MEDINFO 2015: eHealth-enabled Health
I.N. Sarkar et al. (Eds.)

doi:10.3233/978-1-61499-564-7-255

Pre-Implementation Study of a Nursing e-Chart: How Nurses Use Their Time

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Abstract

In clinical practice, nurses perform different activities that exceed direct care of patients, and influence workload and time administration among different tasks. When implementing changes in an electronic nursing record, it is important to measure how it affects the time committed to documentation. The objective of this study was to determine the time dedicated to different activities, including those related to electronic documentation prior to implementing a redesigned nurse chart in an Electronic Health Record at the Hospital Italiano de Buenos Aires. An observational work sampling study was performed. Nursing activities observed were categorized as direct care, indirect care, support, non-patient related, and personal activities. During the study, 74 nurses were observed and 2,418 observations were made in the Intensive Care Unit (32.22%), the Intermediate Care Unit (29.57%), and the General Care Unit (38.21%). Nurses' activities included 37.40% of direct care, 41.18% of indirect care, 0.43% support tasks, 11.14% non-related to patient tasks, and 9.77% personal activities. The results allow for the estimation of the impact of a nursing e-chart on nurses' activities, workflow and patient care.

Keywords:

Work sampling study; Time and motion study; Non-direct care; Indirect care; Nursing workload; EHR use; EHR documentation.

Introduction

The shortage of nurses is a growing problem, and it is estimated that in the next few years the problem will intensify [1]. The existence of nursing activities and factors that are not related with direct patient care is known. Several authors have pointed out that the time devoted to these activities impact the nurses' workload [2–4]. In addition, according to Myny et al. [5], there are still doubts regarding which of these indirect patient care activities are perceived by nurses as part of their work responsibilities. Information technology could be leveraged to solve this problem through multiple implementations that take into account specific nurses' needs. There is no consensus in the literature on how the implementation of an Electronic Health Record (EHR) system may affect the efficient use of time. Several studies show a reduction in nursing documentation time [2,4], while others show that the time gained due to new functionalities in the EHR is lost. According to nurses, informed implementation of the new EHR system reduces communication with physicians, generating mistrust on certain prescriptions, which requires constant re-confirmation, leading to an increase in associated documentation time [6]. Consequently, this results in a lack of nursing staff, endangering work efficiency and generating a rise in hospital costs [7]. Given the impact on time standards of nursing care and human resources management, data regarding nursing time dedicated to different activities is crucial [8]. This information is necessary to evaluate changes in nursing practice after the implementation of a new system, and is decisive in evaluating its efficacy [9]. In order to measure both work and time, different techniques exist to generate standards, "time and motion studies", and "work sampling". The selection of these techniques will depend on the precision and nature of the object in study. These types of studies have been done to describe and evaluate the impact of health care professional activities, including physicians [10], pharmacists [11,12], and nursing professionals [13]. In the context of an implementation of a redesigned electronic nursing record at Hospital Italiano de Buenos Aires (HIBA), the objective of this article is to determine the time needed for nurses to do specific activities, including those related to electronic documentation prior to implementation.

Materials and Methods

Setting

HIBA is an academic tertiary level hospital founded in 1853. It belongs to a nonprofit healthcare network including 25 ambulatory clinics and 150 outpatient offices in Buenos Aires, Argentina. The infrastructure includes 750 beds (200 for critical care), 800 home care beds, and 41 operating rooms. There are 2,800 physicians, 2,800 non-physician healthcare professionals, and 1,900 individuals in administrative services and management. During 2013-2014 there were approximately 45,000 discharges, 45,000 surgical procedures (50% of which were ambulatory), and 3 million visits. Since 1998, HIBA has gradually developed and implemented an "in house" Health Information System (HIS) that handles medical and administrative information from point of capture to analysis. The HIS includes a single, modular, problem-oriented, and patient-centered electronic health record (EHR). The EHR, named ITALICA, allows for the recording of patient care at different levels (outpatient, inpatient, emergency, and home care). ITALICA also enables complementary studies, drug prescriptions, and results display that includes the storage and transmission pictures system (PACS - Picture archiving and communication system). In recent years, the nurse chart evolved from paper to the computerized system. The first phase was digitized paper

documents, but in 2010 the first version of the electronic nursing record was embedded in the EHR, consisting of sections of structured data entry, medication administration, fluid balance, vital signs and a free-text area where nurses record narrative observations. Two years later, the system was updated to a version organized by sections according to nursing process, including planning of nursing interventions (but not nursing diagnosis). Currently, the electronic nurse chart is structured in four sections independent of each other: Assessment, Planning, Implementation, and Evaluation. Different sections allow nurses to record patient care following the logic of nursing processes, or skip to any section without completing the others.

