Impact of Health IT on Nurses' Time Spent on Direct Patient Care

Monitoring nurses' time spent on activities related to patient care allows organizations to measure whether the introduction of health information technology (health IT) decreases administrative tasks, thereby potentially impacting nurse time spent on direct patient care.

Measure Category: Workflow impact

Quality Domain: Efficiency

Current Findings in the Literature: Although there is evidence that health IT can increase patient safety, much less is known about its impact on clinical staff efficiency. While some literature suggests that the introduction of health IT decreases nurses' time spent on administration and other non-patient-care activities,[1] others suggest that new systems may increase their administrative workload or time spent entering information into a system.[2,3] There is concern that new technologies require significant changes in workflow and may impact patient care. Monitoring nurses' time spent on activities related to patient care allows organizations to measure whether the introduction of a health IT application increases or decreases administrative and nondirect patient care tasks, such as documentation, potentially impacting nurses' time spent on direct patient care.

Emerging research, in a variety of clinical settings, suggests that different health IT applications can allow nurses to perform administrative and nondirect patient care tasks more efficiently, leaving them with more time for direct patient care. Researchers based at Brigham and Women's Hospital conducted a time study to determine the proportion of time nurses spent on non-patient-care activities, medication-administration-related activities, and non-medication-administration-related, direct patient-care activities before and after the implementation of barcode medication administration (BCMA).[4] They found that the overall proportion of time nurses spent on the three major activity groups remained stable postimplementation.

A group implementing an information system at a 10-bed surgical intensive care unit (ICU) at a Veterans Affairs Medical Center conducted a time study to determine the impact of the system on the percentage of time nurses spent on documentation and total patient care tasks.[5] They found that the percentage of time spent on documentation decreased from 35.1 to 24.2 percent (p= .025) after the ICU information system was installed and, although not significant, that the percentage of time providing direct patient care increased from 31.3 to 40.1 percent (p= .085). Almost half of the time saved on documentation was instead spent on patient assessment, a direct patient-care task, which increased from 4.0 to 9.4 percent of total nurse time (p=.001).

In another study examining computerized provider order entry (CPOE) use in ICU settings, researchers compared nurses' time spent on three major groups of tasks: conversational, patient care, and documentation and reading. While they found differences in specific tasks within each category, they found no significant differences between the
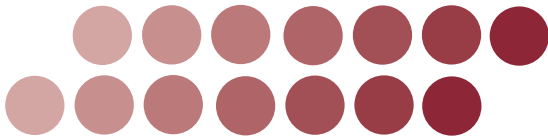
ICUs with and without CPOE on the time spent in each major category.[6]

In a work sampling study, researchers examined the impact of the introduction of an inpatient electronic health record (EHR) on clinical workflow in a labor and delivery unit.[7] Even after adjusting for workload, they found that 2 years after EHR implementation, direct patient-care activities increased from the baseline period for all clinical staff (p< .001) and specifically for nurses (p< .001). These results were consistent with findings 5 months after the implementation, indicating that the findings were sustained over time.[8]

Source of data for the Measure: Conduct a direct observational study (e.g., time study or work sampling) and capture time and date information as well as time spent on task.

Methodology for Measurement

Study Design: Time or work sampling study, pre-and post-health IT implementation. For more information, see the resources provided in the reference section regarding these observational studies.[9-14] During the planning phase, do the following:

1. Document all current tasks without the new health IT.

2. Document all anticipated changes in workflow with the new health IT.

3. Enter this information into a data capture device, such as a personal digital assistant (PDA) or computer tablet, or track it using standardized forms filled out by hand.

Study Period: Define baseline and intervention time periods (e.g., number of days, months) as well as observation periods (e.g., hours).

Evaluation: Change in nurses' time spent on direct patient care related activities pre- to post-health IT implementation. This could be the percentage of time spent on all activities or categories of activities. One could also look at the duration of activities (How long does one spend on specific activities?), or the frequency of activities (How often are these activities performed during one hour or some other unit of time?).

Analysis Considerations

Several issues should be considered before proceeding with an analysis plan:

1. It may be necessary to adjust for patient care unit, time-of-day, or patient volume to account for possible confounding.

2. Consider the structure and roles of staff, especially between organizations. For example, one site may hire nursing assistants; therefore, nurses in this organization may perform less administrative work than those in an organization without nursing assistants.

3. Your data collection and analysis plan should be based on sound methodology. To achieve valid results, consider planning your analysis with the input of a trained statistician to determine sample size and appropriate statistical techniques. It is not uncommon to begin analyzing data, only to find the original statistical plan was flawed, leaving you with data that is inadequate for analysis.

