organizational decision. This paper describes the evaluation of ergonomic characteristics of five local mobile carts for the bedside nursing care at Hospital Italiano de Buenos Aires. Cornell University's checklist was used for data collection according to five domains: car handling, work surface and data load, documents and screen reading, storage and dimensions, and energy and cleaning. Considering the scarcity of literature on needs for WOWs assessment, the findings of this paper represent a valuable approach to the requirements of nurses in real work environments and a support for decision-making based on nursing observations.

Keywords:

Computers; Nurses; Informatics

Introduction

The decrease in time that nurses use to perform tasks related to direct patient care and to document evidence of the care they provided continues to be a challenge for administrators and an unmet demand for nurses [1].

The use of computers and workstations on wheels (COWs and WOWs) is a growing trend for bedside care in healthcare settings. It is an acceptable notion that the use of time and coordination of care will be more effective if devices are used to load the data where they are generated ("point of care") [2]. However, the best solution has not yet been found and although there are recommendations to take into account while making decisions on the subject, there is little research about it [3,4].

Different health professionals can use WOWs but nurses are the main users, and they use them to record patients' assessments and to transport medications [3, 5].

Studies show that WOWs for bedside care that are available on the market have high costs and do not include mobile technology and other equipment that serve as support. They also have some other related problems, such as long inactivity times due to battery recharge, inadequate dimensions, difficult handling [6], and designs based on the devices' ergonomics—and not that of the cart or WOW itself—thus generating low adherence to use [7].

It is imperative for the development of a mobile app for nursing data load at the point of care, and for our nurses' appraisal and needs to make an assessment and collect information regarding the characteristics of different carts and workstations on wheels. This is also useful for the selection that complies with ergonomic recommendations of these devices in nurses' bedside care environments.

Methods

Setting

The study was conducted at the Hospital Italiano de Buenos Aires (HIBA), an academic hospital founded in 1853, located in Buenos Aires, Argentina. As a JCI-accredited and stage 6+ HIMSS-EMRAM hospital, HIBA belongs to a nonprofit healthcare network including 25 outpatient centers and 150 offices located in the city of Buenos Aires. It has an infrastructure supporting 750 inpatient beds, 41 operating rooms, and a home care network with 800 beds. The organization employs nearly 2800 physicians, 1600 nurses, and 1900 employees in administrative services and management. In the past 20 years, HIBA has developed and implemented an "in house" health information system, including clinical and administrative data. The electronic health record (EHR), named ITÁLICA, is a modular, problem-oriented, and patient-centered system with different settings (outpatient, inpatient, emergency, and home care). It includes clinical documentation system, medication administration using bar coding (intensive care areas), and computerized provider order entry (CPOE). Sections according to the stages of the nursing care process organize the electronic nursing record. Nurses must also diagnose using NANDA-I taxonomy II diagnoses classification and care plan that is based on the nursing interventions classification (NIC).

Study design

This study was cross-sectional, observational and descriptive work, with mixed methodology.

Phase 1:

We used three workstations on wheels (named Dina, Jordan, and Andrea) from July 21 to August 15, 2016. Different local suppliers provided them according to pre-established requirements based on the various necessary characteristics. The suppliers did not provide WOWs with bar code scanners, computer or mobile devices such as a PC tablet (except for Andrea) (Figure 1), because the purpose was to evaluate the carts alone at this stage and to assess devices and barcode readers in a subsequent stage.

A convenience sample was performed. Data collection was made through observations made by the adult and pediatric general care nurses from four different wards, including five nursing shifts (morning, afternoon, night number 1, night number 2, and weekends). They were provided with a copy of

a Cornell checklist, translated into Spanish, which included ergonomic factors for computer carts in health environment. The Cornell checklist is developed by the Cornell University and represents a guide on considerations to evaluate a single cart or a WOW. Taking into account the anthropometric data of adults in the USA, the Cornell checklist is organized into five sections: a) Cart maneuvering; b) Work surfaces and data input; c) Screen reading; d) storage/accessories/power; and e) Hygiene in addition to free space for comments. The items of each section have a binary response (Yes/No) option about whether the cart satisfies the item or not. If all items are relevant, the total number of "yes" values can be added at the end of each of the five sections and the overall total score can be summarized at the end of the entire checklist. The maximum possible score is 35 and the higher score represents the computer cart with better ergonomic design. A list of activities to be carried out by the nurses with each computer cart was drawn up in the chosen areas before answering the checklist (Table 3). These activities were presented and explained to the nurse teams. Once the days established in the work plan schedule were met, the cart in a particular area was removed along with the filled checklists and a new cart was delivered to that area. Once the cart had completed its rotation in all the four sectors, it was returned to the Health Informatics Department.

