

# Pharmacists and Transitions of Care From Emergency Department to Home

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When patients transition between care settings, they are at an increased risk of adverse drug events (ADEs) and unplanned readmissions, which can result in an annual estimated cost of more than \$26 billion.<sup>1</sup> Studies have shown that ADEs are a significant contributor to emergency department (ED) visits to manage complications following a transition of care (TOC).<sup>2-4</sup> Studies of consecutive discharges have found that nearly 20% of patients experience ADEs within 45 days of hospital discharge and 66% of complications occurring within 3 weeks of discharge were from ADEs.<sup>5,6</sup> As a result, hospitals, health systems, and payers have become increasingly interested in implementing various TOC programs aimed at reducing readmissions and overall health care utilization.

Pharmacists play a key role in the TOC as part of an interprofessional health care team. A meta-analysis demonstrated that pharmacy-led medication reconciliation interventions were an effective strategy to reduce medication discrepancies.<sup>7</sup> A recent systematic review on pharmacists' impact on the TOC highlighted the crucial role that pharmacists play in promoting medication adherence and providing effective medication reconciliation.<sup>8</sup> However, the review did not identify any one intervention to be the most effective in improving care transitions. Pharmacist involvement within care transitions is common for hospitalized patients being discharged or in ambulatory care settings following discharge.<sup>9-10</sup> Despite the potential benefits that pharmacists provide at care transitions, there are few reported pharmacist transition interventions occurring in the ED.

The ED plays a significant role in delivering health care services and providing care in medically underserved areas.<sup>11,12</sup> Pharmacists could contribute to ED transitions by assessing medication reconciliation, ensuring medication access at discharge, and reviewing for contraindicated medications.<sup>13</sup> Hohner et al reported a clinical pharmacist TOC program between the ED and ambulatory care pharmacists.<sup>14</sup> This program provided patient-specific comprehensive medication review and education in the ED setting and ensured coordinated transition to the ambulatory care setting. Hohner and colleagues recruited 18 individuals, and a pharmacist followed up

## ABSTRACT

**OBJECTIVES:** To determine the impact of a pharmacist-led telephone outreach program among patients discharged from the emergency department (ED) to home.

**STUDY DESIGN:** We conducted a randomized controlled study from February to November 2019 at a tertiary care academic medical center.

**METHODS:** At ED discharge, participants were randomly assigned to usual care (controls) or usual care plus the pharmacist's review (intervention group). Eligible individuals included those being discharged from the ED to home with 8 or more medications. A pharmacist telephoned patients in the intervention group within 48 to 96 hours after ED discharge. The medications in the patient's record from the ED were compared with what the patient was taking at home. Discrepancies were communicated to the primary provider via fax or telephone. The primary outcome was overall health care utilization including unplanned hospital readmissions or ED visits within 30 days of discharge. The effect of the intervention on the number of acute events was analyzed using a Poisson regression model adjusting for relevant baseline characteristics.

**RESULTS:** Of 90 eligible participants, 45 patients each were in the intervention and control groups. A total of 26 patients (58%) in the intervention group were reached, and 56 interventions were provided by the pharmacists. There was no significant difference between groups for overall health care utilization (adjusted risk ratio [aRR], 1.01; 95% CI, 0.50-2.06;  $P = .96$ ), hospitalizations (aRR, 0.20; 95% CI, 0.02-2.18;  $P = .19$ ), and ED visits (aRR, 1.24; 95% CI, 0.56-2.79;  $P = .59$ ).

**CONCLUSIONS:** A pharmacist-led telephone outreach program conducted after ED discharge was not associated with a change in health care utilization.

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## TAKEAWAY POINTS

In this analysis of pharmacist-led telephone interventions as patients transition from emergency department to home, a clear benefit on unplanned hospital utilization was not identified.