For the pilot, we chose three representative sectors: the Adult Intensive Care Unit (ICU), the Adult Intermediate Care Unit (IMCU), and the Adult General Care Unit (GCU). The ICU has 38 beds allocated in three areas, according to the severity and therapeutic requirement of the patient. The nurse:patient ratio is 1:2, and there are 108 nurses allocated to the different shifts. The IMCU has 28 beds, the nurse:patient ratio is 1:3, and the total number of nurses is 58. The GCU has 44 beds; it is a medical-surgical unit, with a nurse:patient ratio of 1:8, and 32 nurses are distributed across the different shifts.

Design

This study was an observational descriptive work sampling. Data collection was made through observations, and work samples were made following the steps proposed in the literature [7,14]. The task consisted of observing a work sample of nurses, and describing the activities performed as well as determining the time cost of those activities.

After the approval of the project, the task categories and the specifics activities were determined. After a literature review [9,15–17], the categories were agreed on with the Chief of Nursing Department (CND). The categories chosen are direct care, indirect care, support activities, non-patient related activities, and personal activities.

***Direct care*:** The activities near a patient's bed, including admission, anamnesis (medical history), comfort, emotional support, and education, among others.

***Indirect care*:** Documenting on paper or EHR, information exchange on handoffs, pharmaceutical preparations, and supplies for procedures typify this category.

Support activities: Interdepartmental activities, scheduled training, and coaching other nurses are examples of this kind of activity.

***Non-patient related activities (NPRA)*:** Activities associated with equipment search, arranging the unit, performing claims to suppliers, use of computers for non-patient related tasks, changing the patient to another bed within the same unit, and the "waiting time" to perform other tasks.

Personal activities: These activities include breakfast/lunch breaks, social interaction, and non-patient related conversations.

Three trained observers collected the data using a worksheet. The CND estimated the percentages of time spent on each category. The use of the EHR (or EHR documentation) was set to 15% [16]. The time duration analysis included mean, standard deviation (SD), minimum (Min), and maximum (Max).

Results

From November 17 to December 5, 2014, 2,418 observations were made. The ICU had 32.22% observations, the IMCU had 29.57%, and the GCU 38.21%. Seventy-four nurses were observed, 82% of whom were women, with mean age 37.56 years old (SD 9.46), and the mean seniority was 10.37 years (SD 8.95). Overall, the nurses' activities included 37.40% of direct care, 41.18% of indirect care, 0.43% support tasks, 11.14% non-patient related tasks, and 9.77% personal activities. The following tables show mean, standard deviation, minimum and maximum values for percentages from different observations, differentiated per sector and categories.

Table 1 shows the ICU data, where the direct care activities represent 34.55%, and EHR activities are 23.79% of the total.

Table 1 - Intensive care unit activities

%	Direct care	Indirect care	Support activities	NPRA	Personal activities	EHR use
Mean	34.55	44.51	0.00	13.14	7.80	23.79
SD	1.49	2.63	0.00	2.25	1.67	3.65
Min	32.69	41.94	0.00	9.93	5.77	19.88
Max	36.77	48.94	0.00	16.03	9.62	29.08
Estimated	35.00	30.00	20.00	5.00	10.00	15.00

The next table (Table 2) shows the IMCU data, where the direct care activities increase to 38%, and EHR activities are 18.26%.

Table 2- Intermediate care unit activities

%	Direct care	Indirect care	Support activities	NPRA	Personal activities	EHR use
Mean	38.61	36.79	0.14	10.69	13.77	18.26
SD	5.22	5.09	0.32	3.65	4.25	2.93
Min	34.44	30.82	0.00	6.34	8.89	15.23
Max	47.41	44.37	0.71	14.57	20.55	21.48
Estimated	40.00	30.00	15.00	10.00	5.00	15.00

The last table (Table 3) presents GCU unit data. Here, direct care activities are 39.05%, and EHR activities are 19.97%.

Table 3- General care unit activities

%	Direct care	Indirect care	Support activities	NPRA	Personal activities	EHR use
Mean	39.05	42.25	1.14	9.59	7.74	19.97
SD	7.51	2.68	1.06	3.32	3.32	2.17
Min	27.32	37.64	0.00	4.59	5.10	17.06
Max	46.63	44.33	2.06	12.89	13.40	23.12
Estimated	30.00	30.00	10.00	20.00	10.00	15.00

The following figures show the variations along the period of study. Figure 1 corresponds to the ICU. EHR documentation was the activity with the most fluctuation. At the beginning, 19.88% of the activities where related to the EHR, while at the end, these activities increased to 29.08%:

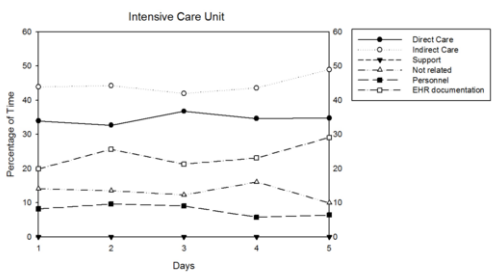

Figure 1- Observations at ICU during the study

In the IMCU (see Figure 2), all activities had large variations along the evaluation period, but none of them had big differences comparing the beginning and the end of the study.