The data based on the responses by the nurses for each cart by area and nursing shift were manually entered into an Excel® data sheet. We performed descriptive statistics for each cart with Stata®13. We used non-parametric Kruskal-Wallis test for independent samples to compare differences between the carts. Then we calculated a pairwise comparison of total scores sorted by each cart with the Dunn's procedure. Furthermore, comments made in the comment space by the nurses in each ward were analyzed independently by the Informatics nurses to gain additional insight about items that were possibly not in the structured checklist.

Phase 2:

Once the data were processed and analyzed, the cart with the best score was returned to the supplier for the necessary adjustments and improvements. A new provider handed over a new cart called Mariano. The WOW 'ANDREA renewed' and MARIANO were delivered to the same sectors and teams of nurses who had participated in the Phase 1 from October 20 to November 9 for following the same methodology that we used in the first phase. Then we performed descriptive statistics for each cart, and a t-student test to compare means from the two phases.

Results

A total of 59 checklists were completed during the three-week rotation of the carts during the first phase. ANDREA was evaluated 20 times, obtaining a minimum score of seven and a maximum of 34, with a mean of 15.85 points (SD 6.9). Meanwhile DINA was also evaluated 20 times, obtaining a minimum score of three and a maximum of 16, with a mean of 6.7 points (SD 3.2). On the other hand, JORDAN was evaluated 19 times obtaining a minimum score of two and a maximum of 16, with a mean of 7.3 points (SD 3.7). Figure 1 shows the carts evaluated in both the phases and Table 1 summarizes the total number of observations for each cart by sector with respective mean, the standard deviation, as well as the minimum and maximum score obtained per sector. ANDREA got the best scores in the carts observed and it was selected for a new evaluation after its reconfiguration by the supplier. The main improvements requested from ANDREA's supplier were in the areas of the handle with a better grip, the tray and the bracket where the optical scanner would hang, and the main pillar where the internal power cables of the device and battery would fit in. The other two (DINA and JORDAN) were discarded. A Kruskal-Wallis test was performed to compare differences between carts. With a type I error of 5%, at least one of the carts had a total score different from the rest (Chi-squared (23.39 (2d.f.), $p = 0.0001$). Then, after controlling with Dunn's pairwise comparisons, we encountered statistical significant differences between ANDREA and DINA (4.66, $p < 0.00001$), ANDREA and JORDAN (4.01, $p = 0.0001$), and non significant difference between DINA and JORDAN (-0.059, p=0.8280)

A total of 52 checklists were completed during the second phase. The scores obtained by 'ANDREA renewed' and MARIANO were similar in general but varied by areas. Nevertheless, the t-student test to compare the means of total scores resulted in a statistic of 0.812 (50 d.f.) and a p value of 0.4209, showing that there is no statistically significant difference for the evaluation of the characteristics evaluated by the nurses with Cornell's checklist.

Table 2 summarized the total number of observations.

Figure 1 – evaluated WOWs

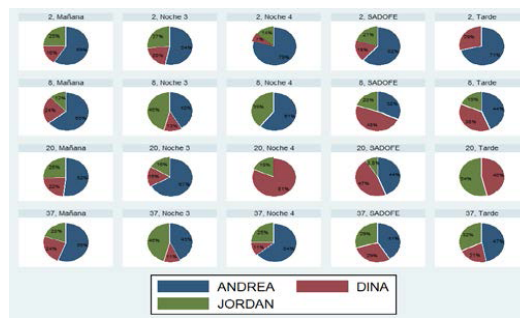

Figure 2 – Scores per cart, area and shift – phase 1

Comments analysis

We mention the themes that emerged in the first phase from nurses' comments related to the topics in the Cornell's checklist. Nursing staff in each ward identified several negative features of WOWs: lack of stability and difficulty in maneuvering (DINA), noise, unstable cart wheels, large footprint that made 'it impossible to walk beside it (JORDAN)'.