- ▶ Pharmacists made a number of interventions that could affect unplanned hospital utilization.
- ▶ Despite not finding a statistical difference, a trend toward beneficial impact on unplanned hospital utilization was seen in the intervention group.
- ▶ Telephone interventions may not be an ideal method of reaching patients, as only 57.8% of patients in the intervention group could be successfully contacted.

with 5 of them on average 16 days after ED discharge. The implementation of this pharmacist-led TOC program demonstrated a potential approach to facilitate the transition of high-risk patients to outpatient care.<sup>14</sup> Pearson et al described a pharmacist-led care transition intervention targeting high-risk older adults after an ED visit.<sup>15</sup> This retrospective pilot study included a telephonic outreach and assessment by a clinical pharmacist. No differences were found in the primary outcomes of ED visit, hospitalization, or death within 30 days after ED discharge.<sup>15</sup> Additional evidence is required to demonstrate that pharmacist TOC interventions in the ED can improve medication management and reduce health care utilization.

A pharmacist-led telephone callback program following ED care has the potential to improve medication adherence and potentially reduce unneeded ED visits and hospital admissions. However, the literature on pharmacist-led ED transition programs is sparse, and both reported studies are observational. Therefore, the objective of this study was to evaluate the impact of a pharmacist-led telephone outreach program among patients recently discharged from the ED.

## METHODS

## Trial Design and Participants

The study was a 1:1, prospective randomized controlled trial conducted from February to November 2019 at Erie County Medical Center (ECMC) and approved by the University at Buffalo Institutional Review Board. The study followed the Consolidated Standards of Reporting Trials (CONSORT) 2010 statement and CONSORT-Outcomes 2022 extension.<sup>16</sup> Patients were recruited from ECMC's treatment area, and those taking 8 or more medications were approached to participate in the study. Inclusion and exclusion criteria for this study are summarized in **eAppendix Table 1** in **eAppendix A** (eAppendices available at [ajmc.com](http://ajmc.com)).<sup>17,18</sup>

## Intervention Description and Sample Size Calculation

The intervention group received usual care and a pharmacist intervention via telephone 48 to 96 hours after ED discharge, whereas the control group received usual care only. Full descriptions of study procedures and interventions are documented in **eAppendix B**.

We aimed to screen all patients who had an ED visit for potential inclusion. For our primary analysis, we employed a 2-sided  $\alpha$  level of

.05 and aimed for a power of 80%. The control group was expected to have a 30-day unplanned hospital utilization probability ranging from 25% to 40% based on previous literature.<sup>19-21</sup>

With the assumption that our intervention would result in a minimum reduction of 20% in unplanned hospital utilization, we calculated a sample size requirement of 94 patients. Accounting for an estimated 20% loss to follow-up, the adjusted sample size would be 112 patients (56 in the intervention

group and 56 in the control group).

## Outcomes and Covariates

The primary outcome was to evaluate the effectiveness of the pharmacist intervention in reducing unplanned hospital utilization within 30 days of ED discharge. The unplanned hospital utilization was defined as a composite of unexpected ED visits and/or hospital admissions. The study collected demographic and clinical variables during the interview, including knowledge of taking medications, adherence to the medications, barriers of access to medications, and confirmed follow-up appointments with the primary care provider. Full descriptions are available in **eAppendix B**.

## Statistical Analyses

Outcome measures were evaluated at the patient level between the intervention and control groups. Categorical variables were reported as percentages and compared using the  $\chi^2$  test; continuous variables were reported as medians (IQRs) and compared using the Mann-Whitney  $U$  test.

To assess differences between groups in the incidence rate of unplanned hospital utilization, a 2-rate  $\chi^2$  was initially used, followed by separate assessments of hospitalizations and ED visits. Poisson regression analysis was employed to evaluate the difference in health care utilization count between groups, with adjustment for age, gender, race, number of comorbidities, and medications. Main analysis and secondary analysis were performed to comprehensively evaluate the outcomes. Main analysis included all enrolled samples from the intervention and control groups after exclusion criteria were applied. In our secondary analysis, we excluded patients in the intervention group who were not successfully contacted by pharmacists. The analysis was performed using SAS 9.4 (SAS Institute). All hypothesis testing was 2-sided with a significance level set at  $P < .05$ .