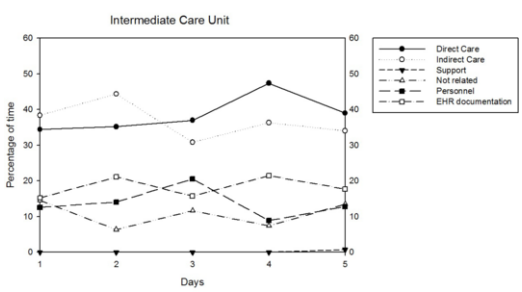

Figure 2- Observations at IMCU during the study

In the GCU, the direct care activities were found to be 27.32% at the beginning, and ended at 46.63%. Other categories did not have important disparities (See Figure 3).

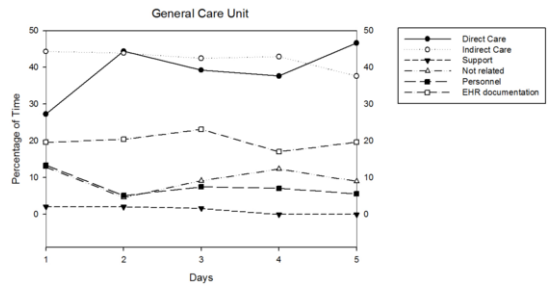

Figure 3 - Observations at GCU during the study

Discussion

In this pilot study, we evaluated how nurses use their time in the pre-implementation phase of redesigning a nursing e-chart. As part of the pre-implementation, we inquired about the nurses' staff expectations regarding implementation, and one of the main issues was the time it would take to complete the nurse record, which motivated the present work. Based on the results of this study, the IMCU direct care and non-patient related tasks matched with the estimated percentage. However, there is an enormous difference in support and personal activities. In the GCU, there was difference in all the categories. In the ICU, the most significant differences were in indirect care and support.

The support task category had zero or few activities in all units. Because this is the first study on this subject, this category will be re-evaluated in a future study.

Except for in the IMCU (that had an almost equal proportion of the direct and indirect care tasks), there was a greater proportion of time spent in the indirect care activities than the direct ones, with less time spent in the personal activities.

Regarding daily activities, the IMCU was the only unit that showed the greatest variations over the course of the study. This may relate to the different patients' complexity of care, the nurse:patient ratio, and/or the infrastructure of the facility compared to the other units. On the other hand, at the end of the study in the ICU, there was a tendency to use the EHR more extensively, and to perform more direct care activities in the GCU. The work sampling method may reduce the Hawthorne effect, but in this first evaluation we cannot determine if this tendency is the product of this effect or a particular characteristic of both units.

Regarding EHR documentation, the percentage was greater than expected in all of the units. ICU showed the greatest percentage (23.79%). According to the literature, the nurse staff expends 15.79% (95% CI 14.25, 17.33) of their time in all documentation tasks, including paper documentation (10.55%) and EHR use (5.24%) [16]. Other authors mention 17.7% [9], 10.1% [17], and even 35.3% time commited to documentation. While there is certain agreement regarding the time modification when transitioning from paper to electronic documentation, it is unclear when there is an update or redesign to an existing electronic record system. For this reason, when the impact to the workflow during EHR implementation is recorded, some studies consider the time associated to registration and direct care as primary and secondary indicators [18].

We included "personal activities" as an individual category separate from the others (or included but in a different category like non-value-adding work [13]). The total time comprising this category contributes to the better understanding of how nurses use their time.

The findings of this study give us useful preliminary information regarding how nurses use time in completing assigned tasks. However, there are some limitations. The WS technique is one of the most frequently used due to its usefulness and cost effectiveness [19], and findings can be compared statistically. However, there are variations in the use of the technique [13]. Additionally, nursing task definitions do not always match in these studies. In spite of this, WS is a useful technique when there are constraints on time and resources, making the evaluation feasible.

We researched adult units during morning and afternoon shifts. To evaluate the night shift, it would be necessary to adapt the list of activities, due to the fact that there are different types of tasks performed during the night shift. Even though the observations took place during three weeks, the observed time only corresponds to five days. However, we obtained the required minimum of observations. To be able to determine if the implementation of the new EHR version will or will not affect the time, it is necessary to complete the evaluation in the post-implementation phase, planned six months after the implementation. It will be necessary to increase the number of units involved, and ideally should be done over a much longer period.

The data regarding the time spent by the nurses in their different tasks enables the evaluation of changes in the nursing practice after the implementation of a new system [9]. While this information is important, it only reflects one part of the phenomenon, since implementation may not only change the time used for doing a task but also the workflow and, consequently, the continuity of care. Further research will help to better understand this situation and to perform improvements during the process.

Acknowledgments

The authors would like to thank the students Leonel Cameselle, Agustina Bertoia, and Leonardo Juarez for tasks related to field observations, data entry, and translation of the manuscript. We extend special acknowledgements to the Chief of Nursing Department, Lic. Elsa Villalba, and the nursing personnel of HIBA.

This research was done under the Health Informatics Residence Program.

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