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Comparison of the Medication History Process at Two Emergency Departments in a Multi-Campus Health Care System

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Research Article

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ABSTRACT

Purpose: The results of a study comparing the accuracy of medication histories obtained by pharmacy technicians against those obtained by nurses in an emergency department setting are described.

Methods: Patient census reports were reviewed to generate a list of patients who met the study criteria. A single pharmacist investigator interviewed a randomly selected subset of patients meeting the criteria. The pharmacist reviewed the medication history recorded in the electronic medical record and compared the record with information obtained from the patient or patient representative. Where discrepancies existed, the patient's pharmacy and/or prescribing physician were queried for clarification. The discrepancies assessed include missing doses, missing frequencies, incorrect doses, incorrect frequencies, medications listed that the patient does not currently take, and medications the patient takes that were omitted from the record. The primary outcome is the number of discrepancies between nurse- and technician-obtained medication histories. Statistical significance was assessed via two-tailed t-tests. The secondary outcomes assessed include timeliness, cost of staff time involved, and physician satisfaction.

Results: The total number of errors was greater among nurse-obtained histories vs. technician-obtained (111 vs. 77, p=NS). Likewise the number of errors involving prescription medications was greater with nurse- vs. technician-obtained histories (83 vs. 39, p=NS). Conversely, errors involving over-the-counter products were fewer when nurses obtained the histories vs. technicians (28 vs. 38, p=NS).

Conclusion: While statistical superiority was not achieved, the present study determined that technician-obtained medication histories are at least as accurate as those obtained by nurses, and take less time to complete. There is also a higher level of perceived satisfaction among providers with the technician model, particularly with regard to timeliness.

INTRODUCTION

The Joint Commission (formerly JCAHO) continues to stress the importance of medication reconciliation with the ongoing development of National Patient Safety Goal (NPSG) number 8: accurate and complete reconciliation of medications across the continuum of care ^[1]. Often, the continuum of care begins when the patient presents to the emergency department. By some estimates, an accurate medication reconciliation process may prevent up to 70% of all potential errors and 15% of all adverse drug events (ADEs) ^[2]. Various authors have noted the difficulty in accurately reconciling patient's medications, while acknowledging the need to improve the reconciliation process in order to reduce both medication errors and ADEs ^[2,3]. The first

step towards an accurate medication reconciliation is to obtain a complete and thorough medication history upon one patient's presentation to the medical facility. Emergency department visits are generally not planned, and one can reason that obtaining an accurate medication history may be difficult because patients do not always bring their medications, or an updated list of what they take. Additionally, patients are frequently in pain or unresponsive, which often hinders ability to recall medications and doses from memory.

Located within 3 miles of each other, the Hackley and Mercy Campuses are the two largest in Mercy Health Partners (MHP) multi-campus health care system, with nearly 400 licensed beds and 137,000 emergency and urgent care visits annually^[4]. Prior to MHP forming in 2008, both emergency departments received extensive remodeling and expansion, and each continues to operate independently with oversight from a joined administration and medical staff.

Following the remodel and expansion, Hackley Hospital added the presence of pharmacy technicians to obtain medication histories for all patients presenting to the emergency department. Currently, one technician per shift to provide coverage 24 hours per day to obtain the history when new patients are brought to an emergency treatment room staffs the department. The history is recorded on a form with specific places for essential information (current medications, dose, frequency, time of last dose) for physician use. The technician also enters the history into the electronic medical record under a section titled "home medications."

The Mercy Campus currently utilizes nursing staff to obtain medication histories. Also in contrast to the Hackley Campus, nurses at the Mercy Campus do not utilize any designated form to document the medication history. While structured forms are available, the list is often written on scrap paper or plain white copy paper and placed with the patient chart before recording in the electronic medical record. As the two facilities continue to unify policies and procedures, a question arises as to whether technicians should be utilized at both campuses for this purpose.