## RESULTS

A total of 120 participants were initially enrolled in the study. Of these, 30 were subsequently eliminated as ineligible (**Figure**). The final study sample consisted of 90 participants (29 men and 52 women) with a mean (SD) age of 58.2 (12.1) years. These individuals were randomly assigned to either the intervention or control group, with

45 patients in each group. However, only 57.8% of the intervention group were successfully contacted by a pharmacist.

**eAppendix Table 2** in **eAppendix F** shows that there were no significant differences in age, gender, or race between the 2 groups but the intervention group had more comorbidities and medications. The top 3 comorbidities were hypertension (n = 14), hyperlipidemia (n = 11), and diabetes (n = 7). During telephone interviews, 56 interventions were provided, with the most frequent being general counseling and monitoring (n = 13) (**eAppendix Table 3** in **eAppendix F**). Medication discrepancies (n = 68) were also identified, with 33 (48.5%) discrepancies relating to the number of medications reported at home and 35 (51.5%) relating to dosage or regimen. On average, the pharmacist spent a total of 62.5 minutes per case. This included 21.3 minutes reviewing the patient's record before making the call, 16.2 minutes conducting the interview, and 25 minutes documenting the call.

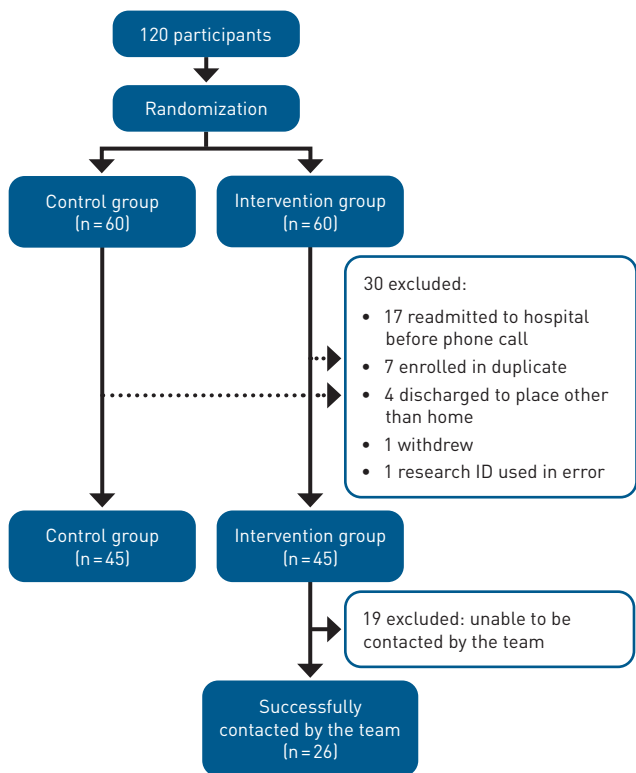
The incidence rate of unplanned hospital utilization within 30 days from the main analysis did not show a statistically significant difference between the intervention and control groups ( $P = .61$ ) (**Table**). There was also no significant difference in the rates of unexpected ED visits ( $P = .34$ ) and hospitalizations ( $P = .45$ ). In main analysis, the adjusted Poisson regression models did not demonstrate significant changes in overall unplanned hospitalizations (adjusted risk ratio [aRR], 1.01; 95% CI, 0.50-2.06;  $P = .96$ ), ED visits (aRR, 1.24; 95% CI, 0.56-2.79;  $P = .59$ ), or hospitalizations (aRR, 0.20; 95% CI, 0.02-2.18;  $P = .19$ ) between the intervention and control groups (**Table**). The secondary analysis also showed similar findings.

