EXPERIENCE EXCHANGE

Development of a master's student assignment to promote safety and quality improvement in ambulatory settings

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Abstract

This Master's level assignment describes an approach to educating adult nurse practitioner students to critically consider potential safety and quality issues in advanced practice ambulatory settings. Eighty-one nurse practitioner students selected a process or protocol that occurred in their clinical setting to analyze for potential error. Root cause analysis was utilized as the examination tool. Following root cause analysis, students developed recommendations that would decrease the likelihood of an error occurring in the future with the chosen process/protocol. The outcome of the analysis was submitted as a paper. Additionally, faculty wanted students to see the linkage of education to practice, and to feel that implementation of recommendations for their identified safety and quality process/protocol could be implemented in practice following graduation.

Eighty-four percent of the submitted papers fell into four categories that students believed had a potential for error. The major categories were: medication errors (50.6%), laboratory analysis errors (23.5%), and missed diagnoses (9.9%). The fourth category of "Other" (16%) included various paper topics with two or less in the same area. The importance of the particular processes/protocols selected and analyzed by students for error potential was supported by the similarity of student outcomes to studies published in the literature regarding ambulatory care errors. Additionally, the students communicated through the course evaluation system that the assignment was interesting, promoted safer practice, and had the potential for implementation following graduation.

Key words

Safety assignment, Ambulatory setting, Master's education, Nursing, Potential ambulatory care errors

1 Introduction

This paper describes an innovative assignment developed for students in an ambulatory adult nurse practitioner program in the United States (US) to link education with practice in two areas, safety and quality improvement. Safety and quality were chosen for the assignment because they were identified by the Institute of Medicine (IOM) as two competencies necessary to continuously improve the quality and safety of healthcare systems in the US [1, 2]. An initial safety assignment had students develop a scholarly paper on safety and quality, which was presented to the healthcare team in the student's

clinical area. This first paper was not well received by students, and revisions to the assignment resulted in the development of a new assignment described below. The revised assignment focuses on analyzing the potential for error in a frequently occurring clinical process or protocol in the student's ambulatory setting.

It is often the case that nurse practitioner students feel there is no practical relevance to paper writing in their program of studies. However, the university in which the faculty involved with this assignment are employed has engagement in scholarly writing as a graduate program outcome. Thus, faculty concluded that scholarly writing could be interesting, and could have practical clinical outcomes if implemented in a creative fashion that engaged the interest of students.

2 Background

The Institute of Medicine (IOM), a private, nonprofit organization, launched the modern patient safety movement in the US [3, 4]. This organization provides health policy advice under a US congressional charter granted to the National Academy of Sciences. The first IOM report in 1999 stated that healthcare in the US is not as safe as it should be, and further reported huge numbers of errors in certain settings [3]. For example, the IOM reported that as many as 44,000-98,000 people died annually in US hospitals as a result of medication errors that are preventable. One of the main points of the IOM Report was that the majority of medical errors are caused by faulty systems, processes, and conditions that lead people to make mistakes or fail to prevent them [3]. An example of a faulty process is stocking two vials of similarly spelled drugs alphabetically, potentially leading to the wrong drug being selected when the staff are very busy.

The IOM Report on failures in US healthcare also followed two high-profile errors involving an overdose of chemotherapy resulting in death, and a wrong leg amputation from another patient. These high-profile errors indicated severe flaws in the US healthcare system [4], and set the stage for the later 2003 IOM Report which challenged the health professions to alter learning experiences so that graduates are educated to emphasize quality improvement approaches to healthcare [1, 2].

