Analysis of the Best Possible Medication History (BPMH) Collected at a Tertiary Care Hospital

by

Roland Massaad

BS in Chemistry, St. John Fisher College, 2011

BS in Pharmacy, Lebanese American University, Lebanon, 2016

PharmD, Lebanese American University, Lebanon, 2018

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This essay is submitted

by

Roland Massaad

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and approved by

Essay Advisor:

Paula Horn, PharmD, BCACP, Manager, Education and Residency Programs, Department of Pharmacy, Allegheny General Hospital, Pittsburgh, Pennsylvania

Essay Readers:

David Finegold, MD, Professor, Human Genetics, Director of Multidisciplinary Master of Public Health, Graduate School of Public Health, University of Pittsburgh

Elizabeth Van Nostrand, JD, Associate Professor and Director, MPH and JD/MPH Programs, Health Policy and Management, Graduate School of Public Health, University of Pittsburgh

Paula Horn, PharmD, BCACP

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Abstract

Purpose: The Best Possible Medication History is a process to obtain the most accurate medication list, used to decrease the incidence of discrepancies and eliminate the risk of unintentional harm. At Allegheny General Hospital, the BPMH process is being expanded with a target capture rate of 100% of admitted patients. For this project, we are implementing documentation and assessment process to measure the workload volume and effectiveness of the AGH BPMH program.

Methods: The BPMH Documentation includes the patients' day of admission, the nursing unit, the date the BPMH was conducted, and the time to conduct the evaluation. This documentation is used for a retrospective chart review of patients who were admitted to AGH during a two week period. Pharmacy intervention documentation reports were used to calculate the hospital capture rate, unit specific capture rate, average time spent on BPMH, average time between admissions and conducting the BPMH, and the total number of discrepancies involving high risk medications.

Results: 423 patients were identified with admission completed BPMH. The capture rate at AGH was defined as 50.3%. The nursing unit with the highest pharmacy completed BPMH was the observation unit with 96 BPMHs. A total of 404 BPMH were completed within 48 hours after

admission, representing 85.6% of all BPMHs, a median of 0 days with an IQR [0,1]. The median time to conduct the BPMH was 20 minutes with an IQR [10, 25].

Conclusion: This evaluation has shown a need at AGH for BPMH specific pharmacy staff that can increase the capture rate around the hospital and on specific nursing unit. Taking in consideration some limiting factors, it is important for any employee to properly document their work, which helps with the accuracy of the BPMH evaluation tool.

Public Health Significance: One of the most effective public health techniques is prevention and optimization of medical care. Maximizing the capture rate around the hospital can prevent any inpatient prescription errors, which will in turn prevent any medication caused adverse effects. This can contribute to the wellbeing of the community AGH serves and the overall safety of the admitted patients.

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1.0 Introduction

During transition of care, patients can experience a variety of medical errors with variable outcomes. One major preventable mistake is the unintentional medication discrepancies, which includes duplication of therapy, omission of medications or prescribing the wrong dose, frequency or duration of a given drug.[1] One way to prevent these medication discrepancies is to use the Best Possible Medication History (BPMH) to actively evaluate the patient's home medication list to that prescribed at the hospital. BPMH is the process of thoroughly and accurately establishing a patient's home medication list upon admission and using this list to provide correct medications to the patient throughout the hospital stay.[2]

Several studies were conducted to evaluate the BPMH process in the intensive care unit, where patients' treatment reflects the comorbidities they face. The ICU patients are usually prescribed more medications and require a more thorough evaluation of their home medication to further reduce the risk of medication errors. A study evaluating the pharmacy impact on medication reconciliation in the medical ICU showed an occurrence of 18% of medication histories to have caused serious or potential life-threatening medication discrepancies. 80% of the patients evaluated in the MICU lacked a pharmacy completed medication history. Medication histories completed in the MICU were more accurate when performed by a pharmacy personnel, at 46% of MH compared to 12% if performed by non-pharmacy personnel.[3]

Even with a patient or family interview, healthcare providers have a duty to ensure that the information provided by the patient is accurate by verifying it with an outside source. Both the pharmacy technicians and pharmacist use the electronic health record (EHR) to record the performed BPMHs and document their work. Therefore, BPMH involves several steps:

- Obtaining patient home medication list through a face to face interview
- Verify the list of medications with at least one other reliable source of information such as an outpatient pharmacy, PCP's office, VA, prison, skilled nursing facility, rehab or retirement home, etc.
- Document and communicate medication discrepancies to the healthcare team

Current institutional practice at Allegheny General Hospital (AGH) involves a few pharmacy technicians and clinical pharmacist. The following is the staffing model throughout the week at the hospital:

- two full time employees (technicians) → 80 hours total Monday-Friday
- 0.5 full time employee (interns) → 20 hours total Monday-Friday
- 0.4 full time employee (interns) → 16 hours total on Saturday/Sunday

The BPMH project at AGH is planned to expand with a target goal to increase the capture rate around the hospital. Ultimately, the target capture rate is 100% of all admissions to AGH and to be able to achieve this goal, the staffing model needs to be evaluated. The purpose of this project was to develop and implement a process to monitor the workload and resource allocation of the AGH BPMH program.

2.0 Study Design

This is a retrospective chart review using the EHR system. An intervention documentation report was extracted from the EHR over a two week period between March 11th 2019 and March 24th 2019. This report was used to evaluate the total number of completed admission BPMH conducted throughout AGH, the nursing unit where the documentation occurred, time it took to conduct the BPMH and the time from admission until completion of the BPMH.

The primary endpoint is the capture rate of admission BPMH completed on AGH inpatients. Secondary endpoints were evaluated to distinguish areas of improvement within the staffing model and include: the number of completed admission BPMH per nursing unit, time BPMH occurred following admission and average time spent per admission BPMH.

2.1 Population

For this study, the inclusion criteria was all documented pharmacy completed admission BPMH within the defined timeline. The exclusion criteria were all documented pharmacy completed discharge BPMH and any duplicate or same admission BPMH.

2.2 Data Analysis

Descriptive statistics were used to calculate the capture rate by comparing the number of pharmacy completed admission BPMH to the total number of admitted patients within the

previously defined two week analysis period. Another set of data was analyzed that involved the number of completed admission BPMH per nursing unit, the time BPMH occurred following admission and the average time spent per admission BPMH. For the time it takes to complete an admission BPMH, they were grouped into four categories: BPMH that were preformed between 0 and 15 minutes, 16 to 30 minutes, 31 to 40 minutes and more than 40 minutes. For the time from admission until BPMH completion, they were grouped by number of days where zero indicated that the BPMH was performed the same day of admission. All formulas used are found in the Appendix.

3.0 Results

After analyzing the EHR report, 895 pharmacy completed BPMH were detected. After excluding 423 discharge and duplicate BPMH, 472 admissions BPMH were evaluated. Using descriptive statistics, the primary endpoint was calculated to be 50.3% capture rate of pharmacy completed admission BPMH at Allegheny General hospital between March 11th and March 24th 2019 (472 admission BPMH out of a total of 938 hospital admissions).

The secondary endpoint of the number of completed admission BPMH on AGH nursing unit was variable. The nursing units with the highest pharmacy completed BPMH was the observation unit with 96 total completed admission BPMH. All of the intensive care units including TICU, NICU, MICU, CCU, and SICU (nursing units abbreviation explanations are found in Appendix B) had the lowest number of completed BPMH (results found in the appendix – Figure 1). Most admission BPMH were conducted within the first 48 hours following admission with a total of 404 BPMH completed the day of or the day following admission, representing 85.6% of total completed BPMH (results found in the appendix – Figure 2). The median days from admission until BPMH completion was 0 days with an IQR [0,1]. The required time to conduct the BPMH ranged between 5 minutes and >40 minutes with a median time of 20 minutes and an IQR [10,25]. Most of the BPMHs, 92.6% of all BPMH conducted, took less than 30 minutes to perform; 225 BPMH took anywhere between 0-15 minutes and 212 BPMH took between 16-30 minutes to conduct (results found in the appendix – Figure 3).