4. Because of the complex environments of inpatient organizations, implementing health IT is not just a technical undertaking. Multiple factors from the implementation could cause changes in nurses' work, including policy changes and training. Consider having a trained human factors professional review your plan*;
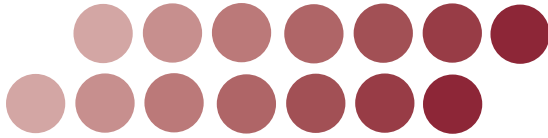
resources on human factors are included in the literature.[15,16]

5. Conduct a preliminary phase in which all tasks are documented to comprehensively capture all aspects of nursing work for the observation study period. This list should include all potential nursing tasks. Each task should be a discrete step with no overlap between tasks. Extensive work to categorize nurse tasks in inpatient settings has already been conducted and developed into a collection instrument.[17] One such instrument is publicly available on the AHRQ National Resource Center for Health IT Web site.

6. A pilot is recommended to ensure that observers understand the definitions of tasks accurately and that there is consistency among observers. In addition, observers should be trained properly on conducting the observational study chosen. Several training sessions may be required to ensure an adequate level of reliability; inter-rater reliability needs to be examined when several observers are used.

Relative Cost: High: Study cost could be high to hire and train qualified observers both before and after the technology implementation. Nonclinical observers need to be carefully trained regarding the well-defined tasks nurses perform.

Potential Risks: Observers need to understand basic nursing workflow and their processes in the setting of implementation as well as be familiar with the technology being used. Tasks will likely change postimplementation; therefore, training on tasks will need to occur both pre and postimplementation. This will ensure that observers understand the different aspects of the technology and their relationship to the tasks.

References

1. Kilgore ML, Flint D, Pearce R. The varying impact of two clinical information systems in a cardiovascular intensive care unit. J Cardiovasc Manag 1998;9:31–5.

2. Bosman RJ, Rood E, Oudemans-Van Straaten HM, et al. Intensive care information system reduces documentation time of the nurses after cardiothoracic surgery. Intensive Care Med 2003;29:83–90.

3. Ammenwerth E, Eichstadter R, Haux R, et al. A randomized evaluation of a computer-based nursing documentation system. Methods Inf Med 2001;40:61–8.

4. Poon EG, Keohane C, Featherstone E, et al. Impact of barcode medication administration technology on how nurses spend their time on clinical care. AMIA Annu Symp Proc 2006:1065.

5. Wong DH, Gallegos Y, Weinger MB, et al. Changes in intensive care unit nurse task activity after installation of a third-generation intensive care unit information system. Crit Care Med 2003;31:2488-94.

6. Ground A. Computerized provider order entry (CPOE): how is nursing work impacted? [dissertation]. Madison: University of Wisconsin-Madison; 2008.

7. Eden KB, Messina R, Li H, et al. Examining the value of electronic health records on labor and delivery. Am J Obstet Gynecol 2008 Sep;199(3):307.

8. Campbell EM, Li H, Mori T, et al. The impact of health information technology on work process and patient care in labor and delivery. In: Henriksen K, Battles JB, Keyes MA, Grady ML, eds. Advances in patient safety: New directions
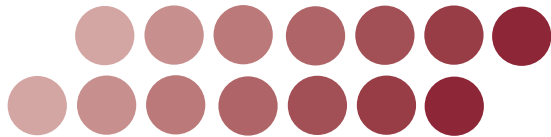
and alternative approaches. Vol. 4. Technology and medication safety. AHRQ Publication No. 08-0034-4. Rockville, MD: Agency for Healthcare Research and Quality; August 2008.

9.   Finkler SA, Knickman JR, Hendrickson G, et al. A comparison of work-sampling and time-and-motion techniques for studies in health services research. Health Serv Res 1993;28(5):577-97.

10. Urden L, Roode J. Work sampling: a decision making tool for determining resources and work redesign. J Nurs Adm 1997;27(9):34-41.

11. Capuano T, Bokovoy J, Halkins D, Hitchings K. Work flow analysis: eliminating non-value-added work. J Nurs Adm 2004;34(5):246-56.

12. Burke T, McKee J, Wilson H, et al. A comparison of time-and-motion and self reporting methods of work measurement. J Nurs Adm 2000;30(3):118-25.

13. Pabst MK, Scherubel JC, Minnick AF. The impact of computerized documentation on nurses' use of time. Comput Nurs 1996 Jan-Feb;14(1):25-30.

14. Wilson JR, Corlett N, eds. Evaluation of human work. 3rd ed. Boca Raton, FL: CRC Press; 2005.

15. Carayon P, ed. Handbook of human factors and ergonomics in health care and patient safety. Mahwah (NJ): Lawrence Erlbaum Associates, 2007.

16. Salvendy G, ed. Handbook of human factors and ergonomics. Hoboken (NJ): Wiley, 2007.

17. Keohane C, Bane AD, Featherstone E, et al. Quantifying nursing workflow in medication administration. J Nurs Adm 2008;38(1):19-26.