Previous studies have compared the accuracy of medication histories obtained by pharmacists and pharmacy students with those obtained by other disciplines such as nurses and physicians^[2,3]. In a landmark paper from 2003, Michels and colleagues published findings from a program that utilized pharmacy technicians to obtain medication histories on patients being admitted for scheduled surgical procedures, but no comparison of results of this practice to others in terms of accuracy or satisfaction were provided^[5]. Our study is believed to be the first to compare the accuracy of technician-obtained medication histories against nurse-obtained histories in the emergency department setting. This study seeks to determine if there is a difference in the accuracy of medication histories obtained by technicians compared to those obtained by nurses.

METHODS

A committee consisting of pharmacists from each of the study campuses formed to determine study design. Pharmacists experienced in informatics were included because the study would rely heavily on data contained in the electronic medical record. Other committee members included clinical pharmacists experienced in project design and research methods. The stated primary objective was to determine if a difference existed in the number of discrepancies in the medication histories between the two campuses. This measurement was assessed by reviewing medication histories and conducting interviews with patients admitted to each campus through the respective emergency departments. Secondary outcomes included measures of perceived satisfaction among providers (particularly internal medicine and emergency department physicians and physician assistants), measures of timeliness, and cost of staff time involved to obtain medication histories.

The study population was identified from daily census and admission reports. After identifying prospective patients, a single pharmacist interviewer set out to conduct patient interviews within 48 hours of admission. To be included in the study, patients had to be at least 18 years of age, admitted through the emergency department, and willing/able to answer questions regarding home medication use. Patients were excluded if they were admitted to the intensive care unit, deemed unlikely to provide an accurate history, non-verbal/non-communicative, or were admitted directly to the floor (scheduled surgeries, transfers from other hospitals).

Project design and details were discussed with MHP's clinical research specialist. It was decided by Institutional Review Board (IRB) subgroup that full approval was not required. Signed informed consent was not required from participants; however, subjects were told of the nature of the interview and given the opportunity to decline participation if they wished.

The study tracked both prescription and non-prescription medications. For study purposes, non-prescription medications included all over-the-counter pain medications, cold, cough and allergy medications, as well as vitamins, herbals, and nutritional supplements. A discrepancy was considered any variance in the medication list obtained during the pharmacist interview compared to the electronic medical record. Types of discrepancies included (a) missing medication, (b) missing dose, (c) incorrect dose, (d) incorrect frequency, and (e) no longer takes medication. Discrepancies were placed into a single category by type, for example, a missing medication was counted as a single error rather than four errors. Data were recorded on a medication history form **Figure 1** developed by the committee and entered into a Microsoft Excel® spreadsheet for tracking. A further discussion of discrepancies and definitions is available in **Appendix 1**.

A satisfaction survey was developed (**Appendix 2**) and providers were asked to rate their level of agreement on a scale of 1

to 5, with one being “strongly agree” and five being “strongly disagree.” The statements they responded to included measures of timeliness, usefulness, and accuracy. A fourth item asked providers to rate their overall level of satisfaction with the medication history process where a score of one indicated “very satisfied” and a score of five indicated “very dissatisfied.” The statements were repeated for each campus and practitioners who work at only one campus were instructed to answer for that site only. The two groups of practitioners targeted for the satisfaction survey included emergency physicians and physician assistants (PA’s) and the internal medicine physicians and PA’s. Emergency department physicians and PA’s were targeted because home medications are directly related to provision of care in the emergency department. The internal medicine group was targeted because they admit the majority of patients from the emergency departments to the inpatient units at each campus.

Patient Identification Sticker

Patient Medication History

Admission date & Time : _____ Attending Physician: _____ PCP: _____

Pharmacy(-ies): _____ Phone: _____ Person providing Information: _____

HOME MEDICATIONS					
Drug Name	Dose	Frequency	Prescribing Physician*	Comments	Discrepancy Type
					O M I F N
					O M I F N
					O M I F N
					O M I F N
					O M I F N
					O M I F N
					O M I F N
					O M I F N
					O M I F N
					O M I F N
					O M I F N
					O M I F N
					O M I F N
					O M I F N

*Prescribing Physician to be used for follow-up to confirm medication if patient is unable to do so
 For Discrepancy Type: O: medication omitted, M: missing dose, I: incorrect dose listed, F: missing or incorrect frequency, N: patient no longer takes medication

Figure 1. Medication history form.