4.0 Discussion

This study serves as an assessment of workload volume for pharmacist completed admission BPMH at AGH which can be used to adjust the staffing model to ensure a capture rate of 100% of admitted patients. Having a 50.3% capture rate indicates a significant opportunity for expansion to be able to reach our target goal. The secondary endpoints are used to reallocate our resources, hire more staff, and adjust the staffing model. According to the data, the highest number of completed BPMH was seen in the emergency department (ED) and the observation unit. On these units, we have full time employees that are dedicated to complete the admission BPMH on inpatients. The documentation of their work is sometimes inputted in the EHR once the patient has moved to the observation unit from the ED. This will affect the capture rate in the ED and therefore we can combine the data from the observation unit and the ED to get a more accurate representation of the number of admission BPMH completed by the ED team.

All of the ICU units have a low number of completed admissions BPMH and can be targeted when it comes to reallocating BPMH technicians. The lack of completed BPMH on these nursing units can be due to the extensive workload clinical pharmacist face daily. Historically, the workload focus and prioritization on ICU nursing units is directed towards acute care treatment with less emphasis on continuation of home medications. Another explanation to this lack of BPMH completion is the complexity of the patients' conditions on these units, making the BPMH collection not a priority on the patient's acute problem list. To have a better idea of the capture rate on each nursing unit, the total admission over the course of the two weeks, stratified by nursing unit, would have to be generated. This data could lead to a more concrete representation of our

nursing capture rate, especially on ICU units, since most patients admitted to the ICU have longer hospital length of stay and more severe admission conditions.

For the best outcome and safety of the patient, the optimal time to acquire an admission BPMH is within the first 48 hours of admission. As shown in figure 2 of the appendix, 85.6% of completed BPMH interviews took place either the same day or the following day after admission. It was noted that some BPMH were conducted more than a week after admission, but these BPMH were performed on surgical patients before being admitted to the OR. This is a very good outcome, with the majority of the BPMH performed early on after admission to allow the treating team to conduct the proper interventions to ensure patient safety.

The time it takes to complete the BPMH is affected by the number of comorbidities present with a patient that will affect the amount of medications the pharmacist needs to reconcile on. Another factor that can increase the time to complete the BPMH includes patients using multiple pharmacies to receive their medications. As shown in figure 3 in the appendix, 92.6% of completed BPMH took less than 30 minutes to conduct with a median time of 20 minutes. This will allow the hospital to estimate the amount of staff required to reach the target goal of 100% capture rate. There were 2 completed admission BPMH that took more than 40 minutes to conduct and both were ICU patients that most probably had co-morbidities. This data was taken one step further and any BPMH that took more than 30 minutes were separated by units. Figure 4 in the appendix shows that 17 out of 35 completed BPMH in over 30 minutes took place on the internal medicine units (6A and 6C).

4.1 Limitations

The first limitation of this QA/QI research is the design of the study. A retrospective review study of the EHR means that all of the collected data relies on the accuracy of documentation. Since the pharmacy completed BPMH expansion program is not yet implemented throughout AGH, pharmacists are not well trained on documenting their work once they conduct a BPMH. This lack of documentation also comes with another limitation that involves the inconsistency of documentation. Some of the documentations on the EHR lack the proper information needed to evaluate some of the secondary endpoints. For example, a few of the Documentations did not include the time required to conduct the BPMH which were rounded up to 5 minutes per BPMH.

4.2 Future Direction

This study has evaluated the current BPMH process and capture rate at AGH and some future direction is very beneficial to help expand the program and reach all admission around the hospital. When it comes to documentation of pharmacist work, proper training and consolidation of documentation techniques will help with the next program evaluation by ensuring no missing information in documentation. Consolidating documentation into a template that can be used by all pharmacists can also ensure that no work is missed, and other healthcare professionals can easily identify discrepancies on the patient profile to fix them and prevent errors.

Another potential future direction includes expanding the technician/intern job role to conduct BPMH. To be able to evaluate the progress of the program and the need to reallocate resources around AGH, a quarterly report is essential. This quarterly report can identify areas of

improvement and it can definitely be made easier by unifying the BPMH documentation into one template.