Table 1 – Assessment of Carts by Sectors and Shifts

Cart	Sector			
	2	8	20	37
ANDREA				
Observation by area	5	5	5	5
Mean	25.6	10.6	13.2	14
SD	5.12	3.91	2.04	4.18
Minimun score	21	7	11	7
Maximun score	34	17	15	18
DINA				
Observation by area	5	5	5	5
Mean	6.8	5	10	5
SD	2.58	1.41	4.41	1.58
Minimun score	3	3	6	3
Maximun score	10	6	16	7
JORDAN				
Observation by area	4	5	5	5
Mean	8.75	6.4	5.8	8.8
SD	2.62	4.33	2.68	4.71
Minimun score	6	2	3	5
Maximun score	11	11	9	16

Adult general care: sectors 2, 20 and 37. Pediatric general care: sector 8

Table 2– Assessment of 'ANDREA renewed' and MARIANO

Cart	Sector			
	2	8	20	37
'ANDREA renewed'				
Observation by area	9	1	5	9
Mean	18.67	20	16	17.78
SD	4.58		6.67	3.15
Minimum score	10	20	8	10
Maximum score	27	20	26	21
MARIANO				
Observation by area	5	4	7	12
Mean	18.6	13.5	15.28	18.16
SD	2.07	5.26	4.15	4.04
Minimum score	17	9	8	12
Maximum score	22	21	20	25

The size 'too small' or 'inadequate', adding a basket and a handles emerged as very important aspects. The main theme in all the observations was that the tray was 'inappropriate to administer the medications', as it was very small or had no containment edges.

The theme related to the need for more comfortable handles and the basket, as well as the noise when moving the carts emerged again in the second phase. The nurses appreciated the improvements from the previous evaluation for ANDREA, but now it was 'too big to mobilize considering that patient rooms are small'. Another new element was that the power cable was 'very short'.

Table 3 – Activities List

Activities
▪ Handle the cart by "pulling" the handle
▪ Adjust handle to fit comfortably
▪ Pull and push the cart, causing it to move
▪ Move the cart in a certain direction
▪ Move the cart through different areas where you walk for your work:
o Nursing Station
o Preparation of medication area (Bunker)
o Hallways
o Patient Room
▪ Elevate the work surface of the cart more than one meter from the floor
▪ Take notes on the work surface of the cart
▪ Place the medication tray on the work surface and move the cart to a room
▪ Adjust the inclination of the working surface of the cart
▪ Turn the work surface of the cart
▪ Lift and lower the platform for the keyboard as if to use it to write while:
o Standing
o Seating
▪ Type on the surface where the device's keyboard would go
▪ Put the items you use to do your work in the cart and move it through different areas
▪ Brake the wheels of the cart and try to move it
▪ Remove the wheel brake of the cart
▪ Throw liquid (small amount) onto the work surface and wipe it with a dressing
▪ Rotate the bracket for the device to left and right without moving the cart
▪ Rotate the bracket for the device up and down (changing the angle) without moving or turning the cart

Discussion

We performed an ergonomic assessment of five WOWs for bedside nursing care, seeking to find a solution to difficulties experienced by our nurses in collecting data at the point of care, and also for the purpose of improving communication and coordination of care. We aligned our work with suggested changes in healthcare systems to achieve more effective processes that truly support the way care is delivered and transformed [8][9].

Our evaluation examined the ergonomic characteristics available and desired in mobile stations. ANDREA showed a significant advantage over the other carts in the first phase and

renewed ANDREA continued in the race for a new evaluation. None of the carts, however, obtained the maximum score, that is, none has all the required characteristics. Some aspects continue to not meet the needs of some nurses at the start of the third phase. This could suggest a low adherence to cart use in future, even more so if we do not include the devices in this stage. Some aspects represent enhancements, such as inability to rotate the axis of the device used to document the patient care, size of the cart perceived by nurses as 'bulky' and difficult to mobilize. Such aspects limit the storage and efficient mobilization [6] in zones in which they will be deployed.

The results of this work can not be generalized since it was performed in a single hospital center. Furthermore, there was a lack of consistency in some answers—for example, user answered only a single survey in one ward in Phase 2—probably because they were self-administered by the nursing staff.

ANDREA was provided with a tablet and that feature had not been included during the previous training to the nurses. We had instructed them to ignore it, however, some observations may have been influenced by the mere presence of the device.

Two Health Informatics research interns, an Informatics nurse, and an Informatics physician agreed upon and decided on the final version of the English-Spanish translation process. The Cornell University's checklist [10] is neither externally validated nor adapted to Spanish; nevertheless, its use provided us a first approximation to the needs of nurses related to mobile workstations. We could include all the HIBA nursing shifts to strengthen our evaluation instead of using only the weekly day shifts. On the other hand, when we discarded the 'worst' carts in terms of score and reconfigured the best positioned cart, we received better response from the nurses who thought that their input was taken into account. We benefited from creating an elaborate list of activities—that simulated real-wrold scenarios in daily practice—before the evaluation. We are about to start a bedside care pilot study, indicating the third phase of WOW evaluation, with a new version of MARIANO renewed based on the findings and suggestions of the second phase. We also plan to incorporate a tablet PC, a bar-code scanner, and the test of the mobile app for nursing bedside care.

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