RESULTS

Forty patients (20 from each campus) were interviewed between December 2009 and March 2010. Corrected medication histories showed each group was taking similar numbers of medications (nurse-obtained=8.85 ± 4.37 vs. technician-obtained=8.85 ± 5.68, p=NS). Interview results showed a greater number of total errors and prescription medication errors among nurse-obtained histories, compared to technician-obtained histories (111, 83 vs. 77, 39; p=NS). Isolation of OTC products showed nurse-obtained histories contained fewer errors compared with technician-obtained histories (28 vs. 38, p=NS) (**Table 1**). An analysis of errors per subject found a higher number of errors for nurse-obtained compared to technician-obtained histories (5.6 ± 6.78 vs. 3.85 ± 2.85, p=NS). When only prescription medications were considered, nurses were found to have higher error rates compared to technicians (4.15 ± 6.02 vs. 1.95 ± 2.21 p=NS). Nurses had lower error rates for OTC products than did technicians (1.4 ± 1.57 vs. 1.9 ± 1.59, p=NS) (**Table 1**).

	Mercy Campus (n=20)	Hackley Campus (n=20)	p-value
Total Errors	111	77	
Avg. Errors/subject (±SD)	5.6 (6.78)	3.85 (2.85)	0.33
Rx. Errors	83	39	
Avg. Errors/subject (±SD)	4.15 (6.02)	1.95 (2.21)	0.15
OTC Errors	28	38	
Avg. Errors/subject (±SD)	1.4 (1.57)	1.9 (1.59)	0.34

Table 1: Primary Endpoint Results. Errors in prescription and OTC products in medication histories; p-values determined via 2-tailed t-test.

To assess temporal relations, the workday was divided into typical eight-hour shifts (first shift between 7 am-3 pm, second shift from 3 pm-11 pm, and third shift from 11 pm-7 am). The error rates per shift were calculated by totaling the number of current medications on the corrected patient profiles and dividing by the total number of errors on the profiles to give a value representing the number of medications that had an error associated with them. Nurse-obtained histories had error rates of 80%, 44%, and 62% for first, second, and third shift respectively. Technician-obtained histories had error rates of 47%, 33%, and 69% for first, second, and third shift respectively. Evaluation of errors per shift revealed no significant difference for time of day histories were obtained (p=NS for all between group comparisons) (**Table 2**).

A time study of technicians’ time to complete medication histories was completed to assess financial impact of this program.

On average, technicians took 11.5 minutes to obtain a medication history (not including time required to enter the information into the electronic medical record). Human Resources provided a mean hourly technician wage of \$13.82, which equates to a cost of \$2.64 for technicians to obtain a medication history. An estimate of time for nurses to complete medication histories was derived from informal surveys of emergency department nurses. Surveyed nurses stated it took 10-15 minutes to obtain a medication history, which was confirmed by observations of the pharmacist investigator, who shadowed the medication history process at the Mercy Campus. Because the pharmacist's observations were consistent with the nurses self reported times, a median time of 12.5 minutes per medication history was used for comparison. Human Resources provided a mean hourly wage for registered nurses (including emergency department) at the Mercy Campus of \$27.94, equating to a cost of \$5.80 for a nurse obtained medication history. Therefore, technician-obtained medication histories save \$3.16 per history (**Table 3**).