Lastly, part of quarterly evaluation of the BPMH staffing model, the efficacy of the program can be evaluated by identifying the high risk medication discrepancies. High risk medication discrepancies have a potential to cause harm to patients if left unchanged. High risk medications are defined by the ISMP high risk medication list 2018.

5.0 Conclusion

This research project is used as an assessment tool for an internal quality improvement for Allegheny General Hospital which can optimize patient safety in regards to home medication administration as an inpatient. One of the most effective public health techniques is prevention and optimization of medical care. Maximizing the capture rate around the hospital can prevent any inpatient prescription errors, which will in turn prevent any medication caused adverse effects. This can contribute to the wellbeing of the community AGH serves and the overall safety of the admitted patients.

Appendix A Statistical Analysis

Descriptive Statistics

Primary outcome

- Capture rate → $\frac{\#\ of\ total\ completed\ BPMH}{Total\ \#\ of\ addmission\ to\ AGH}$

Secondary outcome

- Unit capture rate → $\frac{\#\ of\ completed\ BPMH\ on\ a\ unit}{\#\ of\ addmission\ to\ the\ units}$

- Average time from admission until BPMH collection → $\frac{Sum\ of\ time\ (admission\ until\ BPMH\ collection)}{\#of\ completed\ BPMH}$

- Average time/BPMH → $\frac{Total\ time\ spent\ on\ BPMH}{\#of\ BPMH\ performed}$

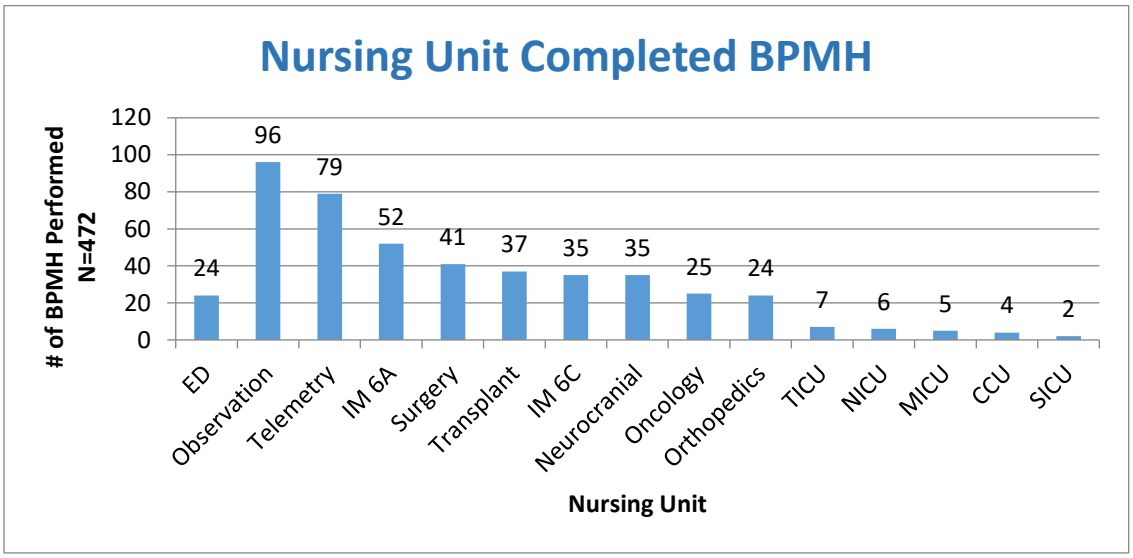
- Patients grouped by time spent on collecting BPMH:
  - 0-15 minutes
  - 16-30 minutes
  - 31-40 minutes
  - > 40 minutes