2.1 Rationale for a safety and quality assignment in the ambulatory setting

In addition to the IOM initiatives, The Robert Woods Johnson Foundation, a private philanthropic organization in the US concerned with healthcare policy, funded a committee of healthcare experts to define quality and safety education for nurses (QSEN). The QSEN definitions are: (1) safety, "minimize risk of harm to patients and providers through both system effectiveness and individual performance" (p. 128), and (2) quality, "use data to monitor the outcomes of care processes and use improvement methods to design and test changes to continuously improve the quality and safety of healthcare systems" (p. 127) [2]. The IOM further recommended that new ways of educating students to apply safety and quality concepts would be needed such as engaging in root cause analysis rather than placing blame when errors or near misses occur [1, 2].

The root cause analysis tool was originally developed in psychology and systems engineering for analysis of industrial accidents. The Joint Commission (TJC), the major US accrediting agency in healthcare, developed a template based on this tool, and recommended utilization of this template by all healthcare agencies experiencing adverse or sentinel events [5]. The TJC accredits hospitals of all types, home care organizations, nursing homes, freestanding clinical laboratory, and ambulatory care providers.

Another organization, the Agency for Healthcare Research and Quality, an arm of the US Department of Health and Human Resources, reported that root cause analysis is now one of the most widely used approaches for analyzing error in healthcare [6]. Utilization of this tool to teach nurse practitioner students to analyze frequently occurring processes or protocols for potential errors is a practical approach to raising awareness of safety issues.

Therefore, faculty decided this revised assignment should emphasize application of root cause analysis principles to identity potential errors in ambulatory settings. As fewer efforts have been directed toward addressing errors in ambulatory care than in hospitals, this assignment would provide an opportunity for students to identify potential errors in this setting [7-11].

Further, this student assignment took into consideration that there are important differences other than setting, inpatient and outpatient, in regard to quality and safety issues. For example, providers of patient laboratory and diagnostic testing for ambulatory clinics are often located in facilities outside the ambulatory agency which may lead to delays in reporting results or even specimen loss. Also, off-site facilities may have their own protocols which can be different from the ambulatory agency, and thus could lead to a lack of clarity and an increased likelihood of error [12].

Another difference between inpatient and ambulatory settings is that the vast majority of patients have their first encounter with the healthcare system through ambulatory care [13, 14]. In addition, accreditation of ambulatory care facilities is reported by the US Health Resources and Service Administration to be low. For example, of 1,128 federally supported ambulatory health centers, only 281, 25%, were accredited as of January 1, 2012 [15].

2.2 Steps on the way to developing a relevant quality and safety assignment

After the student expression of dissatisfaction with the original safety and quality assignment, faculty explored the literature looking for teaching strategies that would engage the students' interests and foster active participation in this assignment. The literature indicated that students who actively participated in their learning, were more engaged, had higher levels of interest, and higher levels of learning [16-20]. Faculty applied this strategy in the development of the new assignment. The resulting assignment required students to analyze frequently occurring processes and protocols for safety and quality issues in their assigned clinical areas. This approach had the benefit of linking education directly to practice. Guidelines for this assignment were developed along with a grading rubric which is presented in Table 1.

Table 1. Paper Guidelines and Grading Rubric for the Safety and Quality Assignment

Student Name:		
Purpose: Describe frequently occurring process and analyze each step for error using root cause analysis.	Points Possible	Points Earned
Introductory Paragraph: overview of safety and quality problem	5	
Review: literature review on issue, discuss and cite references. Write 2 pages on your safety issue. List any need for further research on topic	20	
Selected Process: 1) describe a multi-step process at your clinic; 2) describe forms, paper/electronic involved in each step; 3) include any steps that take place outside the clinic; 4) describe what happens when laboratory data is received in the ambulatory setting; 5) who informs the patient of results and 6) how are abnormalities addressed	15	
Safety and Quality Issues: 1) analyze each step for error, shortened or skipped steps, and 2) describe what problems could occur if an error were to occur with this process	25	
Recommendations: Develop recommendations for your issue that could decrease error potential in your practice after graduation	25	
Summarize: steps to inform ambulatory personnel of findings and need to implement recommendations to improve safety and quality	10	
Read: Elder, N., McEwen, T., Flach, J., Gallimore, J. 2008. Creating safety in the testing process in ambulatory care offices. Agency for Healthcare Quality Research.		