## DISCUSSION

In this trial, a pharmacist-led telephone outreach program following ED discharge was not associated with a change in 30-day ED revisits or hospitalizations. Pharmacists were able to follow up with 26 patients after ED discharge and perform a medication reconciliation interview with the patient or caregiver. This led to numerous interventions related to medication list discrepancies at discharge, medication access issues, and counseling on appropriate medication administration for high-risk drugs such as insulin. In some instances, the pharmacists followed up directly with the patient's primary care provider because they deemed the identified medication-related problems time sensitive. These recommendations provided by pharmacists are viewed as a study strength and support the value of a pharmacy-led outreach program after ED discharge.

Return visits to the ED and hospital are costly for health systems, and the ED discharge process is typically a high-stress encounter for patients. Medication-related problems including adverse events, medication access, and incorrect medication lists are common following ED discharge.<sup>22,23</sup> Implementation of a pharmacy telephone outreach program after discharge is an innovative approach toward reducing medication-related problems. This is the first randomized controlled trial to evaluate a pharmacist-led outreach program after ED discharge, and we were able to successfully implement the program within a medically underserved area. Numerous

**FIGURE.** Study Recruitment Flow Chart



medication interventions were completed, yet we found no statistical differences in return ED visits or hospitalizations. Two previous studies evaluated similar pharmacist-led interventions and found no significant differences in 30- or 90-day repeat ED visits or hospitalizations.<sup>14,15</sup> Post-ED discharge outreach or callback programs are receiving broad attention across the United States, as this period represents an opportunity to improve care and is used as a quality metric. However, most studies focus on physician or nurse outreach post discharge and are unable to demonstrate improvement in patient outcomes.<sup>24,25</sup> The optimal location and time for medication reconciliation during a care transition has not been identified.<sup>8</sup> Given the complexities at ED discharge, it will be a priority to further explore pharmacist-led interventions either within the ED or directly after discharge.

The pharmacist interview led to numerous medication-related interventions, which support the value provided by the program. Currently, there is a lack of economic data to support pharmacist-led care transition programs and the value provided to the health care system. Although we did not perform a formal economic analysis, the estimated pharmacist costs based on current salary data<sup>26</sup> were approximately \$38 per patient, with an overall cost of \$1724. As health care shifts toward value-based payment systems, there will be opportunities for pharmacists to provide transition

## TRENDS FROM THE FIELD

**TABLE.** Rate of Unplanned Hospital Utilization and Outcomes Among Patients With or Without the Pharmacist Telephone Intervention

Main analysis	Case (n = 45)			Control (n = 45)		
	Total	ED	Admission	Total	ED	Admission
No. of health care events within 30 days (%)	18 (100)	16 (88.9)	2 (11.1)	15 (100)	11 (73.3)	4 (26.7)
Rate of health care events per 100 persons (95% CI)	40 (23.7-63.2)	35.6 (20.3-57.7)	4.4 (0.5-16.1)	33.3 (18.6-55.0)	24.4 (12.2-43.7)	8.9 (2.4-22.8)
Rate difference between groups (95% CI)				6.67 (-18.4 to 31.7)	11.1 (-11.5 to 33.7)	-4.4 (-15.1 to 6.2)
<i>P</i>				.61	.34	.45

Secondary analysis	Case (n = 26)			Control (n = 45)		
	Total	ED	Admission	Total	ED	Admission
No. of health care events within 30 days (%)	10 (100)	8 (80.0)	2 (20.0)	15 (100)	11 (73.3)	4 (26.7)
Rate of health care events per 100 persons (95% CI)	38.5 (18.4-70.7)	30.8 (13.3-60.6)	7.7 (0.9-27.8)	33.3 (18.6-55.0)	24.4 (12.2-43.7)	8.9 (2.4-22.8)
Rate difference between groups (95% CI)				5.1 (-24.1 to 34.3)	6.3 (-19.4 to 32.1)	-1.2 (-15.0 to 12.6)
<i>P</i>				.72	.62	.90

Main analysis						
Intervention vs control	Unadjusted model			Adjusted <sup>a</sup> model		
	Total	ED	Admission	Total	ED	Admission
Poisson regression model						
Risk ratio (95% CI)	1.20 (0.60-2.38)	1.45 (0.68-3.13)	0.50 (0.09-2.73)	1.01 (0.50-2.06)	1.24 (0.56-2.79)	0.20 (0.02-2.18)
<i>P</i>	.60	.34	.42	.96	.59	.19