Appendix B Nursing Units Abbreviations

Appendix Table 1: Nursing Units' Abbreviations at AGH

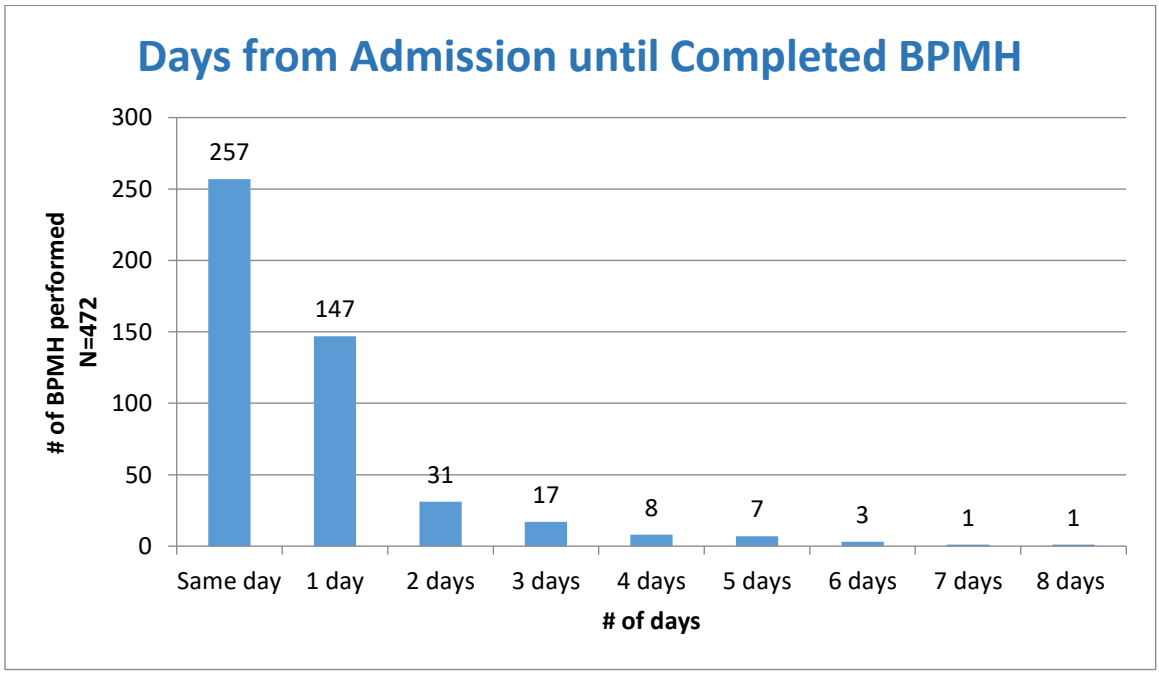
ED	Emergency Department
IM	Internal Medicine
TICU	Trauma ICU
NICU	Neuro ICU
MICU	Medical ICU
CCU	Cardiac care unit
SICU	Surgical ICU

Appendix C Figures and Bar Charts



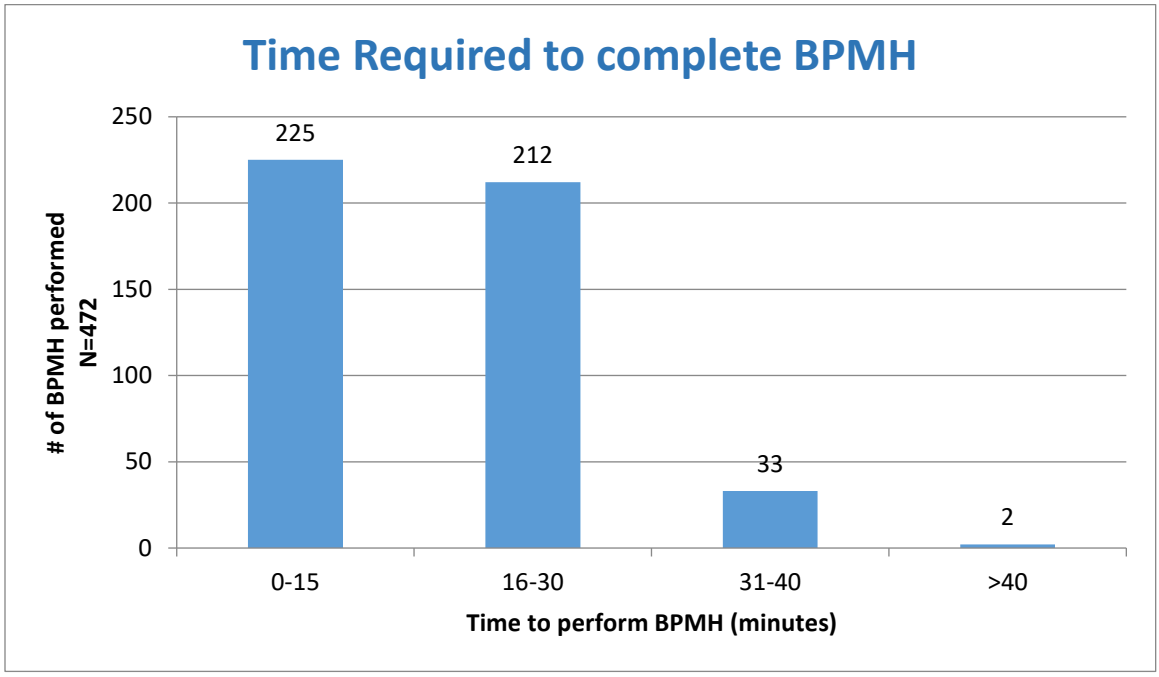
Appendix Figure 1: Nursing Unit Completed BPMH

