Engaging Patients and Caregivers in a Transdisciplinary Effort to Improve Outpatient Parenteral Antimicrobial Therapy

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Key Points: We performed a barrier identification and mitigation activity among patients, caregivers, and healthcare workers to prioritize barriers and propose solutions to outpatient parenteral antimicrobial therapy (OPAT) care.
Abstract

We worked with patients, caregivers, and healthcare workers to prioritize barriers and propose solutions to outpatient parenteral antimicrobial therapy (OPAT) care. Unclear communication channels, rushed instruction, safe bathing with an intravenous catheter, and lack of standardized instructions were highly-ranked barriers. OPAT programs should focus on mitigating barriers to OPAT care.

Key Words: OPAT; home infusion; catheter complications; FMEA; patient-involved research
Introduction

In the United States, home-based outpatient parenteral antimicrobial therapy (h-OPAT) frequently involves patients and their caregivers performing routine daily medication infusions and intravenous (IV) catheter care. Although patients and caregivers receive support and training from home infusion therapy agencies, they have no formal training in administering IV medications and performing IV catheter maintenance. Patients receiving h-OPAT are at risk of complications from the IV catheter, the antimicrobial agents, and the underlying infection especially if they do not appropriately perform IV catheter maintenance or infusions.\textsuperscript{1,2} Understanding how to prevent these adverse effects is essential.

Recent work has highlighted the importance of close monitoring by infectious diseases physicians within two weeks of hospital discharge to reduce adverse outcomes.\textsuperscript{3-5} National and international guidelines recommend close monitoring of OPAT patients.\textsuperscript{1,2} However, in reality, limitations in care coordination across healthcare systems frequently results in the suboptimal care of h-OPAT patients.\textsuperscript{6} Identifying barriers to and strategies for safe h-OPAT care is essential in improving care.

As patients and caregivers perform day-to-day antimicrobial delivery and IV catheter maintenance in h-OPAT, understanding the patient experience is necessary to identify barriers to and strategies for safe h-OPAT care. We have previously performed semi-structured interviews and home-based observations among adult patients on h-OPAT and have demonstrated that barriers including performing IV catheter care outside of the well-structured setting of the hospital or office, the complicated nature of h-OPAT-related tasks, and confusion over the roles of healthcare workers are barriers to safe h-OPAT care.\textsuperscript{7-9}

Barrier identification and mitigation (BIM) is a manner of systematically identifying and prioritizing barriers to safe care, in a focus group-style interaction, by ranking those of the highest importance,\textsuperscript{10} through use of participatory design.\textsuperscript{11} However, it has been infrequently used to assess barriers to patient safety in the home or with input from patients.
and caregivers. We performed a proactive risk assessment using an interactive in-person BIM from both healthcare workers and h-OPAT patient and caregiver perspectives to prioritize barriers and strategies for safe h-OPAT.

Methods

The Johns Hopkins Hospital (JHH) discharges over 2000 patients on h-OPAT annually. Eligible patient and caregiver participants included any patient who had received h-OPAT after discharge from JHH, or the caregiver of the patient. Eligible healthcare worker participants included those involved in the referral or care of patients on h-OPAT including home care coordinators, home infusion pharmacists, home infusion nurses, and home infusion administrators. The Institutional Review Board at the Johns Hopkins University School of Medicine approved the study.

We previously identified barriers to the safe provision of h-OPAT based on semi-structured interviews with 40 patients receiving h-OPAT, and through the observations of 20 patients in the home while performing OPAT-related tasks (Appendix).7-9 For the current work, we convened four groups to go through an in-person group BIM between May and July 2019. Each contained four to eight participants and each session lasted approximately two hours. Participants were provided a $50 gift card for their efforts. Each group was led by an infectious diseases physician with expertise in OPAT (SCK) and a research coordinator (AS). Two groups included patients who had received h-OPAT and their caregivers, one included home care coordinators, and one enrolled home infusion staff members. Eligible patients and caregivers included those who enrolled in a prospective cohort of h-OPAT patients12 or in the semi-structured interviews or home-visit observation studies within the last year (of 29 patients approached).