	Nurses (Mercy)			Technicians (Hackley)		
	Total Meds Taking	Total Errors	Error Rate (%)	Total Meds Taking	Total Errors	Error Rate (%)
First Shift	78 (n=9)	63	80	19 (n=4)	9	47
Second Shift	70 (n=9)	31	44	115 (n=11)	38	33
Third Shift	29 (n=2)	18	62	43 (n=5)	30	69

Table 2. Temporal analysis of errors. Determination of error rates for standard 8-hour shifts. Error rates calculated by dividing total errors for shift by the number of medications on corrected medication profiles. All results are not statistically significant.

	Nurses	Technicians
Time to Complete Medication History	12.5 minutes	11.5 minutes
Mean Hourly Wage	\$27.94	\$13.82
Cost to Obtain History	\$5.80	\$2.64

Table 3: Cost Effectiveness. Compares cost to obtain medication history accounting for time spent and average wage. Excludes data entry time.

Provider satisfaction survey results favored technician-obtained histories (**Figure 2a-2d**). Significant among the survey responses was that 90% of respondents answered positively to the statement, “Medication histories are obtained by the technician in a timely manner.” Conversely, 69% of respondents had an unfavorable response as the statement pertains to nurses (**Figure 2a**). Eighty percent of respondents felt that the technician-obtained medication histories were useful while the patient was in the emergency department, while 53% percent of respondents answered favorably as the statement applies to nurse-obtained histories (**Figure 2b**). Eighty percent of respondents felt that the technician-obtained histories are accurate, compared to just 23% for nurse-obtained histories (**Figure 2c**). Overall satisfaction favored the technician model with 67% of respondents stating they were either “satisfied” or “very satisfied” with the technician model, whereas 77% of respondents stated they were “unsatisfied” or “very unsatisfied” with the nurse model (**Figure 2d**).

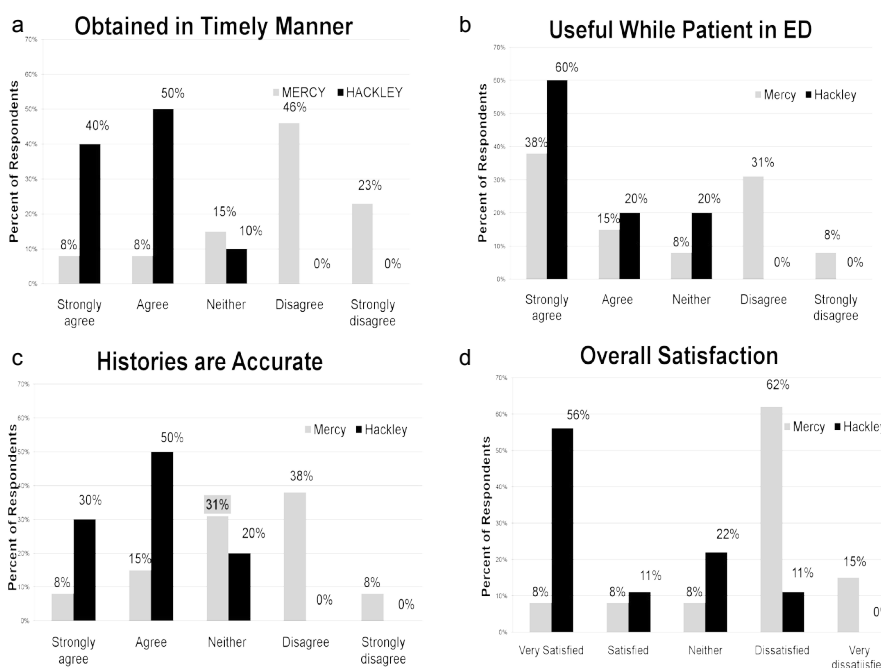


Figure 2. Provider Satisfaction Survey Results. Graph a - Medication histories are obtained in a timely manner. Graph b - Medication histories are useful to the provider while patient is in the emergency room. Graph c - Medication histories are accurate. Graph d - Overall level of satisfaction with the medication history process.