2.3 Student examples of specific safety and quality issues in the category of laboratory analysis

A few examples of students' findings and recommendations are provided here to illustrate how the assignment was interpreted and implemented by students.

2.3.1 Failure to order a critical laboratory test

One site had a large HIV-positive population. The potential error identified involved a failure to routinely order a kidney function test. This student was aware that as many as 12% of the HIV/AIDS population aged 50 and older have renal disease [21]. Since HIV medications are often cleared renally, kidney function tests should be performed regularly in this group of patients [22]. The error potential in this case is the development of renal toxicity if kidney function tests are not monitored on a regular basis.

Recommendation

The electronic medical record system should be programmed to flag the need for kidney function testing at regular intervals for all patients on anti-HIV medications.

Tracking of the specimen

One clinic had a very detailed, multistep system in place for tracking specimens. The protocol involved follow-up on electronically-reported laboratory results. Each morning the healthcare provider came to the clinic an hour prior to patient appointments to check the computerized laboratory reports, and to take action on the results of the previous day's laboratory test orders. The student analysis found that the clinic did not keep a separate list of all the laboratory tests actually ordered, obtained, and sent for analysis on previous days. If a specimen became lost or results were not reported, the clinician had no way of knowing this without reviewing all recent patient charts and laboratory tests ordered.

Recommendation

Maintain a log of laboratory specimens collected to be checked against the returned results. The log would include all the patients' diagnostic tests. In clinics where the providers use electronic medical records, it was recommended that a list of laboratory examinations ordered be produced at the end of each clinic day, and entered into the system where returned result reports could then be reconciled with the previous day's examinations.

Follow-up on test results

In another clinic, it was the routine practice for blood and urine samples to be sent to an outside laboratory for analysis. The results were later returned to the ambulatory agency. A clerk reviewed all results, placed the normal and abnormal results values in each patient's chart. Only those charts with abnormal values were forwarded to a clinic nurse designated for follow-up. Results deemed to be normal by the clerk were never seen by a healthcare provider such as a nurse, nurse practitioner, or physician. The clerk then sent out a form letter to those patients with reported normal values. There is a potential for several errors to occur with the use of this process.

A border-line high normal value could be significant for a specific patient situation such as cholesterol levels in a patient having an HMG-CoA reductase inhibitor dosage adjusted [23]. Further, healthcare worker fatigue has been identified as a major patient safety factor [24]. The clerk who checks the results could, due to fatigue, miss an abnormal value and file it away without review by any healthcare worker. And finally, the specifics of what information the healthcare provider was seeking when the test was ordered most likely will not be known by the clerk reviewing a large stack of results. For example, if a DEXA scan indicated osteopenia, and the clinician was seeking ways to help slow the bone loss, a border-line low normal vitamin D result would be missed and the patient would not receive supplementation.

Recommendation

All results would be seen by both the clerk and the nurse, with the clerk flagging the abnormal values for the nurse's review. A second recommendation was for the clinician who ordered the tests to be responsible for review of laboratory results.

Follow-up with the patient

Several clinics notify patients by telephone when laboratory results become available. If the patient cannot be reached by telephone, then a letter is sent to the patient's mailing address of record. When the laboratory test result is abnormal, the

letter instructs the patient to contact the clinic to schedule an appointment. In one student's clinic, no other follow-up occurs regardless of the seriousness of the test result. The potential for errors with this system includes the possibility of: (1) an inaccurate address or postal delivery, (2) the letter opened by a person incapable of following instructions, (3) misinterpretation of urgency or seriousness of the need to follow-up, and (4) the patient became too ill to respond.

Recommendations

A more inclusive electronic follow-up of failure to reply would include using emails, text messages, repeated telephone calls, and more than one follow up letter to patient and/or family.

