

10-26-2016

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## Recommended Citation

Chong C, Haile A. Medication Reconciliation Limitations: Observation of the Medication Reconciliation Process in the Emergency Department by Two Immersion Pharmacy Students. *Inov Pharm*. 2016;7(4): Article 4. <http://pubs.lib.umn.edu/innovations/vol7/iss4/4>

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## **Cover Page Footnote**

The authors would like to thank Moses Cone and UNC Eshelman School of Pharmacy for the opportunity for this immersion experience. We do not have any potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Medication Reconciliation Limitations: Observation of the Medication Reconciliation Process in the Emergency Department by Two Immersion Pharmacy Students

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### Abstract

Multiple medical records may exist for a particular individual based on the various health services he or she receives. Maintaining updated, accurate records remains the responsibility of both practitioners and patients. Medication reconciliation, defined as the process to accurately depict the patient's current orders and medications,<sup>2</sup> seeks to avoid errors in duplicity, interactions and dosing errors. Medication histories at Moses Cone Hospital are currently recorded by pharmacy technicians who follow specific standards, for instance they cannot remove "house meds", which are prescribed medications with an active prescription attached. Technicians instead mark these medications for removal, leaving reconciliation to the physician. The physicians in the emergency department are not required to complete a full reconciliation for patient's profiles as this is a task left for the admitting physician. This leads to the question whether the reconciliation process in the emergency department (ED) needs to be re-evaluated. Patients' "After Visit Summary" reports were used to analyze patient profiles in determining medication reconciliation statuses (whether fully reconciled, partially reconciled, or unreconciled). 280 patients' profiles were used. 243 records (86.79%) were found unreconciled, 18 (6.43%) were partially reconciled, and 19 (6.79%) were fully reconciled.

**Keywords:** medication reconciliation, emergency department, immersion students

### Introduction

The University of North Carolina-Chapel Hill Eshelman School of Pharmacy began a new innovative program in Fall of 2015. Their goal was to create a class of pharmacy leaders prepared for the ever evolving future, resulting in a more rigorous and involved program. A part of this program is an immersive two-month rotation in which we were introduced to health systems. In our involvement with Moses Cone Hospital, we found areas in which to improve processes, which evolved into a research opportunity expanded in this paper.

For any single patient, a multitude of various medical records may exist. The integration of information across different organizations, settings, and/or disciplines (pharmacy, nursing home, primary provider, hospital, etc.) has proven difficult and often leaves gaps of information as there is not one standard method to taking medication histories. Even within the same organization, errors found upon admission may not necessarily be corrected at discharge. To note, up to 67% of patients have such medication discrepancies from admission and remaining through discharge<sup>1,5,6</sup>. Furthermore more than 40% of medication errors are likely produced from inadequate reconciliation during the admission, transfer and discharge process<sup>4</sup>. As defined by the Joint Commission medication reconciliation is "the process of comparing a

patient's medication orders to all of the medications that the patient has been taking" in order to avoid medication errors such as "omissions, duplications, dosing errors, and drug interactions"<sup>2</sup>. While only a smaller percentage (11-59%) of those discrepancies actually have the potential for harm,<sup>5</sup> it is imperative to adopt a correct method in obtaining medication history profiles of patients to better utilize personnel resources and also to better patient experiences.

Joint Commission accredited institutions at a minimum are expected to collect and document an accurate list of medications with the patient upon admission and communicate this completed list to the next provider of service when the patient is transferred to another setting or service outside or within the original organization<sup>2</sup>. It is expected that whenever there are new medication orders or the rewriting of pre-admit orders medication reconciliation occurs, but it is left to the discretion of the organization in other circumstances<sup>2</sup>. As an accredited hospital Moses Cone hospital has a robust medication history program. The Moses Cone pharmacy employs medication history technicians, who go into patients' rooms to obtain a list of previously taken medications. The technicians rely on patient accounts for an accurate list of prior to admission medications, but may also use prescription bottles or a list of medications the patient has with them. If necessary other resources such as the patient's pharmacy, skilled nursing facility documents, and individual caregivers may be contacted to confirm medications and fill dates. Pharmacy technicians follow the standards that have been approved by the hospital's P&T committee. One standard they follow is that they are not allowed to remove "house meds" which are "prescribed

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medications" associated with a current prescription within Cone Health Link. Two exceptions to this rule include expired medications and completed courses of antibiotics. The remaining "house meds" must be "marked for removal" with a reason why the patient is no longer taking the medication (i.e. "completed course"). In the electronic record at Moses Cone, the technician must also document why it is marked for removal (i.e. "hasn't taken in 30 days"). The physician will then reconcile the medication as he determines appropriate. At Moses Cone the standards for patient reconciliation varies among the emergency room physicians and the in-house physicians. This then leads to the focus of the paper; is the current process by our ED physicians adequate or does the medication history process need to be reviewed and new processes implemented.