Secondary analysis						
Intervention vs control	Unadjusted model			Adjusted <sup>a</sup> model		
	Total	ED	Admission	Total	ED	Admission
Poisson regression model						
Risk ratio (95% CI)	1.15 (0.52-2.57)	1.26 (0.51-3.13)	0.86 (0.16-4.72)	1.08 (0.47-2.50)	1.27 (0.49-3.29)	0.38 (0.03-4.96)
<i>P</i>	.73	.62	.87	.85	.62	.46

ED, emergency department.

<sup>a</sup>Adjusted for age, gender, race, number of medications, and number of comorbidities.

interventions within different parts of the care continuum. Although most pharmacist-led care transition interventions occur within the hospital, care transition pharmacists and interventions are expanding into primary care, community, and long-term care settings.<sup>8,27-29</sup> Despite pharmacist role expansion into the TOC process, there is still insufficient evidence to determine the most effective pharmacist-led intervention for improving the continuity of care. Moving forward, studies should include both clinical and economic outcomes, with a priority on using rigorous study designs. This will provide best practices and identify pharmacist-led TOC services that improve care and are cost-effective.

One potential approach to enhance the outcomes of pharmacist-led intervention programs is through collaborative efforts among providers, patients, and pharmacists. For example, Taber et al developed and implemented a mobile app and web portal to consolidate patient-level data.<sup>30</sup> This system aimed to monitor the occurrence and severity of medication errors in kidney transplant recipients.<sup>30,31</sup> By using this technology, pharmacists could receive automatic notifications through the app from patients regarding

medication changes. They could then take necessary actions, such as scheduling televisits with patients or contacting physicians for recommendations to prevent medication errors. A report showed that the participants who received this intervention demonstrated a significant reduction in medication errors (incident risk ratio, 0.39;  $P < .001$ ).<sup>32</sup> In future studies, it is recommended to adopt a similar automated workflow to provide pharmacists with comprehensive patient-level data and enable the capture of a broader range of cases.

### Limitations

There are several important limitations to consider when interpreting the findings of our study. First, our data analysis was based solely on information obtained from ED discharge summaries and charts. This limited our ability to access vital patient information, such as living situations, previous ED visits, and inpatient admissions. Although we were able to determine patient insurance status, we could not determine the specific plan or coverage, potentially affecting the validity of our results. Future studies should aim to collect more comprehensive patient data to ensure the accuracy



of their findings. Second, our post-ED outreach call was primarily focused on medication, so other factors that could contribute to ED revisits and hospitalizations, such as communication between providers and patients or socioeconomic status, were not fully considered. This lack of information may limit the generalizability of our results, and future research should explore these aspects to validate our findings. Third, we excluded patients in the intervention group from the analysis who were readmitted prior to receiving an outreach call, which may have created a selection bias. Future studies should take this into consideration to minimize the potential for a selection bias. Fourth, our final sample was underpowered after exclusion criteria were applied, and we were able to contact only 58% of the patients in the intervention group, which could have introduced bias into our results. Future research with powered samples should be conducted to evaluate the effect of pharmacist-led TOC intervention programs. To improve contact and participation rates, future studies may need to explore alternative strategies, such as offering incentives or compensation to patients. Taken together, these limitations underscore the need for caution when interpreting our findings, and future research must address them to enhance the validity and generalizability of their results.