DISCUSSION

Study results showed medication histories obtained by pharmacy technicians are at least as accurate as medication histories obtained by registered nurses in the emergency department setting. The benefit of designating technicians to obtain medication histories may be that it frees nurses to focus more on direct patient care, while delegating technicians to interview patients and follow-up with their physician or pharmacy. Additionally, because of their presumed familiarity with brand and generic medications, technicians may obtain a more accurate history with fewer difficulties. Another advantage to technicians obtaining medication histories is that at our institution, technicians have access to computer software that can help with medication identification. While the present study does not conclusively prove the hypothesis, it does show trends favoring a technician-obtained medication history model. Larger studies may lead to results that are more conclusive.

Technician utilization to obtain medication histories requires skill in the area of patient interaction. In our facilities, technicians have infrequent interaction with patients because the technicians mainly work in drug distribution functions. While technicians working in community settings may have frequent patient contact, these patients are not usually acutely ill or require immediate medical care. This scenario raises the issue that appropriate training and supervision of technicians is crucial to a program that plans to utilize technicians to obtain medication histories. At our facility all medication history technicians have completed certification programs and have experience in both retail and hospital pharmacy.

Study design discussions raised concerns that nurses could feel offended by the possibility of pharmacy technicians taking over what had traditionally been a nursing role. The first step in the study was to observe procedures in each emergency department. This presented the opportunity to inform nurses of the purpose of the study, which in general terms was to improve the medication history process, while simultaneously making it easier for nurses to focus on direct patient care. The response among nurses and physicians was universally positive. Physicians and nurses at the Hackley Campus (where technicians had been conducting medication histories) stated they would not want to revert to the previous practice. Similarly, nurses at the Mercy Campus welcomed the idea of more time dedicated for direct patient care activities.

This study is not without limitations. One such limitation is the sample size. Differences were found in the number of total, prescription, and OTC errors, although none of the categories showed statistical significance. As previously mentioned, larger studies may provide results that are more conclusive. Our sample size was limited by the use of a single pharmacist investigator to conduct patient interviews on two separate campuses. The initial plan had been to utilize fourth year pharmacy students to conduct patient interviews, but was rejected because it would introduce multiple interviewer biases.

Also related to the small sample size is the fact that only patients admitted to the hospital were included. As previously noted, medication histories are required for all patients, including those seen in the emergency department, and subsequently discharged. Our emergency department physicians expressed frustration over the requirement to obtain complete medication histories on patients who present for outpatient treatment such as simple fractures or sprains, and the large array of nutritional supplements and herbal products available to patients without a prescription. Clearly, a technician is not able to make recommendations about continuing various products, or their interactions; however, technicians are able to gather and compile information to present to the physician. Another complaint from physicians and nurses alike is the requirement to document the time each medication was last taken prior to coming to the emergency department. This can be a difficult task in the emergency setting, and some providers at MHP question its necessity during the provision of emergency treatment.

Regarding the time to obtain medication histories, it is acknowledged that time to enter data into the electronic medical record was not included in the technician time study, or the estimates of time for nurses to obtain medication histories. The reason this information was not included is that technicians normally batch the histories and enter several together during slower periods. Nurses obtain the medication history as time allows, while juggling multiple patients and responsibilities. Because of these factors, they too, often wait until other responsibilities have been completed to enter medication histories into the electronic record. Future studies that include assessment of data entry time are important to evaluating the Mercy Campus stated goal of completing all charting and documentation at the bedside.

CONCLUSION

While questions remain concerning the ultimate role of pharmacy technicians in obtaining medication histories, it appears that appropriately trained individuals can successfully complete the crucial first step in complying with the Joint Commission requirement for medication reconciliation across the continuum of care. While statistical superiority was not achieved, the present study determined that technician-obtained medication histories are at least as accurate as those obtained by nurses, and take less time to complete. Utilizing technicians to obtain medication histories may provide opportunities for further improvement of the medication history process. Such improvements may come in the form of enhanced information for physician decision making, and improved documentation of relevant data. These improvements will not only enhance patient medication safety, but also add to provider satisfaction.

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