2.3.2 Summary of all student papers

Following submission of all student papers, frequency-level analysis was performed with the goal of identifying the broad categories into which the common processes could be placed. From the 81 papers submitted, four categories were identified as the most frequently selected processes with potential error. The four categories were medications (41 students, 50.6%), laboratory analyses (19 students, 23.5%), and missed diagnoses (8 students, 9.9%) for a total of 84% of papers. The remaining 16% contained only one or two papers for each possible additional subcategory, and was labeled as "other potential error issues." The variations within the major categories are outlined in Table 2.

Table 2. Student Identification of Frequently Occurring Processes with Potential for Error in Ambulatory Settings

Total Papers in Major Category	Subcategories of Potential Problem Areas	Papers in each subcategory
Medication 41 (50.6%)	Prescription Process: wrong medications, illegible, lack of follow up on medication errors, dosage	15
	Medication Reconciliation: polypharmacy	7
	Electronic Medical Records: training, different systems, confidentiality, patient identification	6
	Special Populations: elderly, HIV/AIDS, anticoagulant therapy	5
	Samples Dispensed at Clinic: no log to track, no record of lot number for possible recall	3
	Communication: among providers, patients unclear on medications to take, phone-in prescription orders	3
	Adverse reactions: time constraints on checking adverse reactions	2
Laboratory Diagnostic Processes, 19 (23.5%)	Follow-up: overlooked results, wrong phone number, delays in report or loosing results	13
	Patient Identification: mislabeling, illegible handwriting	2
	Test tracking: difficulty in finding laboratory tests or diagnostic status	3
	Patient Preparation: nothing by mouth instruction not given	1
Missed Diagnosis, 8 (9.9%)	Reading Films: delays, missed or wrong diagnosis	8
Other Potential Error Issues, 13 (16%)	Areas: radiology examination preparations, manner of delivering bad news, do-not-resuscitate protocols for ambulatory care, delayed referrals, failure to adhere to national protocols, patient education telephone triage, lost records, missing information	13
		Total number 81

The processes and protocols the students selected to analyze for potential error are similar to published studies regarding errors or adverse events in ambulatory care. For instance, the authors, Fernald et al., reported the results of a project designed to collect and analyze medical errors. Their findings showed a majority of errors, 47%, were associated with diagnostic tests, and another 35.4% with medications. Embedded within these two categories, 70.8% included communication issues which contributed to the diagnostic test and medication errors [7].

Other researchers, Makeham *et al.*, reported the results of 525 patient safety events in which 69.5% were related to errors in the clinical processes. Of these errors, medication process errors comprised 20.4%, and diagnostic errors were 11.8% [8].

Additionally, Kaprielian *et al.* developed a taxonomy for reporting errors in outpatient clinics, and identified the most common error at their institution as diagnostic studies [9]. Hickner *et al.* conducted a study of 507 event reports in which 70% of events concerned medication errors [10]. Singh *et al.* examined 190 cases for diagnostic errors, and found that 68 diagnoses were missed. They further stated that diagnostic errors are an increasing concern in the primary setting, and that understanding the circumstances in which the errors occur is necessary to generating preventive strategies [11].

3 Conclusion

Four of the five published studies cited identified medication and diagnostic errors as the top two categories found. The top two potential error categories identified by students were also medication and diagnostic/laboratory processes. Root cause analysis can be a powerful tool in identifying potential error in the ambulatory setting. Consequently, the importance of teaching this skill to advanced practice nursing students is supported by the student's ability to identify processes that could lead to significant error potential in the ambulatory setting [7-11].

Further, this student-centered assignment engaged the students' interest, and actively involved them in identifying error potential in their clinical settings. In addition, feedback from the university's student evaluation system indicated that the assignment was perceived by students as practical and beneficial. It also helped the students to realize that processes they previously had taken for granted as safe could have potential for error. In fact, one student wrote, "This assignment has really put safety on my radar".

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