### Methods

Data was collected using Cone Health Link to access the Moses Cone ED discharge lists dated from June 11, 2016 to June 17, 2016. Two hundred and eighty patients were included in this research. Patients were excluded if their medication history completed was not completed by a medication history technician from the pharmacy and at least one medication marked for removal (formally denoted as "Consider Medication Status and Discontinue"). Additionally, medications had to be properly marked for removal per the medication history standards established by Moses Cone (n=1). Patients were also excluded if an "After Visit Summary" (AVS) report was not available (n=6). For each patient the "Review Prior to Admission Medications" tab was used to assess whether a medication history was completed by a

technician from the pharmacy and if any medications had been marked for removal. If at least one medication was marked for removal the patient's "After Visit Summary" report was then used to determine whether the patient's profile was reconciled. Medications were considered reconciled if the physician addressed medications marked for removal by either removing the medications or categorizing them under "Continue" or "Stop" categories within the AVS. Medication profiles were considered unreconciled if marked-for-removal medications remained under the "Ask your doctor" column. Medication reconciliation was classified into one of three statuses: fully reconciled, partially reconciled, and unreconciled categories -- with only profiles in which all marked-for-removal medications had been addressed (either continued, stopped or removed) considered as fully reconciled. The profile was considered partially reconciled if one or more of the medications marked for removal were stopped, continued or removed, but others were left on the profile. If medications were marked for removal in previous encounters, the earliest encounter date was recorded. Additionally, the number of previous encounters, not including the current encounter that was being analyzed, was recorded.

### Results

A total of 280 patient cases were used (average: 40, median: 37) with only 19 (6.79%) and 18 (6.43%) profiles being fully and partially reconciled, respectively (Table 1). 243 records (86.79%) were unreconciled. Figure 1 depicts a compilation of the medication histories and their statuses from the collected data.

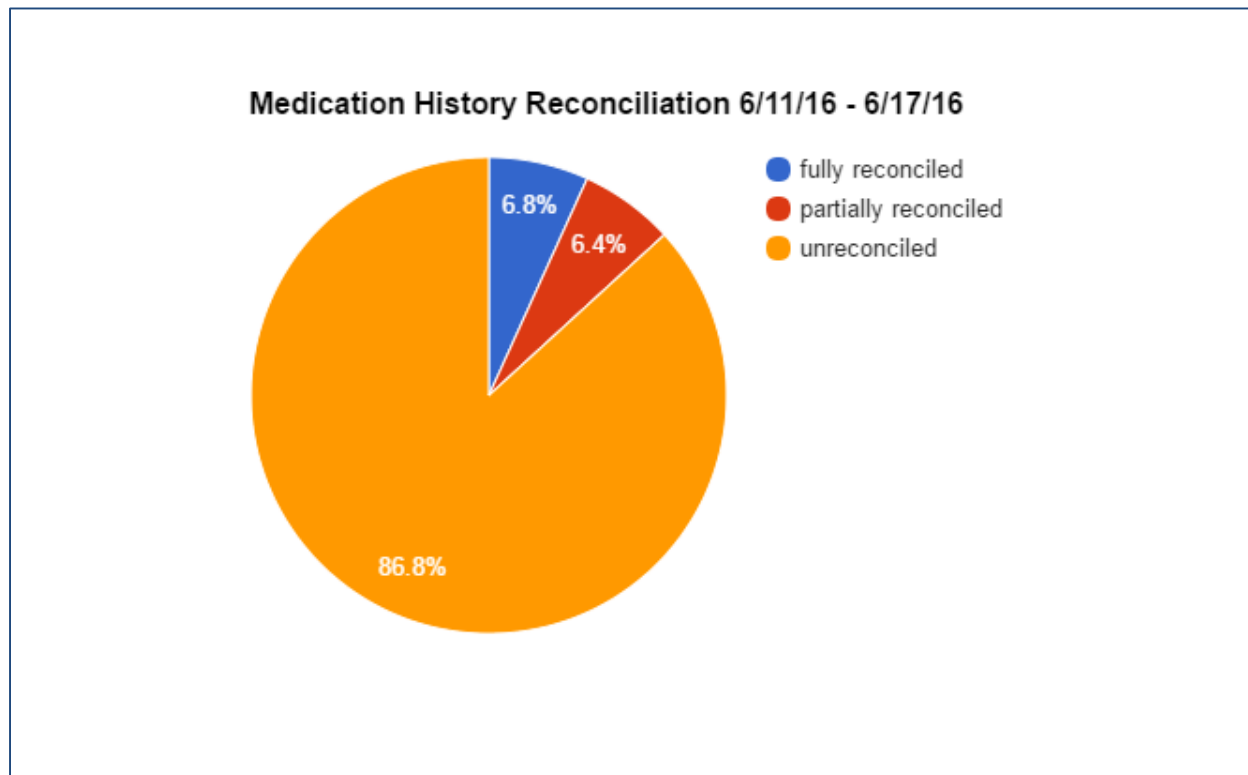
**Table 1: Daily Medication History Statuses of Patient Profiles.**

Contains daily counts and percentages on whether a medication profile was fully reconciled, partially reconciled, or unreconciled.