Number of pharmacy completed admission BPMH between March 11th and March 24th 2019, according to nursing unit. Total admission BPMH completed is 472 with the observation unit having the highest number of completed BPMH at 96.



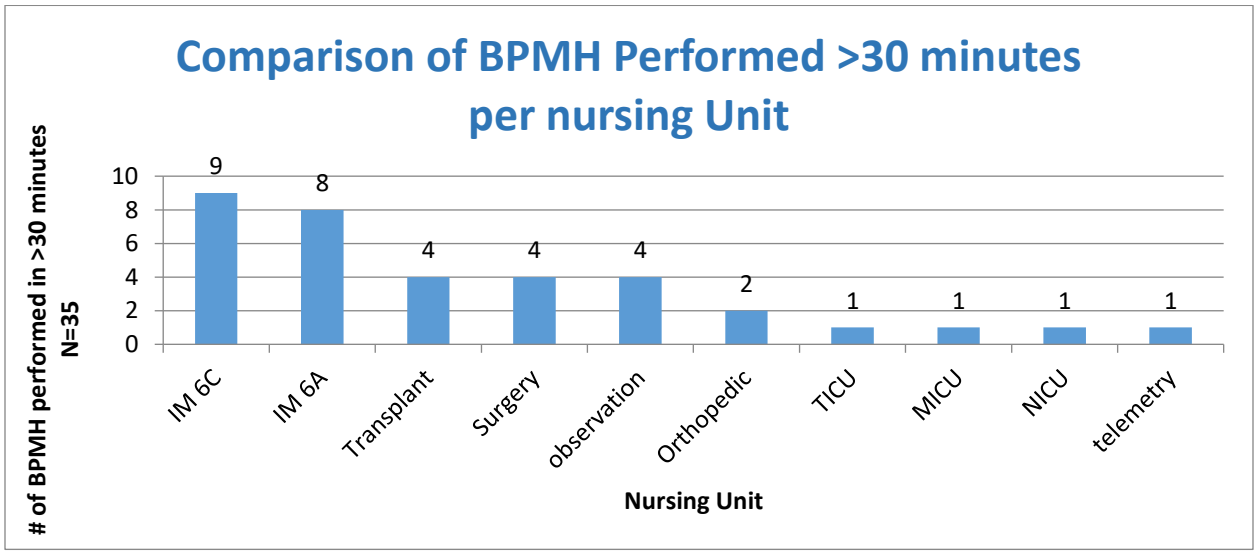
Appendix Figure 2: Days from Admission until Completed BPMH

The number of days it took pharmacy to complete the admission BPMH following patient admission.



Appendix Figure 3: Time Required to Complete BPMH

The time required to complete admission BPMH. The time was categorized into 4 groups: 0-15 minutes, 16-30 minutes, 31-40 minutes and >40 minutes.



Appendix Figure 4: Comparison of BPMH Performed > 30 Minutes per Nuring Unit

All completed admission BPMH that were performed in >30 minutes, stratified by AGH nursing unit.

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