## CONCLUSIONS

ED discharge poses significant difficulties for health care systems and can cause distress for patients. Despite this, our study found that implementing a pharmacist-led telephone outreach program after ED discharge did not result in a decrease in the number of ED revisits or hospitalizations within 30 days. Nevertheless, pharmacists were able to address medication-related problems such as incorrect medication lists and medication access issues. The effectiveness of pharmacist-led interventions during the TOC process after ED discharge requires further investigation. ■

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## eAppendix A

<b>eAppendix Table 1. Study inclusion and exclusion criteria<sup>1,2</sup></b>
Inclusion criteria
<ul style="list-style-type: none"><li>• Adults are at least 18 years of age.</li><li>• Patients will be discharged from the ED to the home setting.</li><li>• Taking at least 8 different medications, inclusive of as needed medications, at admission to the ED.</li><li>• Patients have a primary care provider.</li><li>• Patients speak and understand English.</li></ul>
Exclusion criteria
<ul style="list-style-type: none"><li>• Prisoners or patients in police custody.</li><li>• Patients who do not have a telephone with which to be contacted by a pharmacist.</li><li>• Patients who leave against medical advice.</li><li>• Patients who are readmitted to the ED or hospital prior to receiving a phone call from the pharmacist.</li></ul>
<p>Abbreviation. ED, emergency department.</p> <p>Note. Participants were selected from patients admitted to the ED at Erie County Medical Center (ECMC) and placed in a treatment area of the ED. ECMC is a tertiary care medical center, located in an area designated by the Health Resources and Service Administration as a medically underserved area. Written informed consent was obtained from patients by research assistants at ECMC.</p>

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## **eAppendix B**

### **Study procedures**

When a patient was admitted to the ED at ECMC and placed in a treatment area, the research assistants (RAs) would review patient's current medication list via electronic health record system as part of the assessment process. If a patient was taking 8 or more medications, the patient would be approached by the RAs to participate in the study. The RAs described the research study and administered a screening tool using REDCap (Research electronic Data Capture) questionnaire (**eAppendix C**). The questionnaire collected subject's demographics (name, date of birth, and gender), phone number for follow-up, ED visit information (date of service, medical record number), and primary care provider (PCP) information. Patients without a PCP and without a telephone were excluded from the study. Patients who decided to enroll in the study would be asked to sign a written informed consent document. This process ensured that all participants were fully informed and had the opportunity to make an informed decision about their participation.

Pharmacists on the research team would review REDCap every 24-72 hours to identify newly enrolled subjects in need of follow-up. When discharged from the ED, each subject was assigned randomly to either intervention group (usual care + pharmacist intervention) or control group (usual care only) using the simple randomization technique performed in Microsoft Excel 2016.

### **Interventions**

The subjects in the interventional group were contacted by a pharmacist via telephone between 48 – 96 hours after ED discharge to perform a medication reconciliation interview with the subject or the caregiver.

The aim of the interview was to gather information related to subject's medication regimens, including (1) whether the subject understood the purpose of their medications, (2) comprehended the discharge instructions given by ED physicians, (3) adhered to their medications, and (4) scheduled any necessary follow-up appointments with a PCP. Prior to calling the subject, the pharmacist would review the ED discharge summary/chart for each subject to determine the most current documented list of medications. The subject was then administered a standard script (**eAppendix D**) for data collection during the interview. If the pharmacist identified any discrepancies in the subject's medication regimen, or any other pertinent issues during the phone call, the information was documented in a standardized form and sent to the PCP via fax

(eAppendix E). In cases where the identified issues were deemed to be time-sensitive, the PCP was contacted immediately by phone.

Subjects who could not be contacted after 3 attempts within the 48-to-96-hour period were classified as “unable to contact.” The diagram was provided to show the attrition of subjects after applying exclusion criteria and subject drop out (**Figure**).

### **Covariates**

The variables collected during the interview included (1) knowledge of taking medications, (2) adherence to the medications, (3) barriers of access medications, and (4) confirmed follow-up appointment with PCP. Medication discrepancy was collected by comparing the list directly from the EHRs to medication reconciliation by the pharmacist via phone call.

The study collected information on various time-related aspect, including the (1) number of attempts, (2) the duration of record review to initiating contact, (3) the time taken for the pharmacist to make the 1<sup>st</sup> attempt, (4) the time of total subject contact (including all attempted calls), (5) the duration of the patient interview, (6) the time taken to document subject contact, and (7) the time required to follow-up with the subject’s PCP.