	Fully reconciled (%)	Partially reconciled (%)	Unreconciled (%)	Total
06/11/16	1 (3.125)	0 (0)	31 (96.875)	32
06/12/16	1(3.125)	3 (9.375)	28 (87.5)	32
06/13/16	3 (8.823)	1(2.941)	31 (91.176)	34
06/14/16	2 (5.405)	4 (10.81)	31 (83.783)	37
06/15/16	5 (13.158)	3 (7.895)	29 (76.316)	38
06/16/16	2 (4.255)	1 (7.895)	44 (93.617)	47
06/17/16	5 (8.333)	6 (10)	49 (81.667)	60
<b>Total</b>	19 (6.786)	18 (6.429)	243 (86.786)	280

**Figure 1: Medication History Reconciliation by Percentages.**

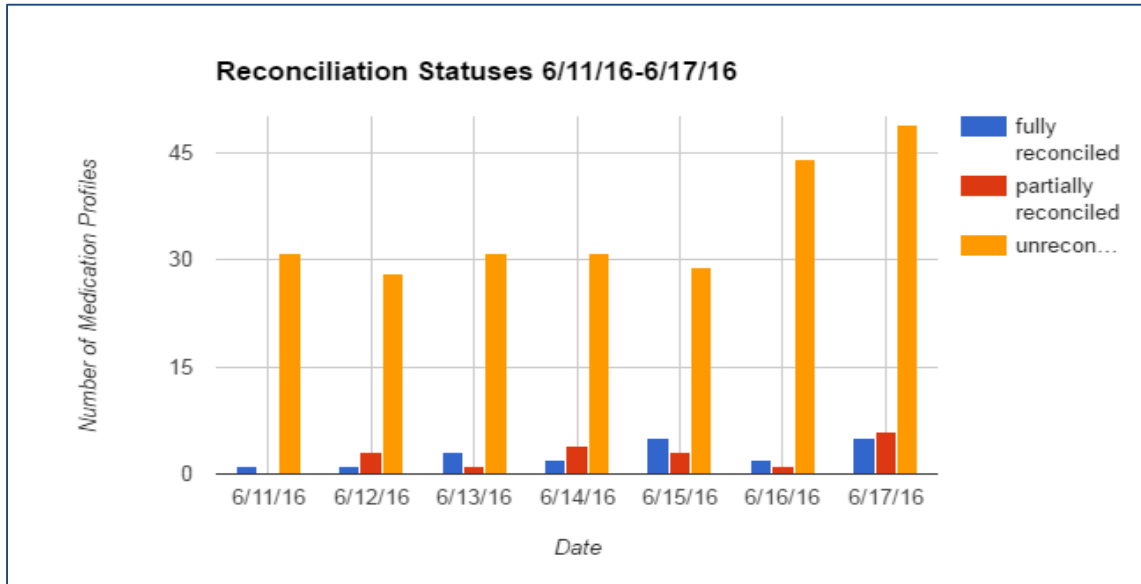
Representation of weekly percentages of whether a profile was fully reconciled (blue), unreconciled (orange) or partially reconciled (red).



The lowest percentage of unreconciled profiles occurred on 6/15/16, with 76.32% of records unreconciled and the highest percentage occurred on 6/11/16 with 96.88% of patient cases unreconciled. For fully reconciled cases, the highest percentage (13.12%) occurred on 6/15/16 and the lowest percentage (3.13%) occurred on 6/11/16 and 6/12/16. Partially reconciled cases saw 0% and 10.81% on 6/11/16 and 6/14/16, respectively. Figure 2 displays the number of medication profiles unreconciled or fully or partially reconciled daily.