Group members were first presented with a list of barriers to rank on a scale of 0 to 10 to anchor the later discussion (Appendix). For frequency, low scores meant the barrier
never occurred. For significance, low scores meant the barrier was of no concern. For ease-of-mitigation, low scores meant the barrier would be too difficult to mitigate due to cost, manpower, resources, legal or insurance constraints, or other factors. Participants were then asked to multiply the frequency, significance, and ease-of-mitigation scores and to note the three highest-scoring barriers. After participants completed the ranking process, each verbally presented the three barriers with the highest rankings to the group. Participants then discussed each of the barriers and suggested strategies. Ranked barriers and strategies were consolidated across the four groups.

Results

Table 1 demonstrates the composition of each of the four groups. Of a total population of 24 participants, 7 were patients and 3 were caregivers. Overall, 75% of the participants were women and 70% were white.

Participants identified barriers and mitigation strategies when receiving h-OPAT (Table 2). The top two barriers across the four groups were each proposed by ten of the 24 participants and were as follows: (1) “Healthcare providers may not always communicate with each other about a patient’s care, so may be unaware of how the patient is doing,” and (2) “Instruction is rushed.” Suggestions to improve healthcare worker communication included standardizing communication protocols for OPAT care options, expanded access to medical records for home infusion agencies in different health systems, scheduling follow-up appointments prior to discharge, and having patients assist with transmitting information by providing documentation to members of the healthcare team. To ensure that instructions are not provided hastily at the time of hospital discharge, suggestions included identifying patients requiring parenteral therapy early in their hospital course and development of a discharge plan as soon as patients potentially requiring parenteral therapy are identified, providing instructions to patients targeted to the patient’s education or abilities well before
hospital discharge, and providing written and visual instruction including handouts and videos.

Eight participants listed “The patient is unsure how to keep their IV line dressing dry while bathing” as one of the most significant barriers, including six patients and caregivers. Several products for keeping IV dressings dry and intact were discussed, including adherent cling wrap and taping clean plastic bags over dressings. Other suggestions included providing supplies to patients in the hospital upon discharge, evaluating dressings more frequently, and using a detachable shower head to direct the flow of water away from the dressing.

Six participants listed a lack of standardized instructions. Solutions included having standardized instructions available to patients, caregivers, inpatient nurses, and home infusion nurses in the form of written checklists and videos.

Discussion

Through a novel approach including patients and caregivers to undergo a formal BIM process to identify and mitigate barriers to safe h-OPAT, we identified important and often unrecognized obstacles to safety. Major barriers included practical challenges with protecting IV catheters from moisture, a lack of streamlined communication between healthcare providers, hastily provided instructions, and not providing relevant instructions to all relevant stakeholders (e.g., patients, caregivers, and home infusion nurses). While there
was no consensus around the best approach to protect IV catheter dressings, several key strategies were identified to reduce communication barriers. Some of these included initiating training as soon as it becomes likely that a patient will need h-OPAT, tailoring instructions to a patient’s previous experiences, practicing infusions and line care prior to hospital discharge, and ensuring that patients have access to written instructions and videos.

Communication barriers between healthcare providers (e.g., home infusion staff and ordering physicians) were problematic. Streamlined communication pathways and checklists for inpatient nursing, patients and caregivers, and home infusion nurses; improving access of home infusion staff to medical records; and clearly designating the ordering physician and their contact information were underscored as essential for improving communication.

By performing a structured assessment of barriers to safe h-OPAT, we showed that it was important to involve all stakeholders in the process, especially patients and caregivers. Opinions of OPAT patients and caregivers have been sought in prior qualitative research, but primarily in the United Kingdom, where most infusions are performed by home nurses.\textsuperscript{13-15} With the exception of our group,\textsuperscript{7-9} few have used patients to identify specific barriers to appropriately maintaining the IV catheter and infusing medications. We found that patient insights were essential in identifying barriers and solutions, as they emphasized day-to-day management concerns (in particular, concerns about bathing) to a greater extent than the healthcare workers.