The subject’s demographic and clinical variables were extracted from the ED discharge summaries/charts. Demographic variables included age, gender, and race. Race was categorized as White, African American, and multiracial. Clinical variables included total number of medications and comorbidities. For clinical variables, we manually reviewed each subject’s ED discharge summary/chart documented by the ED physicians and collected the comorbidities and medications from the chart.

### **Outcomes**

The primary outcome was to evaluate the effectiveness of a pharmacist telephone intervention in reducing the incidence of unplanned hospital utilization within 30 days following discharge from the index ED visit. The unplanned hospital utilization was defined as a composite of unexpected ED visits and/or hospital admissions. To ensure accurate healthcare utilization counts, ED visits that led to hospitalizations were not included in the ED visit counts. Patient hospital records were reviewed 30 days after the index ED discharge to determine these data. Secondary outcome included ED revisits within 30 days after ED discharge.



**eAppendix C****Enrollment screening questionnaire**

<b>Record ID</b>	
Hospital medical record number	
Date of emergency department visit	
First name of subject	
Last name of subject	
Date of birth	
Gender	Male Female
What is the best telephone number for the pharmacist to call you?	
What is the best time to call? The pharmacist may not always be able to call you at your best time.	Morning Afternoon Evening
What is the name of your primary care provider? (Name, location, numbers, etc)	
When is the last time you saw your primary care provider?	In the past 30 days In the past 3 months In the past 6 months In the past year More than a year ago I cannot remember

## eAppendix D

### Telephone Intervention Interview

#### Interview flow

##### Before phone call

- Review documented medications listed in electronic health record system.
- Review discharge report from the emergency department (ED).
- Identify chief complaint of visit.
- Determine primary care provider and pharmacy of subject if possible.

##### Order of questions

1. Determine the current health of a patient.
2. Determine status of follow up appointment with a primary care provider.
3. Determine medication status on the following items.
  - a. Knowledge
  - b. Adherence
  - c. Discrepancies

##### Interview script/questions

1. Team member: Hello Mr/Ms. \_\_\_\_\_. I am [caller's name], from the University at Buffalo School of Pharmacy research team. You may remember that when you were in the ED, you agreed to be part of our study about the medicines you are taking. A study assistant mentioned you'd receive a call checking in on things. I am hoping to talk to you about your medications and see how you are doing. Do you mind if I ask you a few questions so I can see if there is anything I can help you with? Is this a good time to talk? It will probably take about 20 minutes, depending on the number of medicines you are taking. **YES/NO**
  - a. If **yes**, continue with questions.
  - b. If **no**, is there a better time that I can call you back?

If subject answered **Yes** to question 1 proceed with the following questions

2. Why did you visit the ED on (Date of visit taken from hospital record)?
3. How do you feel now? (What do we do if they sound like they are ready to go back to the ED?)

4. Have you scheduled a follow-up visit with your primary care provider? (Yes/No)
  - a. If **yes**, confirm date and name of provider and move onto question 5.
  - b. If **no**, ask if they have a primary care provider (PCP)?
    - i. If **yes**, encourage making a follow-up appointment.
    - ii. If **no**, provide information on contacting a PCP or hospital social worker.
5. Were you given any prescriptions from the provider in the ED? (Yes/No)
  - a. If answered **yes**. "The primary purpose of this call is to go over the medications you are currently taking. Do you have your medications in front of you right now or a list of medications with you to make this process go smoother?"
    - i. If **yes**, begin medication reconciliation section.
    - ii. If **no**, ask to collect them or schedule a time to call back when they have their medications.
    - iii. If they do not have any medications, ask if there are barriers to access.  
(Subjects should have at least 8 medications per inclusion/exclusion criteria)
6. Have you picked up the prescription(s) prescribed to you in the ED? (Yes/No)
  - a. If **no**, "What barriers are keeping you from getting your medication?"
  - b. If issues with access, provide information for how to access medications, social services referral.