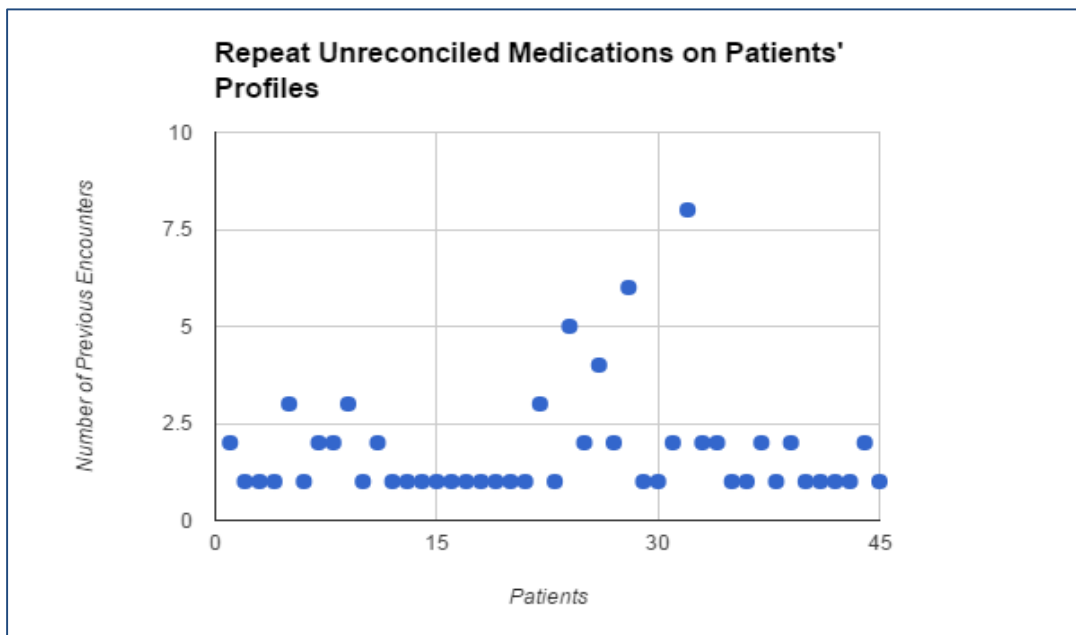
**Figure 2: Compiled Medication Reconciliation Statuses.**

Reconciliation statuses in categories of fully reconciled (blue), partially reconciled (red) and unreconciled (orange), depicted daily. Forty-five patients (15%) had medications that had previously been marked for removal. The number of previous encounters for these patients ranged from 1 to 8 (Figure 3), averaging 1.82 encounters and totaling 82 encounters all together.



**Figure 3: Histogram of Medication Profiles Containing Previously Unreconciled Medications.**

Representing 45 patients whose medication profiles contained at least one (1) medication which was previously marked for removal. Encounters recorded are those in which the medication was not reconciled.



Discussion

This study looked at medication reconciliation conducted by physicians in the Moses Cone Emergency Department. Physicians in the ED are required to reconcile each patient's medication profile but not to the extent that an admitting physician or primary care provider might do. The current process requires a physician to address medication(s) marked for removal by the pharmacy technician before removing said medication(s) from the profile. We have found that most medications marked for removal are not often reconciled by the physician. Furthermore, a portion of medication profiles seen in the ED contain previously marked-for-removal medications, indicating medication reconciliation likely had not been completed despite multiple encounters. These findings suggest the need to focus on medication histories across transitions of care and possibly implementing clinicians of other disciplines to aid in the reconciliation process. Physician's assistants, nurse practitioners and pharmacists may be able to aid physicians in reconciling patient profiles at discharge in the ED as well as after admission. Kwan et al. found pharmacists conducting 17 of 20 reconciliations at discharge while physicians only executed 2 reconciliations, indicating the feasibility of pharmacists taking a more direct role during the discharge process<sup>3</sup>.

In failing to remove incorrect medications from patients' profiles, patients may be confused by muddled discharge papers containing inaccurate and outdated medications. Patient understanding, as well as patient safety, may be compromised as these "house meds" are prescribed medications which may have serious consequences if taken incorrectly. Furthermore, failure to reconcile medication profiles may introduce additional confusion for clinicians at other transitions of care.

A standardized process for conducting medication histories should be implemented as pharmacy technicians, certified medical assistants, nurses, and physicians appear to use different processes in reviewing patients' medications. These various clinicians gather medication information from the patient and document it in separate places in Cone Health Link. Medication information in various locations creates a disconnect between the clinicians, and often results in repeated questions to the patient, regardless of medication history status. Not only is such a process inefficient, but also requires patients to constantly request medications to be removed from their medication profiles which may lead to patient dissatisfaction and negatively influence patient perception in regards to the competency of clinicians.

Limitations to the study include a small data set, as only discharges over the course of one week were used. Only the profiles in which the medication history had been completed by pharmacy technicians were included, whereas multiple clinicians currently complete various forms of medication histories. Reconciliation completed by the physician may have

occurred in profiles in which there were no medications marked for removal. The direct clinical significance of incorrect medication histories is unknown as data was collected over a short period of time, whereas the clinical effects of medication discrepancies may be seen months later.

Future research should include larger data sets, as well as reviewing discharges over extended periods of time. Inclusion of all medication histories including marked-for-removal medications, stopped medications, as well as added medications should help gain understanding of the clinical significance of incorrect medication profiles. Collaborations with clinicians of other disciplines may be beneficial in establishing a standardized medication history process to ensure patient safety at each transition of care.

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