### **Medication reconciliation section**

7. I'm going to ask you some questions about your medicine to see if there is anything I can help you with. I also want to make sure that the medications you have are the right ones. We will go through what you have one by one.
8. What is the medication name? (Insert name in data collection form)
  - a. What do you take (medication name) for?
  - b. How were you told to take (medication name)?
  - c. What were you told to expect when taking (medication name)?
9. Ask the subject, are there any over-the-counter medications, herbal supplements, or nutraceuticals you are taking but have not mentioned?
10. Compare this to the information in the hospital electronic health record. Note any differences.

11. Drug related problems may fall into one of the following categories.
  - a. Adherence (identify barriers to access, difficulty taking, financial, etc)
  - b. Consistency (drugs in hospital electronic health record do not match with patient record)
  - c. Drug-drug interaction
  - d. Drug-disease interaction
12. Thank you for your time. We will contact your primary care provider to let them know that we spoke. We will provide your PCP with the list of medications you have given me and let them know about any problems we identified.
  - a. Confirm the date and time of the subjects follow up appointment.
13. Take care and have a nice day.

**eAppendix E**

DATE:

Dear Dr,

Upon telephone medication reconciliation conversation with **Patient Name (DOB)**, who was discharged from ECMC Emergency Department on **Date** and has consented to participating in the research study, **Evaluation of Health Outcomes Associated with a Pharmacist's Telephone Intervention in Transitions of Care in an Underserved Population**, I have identified a concern that warrants your attention. This phone call to the patient is the intervention in the study. Also attached to this fax is an updated list of medications based on this phone call.

Please consider discussing these concerns with your patient.

Thank you,

**IMPORTANT:** This facsimile transmission contains confidential information, some or all of which may be protected health information as defined by the federal Health Insurance Portability & Accountability Act (HIPAA) Privacy Rule. This transmission is intended for the exclusive use of the individual or entity to whom it is addressed and may contain information that is proprietary, privileged, confidential and/or exempt from disclosure under applicable law. If you are not the intended recipient (or an employee or agent responsible for delivering this facsimile transmission to the intended recipient), you are hereby notified that any disclosure, dissemination, distribution or copying of this information is strictly prohibited and may be subject to legal restriction or sanction. Please notify the sender by telephone (number listed above) to arrange the return or destruction of the information and all copies.

eAppendix F

<b>eAppendix Table 2. Demographic characteristics of participants</b>						
	<b>Main analysis</b>			<b>Secondary analysis</b>		
	Case group (n=45)	Control group (n=45)	P-value	Case group (n=26)	Control group (n=45)	P-value
Age (y), median (IQR)	60 (52, 66)	59 (54, 68)	0.73	59.5 (52, 67)	59 (54, 68)	0.86
Sex (%)			0.20			0.24
Male	16 (35.6)	22 (48.9)		9 (34.6)	22 (48.9)	
Female	29 (64.4)	23 (51.1)		17 (65.4)	23 (51.1)	
Race (%)			0.30			0.29
White	15 (33.3)	17 (37.8)		10 (38.5)	17 (37.8)	
Black	29 (64.4)	24 (53.3)		16 (61.5)	24 (53.3)	
Other	1 (2.2)	4 (8.9)		-	4 (8.9)	
No. of comorbidities, median (IQR)	6 (5, 8)	5 (4, 7)	0.11	6.5 (5, 8)	5 (4, 7)	<b>0.02</b>
No. of medications, median (IQR)	13 (11, 16)	12 (10, 14)	0.08	14 (12, 17)	12 (10, 14)	<b>0.02</b>
Abbreviation: IQR, interquartile range; ED, emergency department						



<b>eAppendix Table 3: Intervention Type</b>	<b>Number of Incidents</b>
General counseling/monitoring	13
Patient advised to follow-up with primary care provider	9
Discrepancy in updated medication list	5
Current medication regimen ineffective	5
Non-adherence/adherence counseling	4
Missing medication/device or medications not received post-discharge	3
Adverse event(s)	3
Medication access	3
Referral to specialist	2
Refills	2
Allergy	1