Our study has several limitations. Our findings are reflective of findings in a single hospital system using a single modality of OPAT delivery (home infusion) and barriers and solutions may differ across different populations and home environments (e.g., urban versus rural) as well as OPAT delivery mechanisms (i.e., outpatient infusion, skilled nursing facilities). Additionally, patient and caregiver participants may not be representative of all h-OPAT patients as volunteers may be more engaged in their care. Our qualitative study was hypothesis-generating, and future studies should be performed to see if the proposed
strategies may be effective in preventing OPAT complications. Alternatively, organizations could perform BIM to identify barriers to and strategies for safe OPAT care in their setting.

H-OPAT is a complicated process with numerous potential barriers that may impact patient safety. We found that BIM can successfully identify barriers as well as potential solutions through the inclusion of patients and caregivers, and diverse healthcare providers. This work serves as a road map to investigate other processes in healthcare where understanding patient experiences is integral to identifying barriers.
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Conflicts of Interest

The authors report no conflicts of interest.

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Table 1: Composition of Groups performing Failure Mode and Effects Analysis (FMEA)

| Characteristic          | Home Infusion Employee Group (of N=8, %) | Home Care Coordinator Group (of N=6, %) | Patient-Caregiver Group 1 (of N=4, %) | Patient-Caregiver Group 2 (of N=6, %) | Total (of N=24, %) |
|-------------------------|------------------------------------------|----------------------------------------|---------------------------------------|---------------------------------------|--------------------|
| Role                    |                                          |                                        |                                       |                                       |                    |
| Infusion Nursing        | 3 (37.5%)                                | 0 (0%)                                 | 0 (0%)                                | 0 (0%)                                | 3 (12.5%)          |
| Administration, Scheduling | 1 (12.5%)                               | 0 (0%)                                 | 0 (0%)                                | 0 (0%)                                | 1 (4.2%)           |
| Pharmacist              | 2 (25.0%)                                | 0 (0%)                                 | 0 (0%)                                | 0 (0%)                                | 2 (8.3%)           |
| Pharmacy Technician     | 1 (12.5%)                                | 0 (0%)                                 | 0 (0%)                                | 0 (0%)                                | 1 (4.2%)           |
| Infection Preventionist | 1 (12.5%)                                | 0 (0%)                                 | 0 (0%)                                | 0 (0%)                                | 1 (4.2%)           |
| Home Care Coordinator   | 0 (0%)                                   | 6 (100.0%)                             | 0 (0%)                                | 0 (0%)                                | 6 (25.0%)          |
| Patient                 | 0 (0%)                                   | 0 (0%)                                 | 3 (75.0%)                             | 4 (66.7%)                             | 7 (29.2%)          |
| Caregiver               | 0 (0%)                                   | 0 (0%)                                 | 1 (25.0%)                             | 2 (33.3%)                             | 3 (12.5%)          |
| Gender: Female          | 6 (75.0%)                                | 6 (100.0%)                             | 3 (75.0%)                             | 3 (50.0%)                             | 18 (75.0%)         |
| Race/Ethnicity          |                                          |                                        |                                       |                                       |                    |
| White                   | 6 (75.0%)                                | 5 (83.3%)                              | 3 (75.0%)                             | 3 (50.0%)                             | 17 (70.8%)         |
| African American        | 2 (25.0%)                                | 0 (0%)                                 | 0 (0%)                                | 2 (33.3%)                             | 4 (16.7%)          |
| Asian                   | 0 (0%)                                   | 1 (16.7%)                              | 0 (0%)                                | 0 (0%)                                | 1 (4.2%)           |
| White Hispanic          | 0 (0%)                                   | 0 (0%)                                 | 1 (25.0%)                             | 1 (16.7%)                             | 2 (8.3%)           |
| Barrier                                                                 | Number of Votes | Proposed Strategies                                                                 | Cost of Strategies (Resources, Financial, and Personnel) |
|------------------------------------------------------------------------|-----------------|-------------------------------------------------------------------------------------|--------------------------------------------------------|
| Healthcare providers may not always communicate with each other about a patient’s care, so may be unaware of how the patient is doing. | 10 (6 home infusion employees; 1 home care coordinator; 3 patients or caregivers) | Standardization of communication protocols; expectation for communication from designated physician identified prior to discharge with home health staff; expanded access to EHR; schedule follow-up appointments for patients prior to discharge; patients assist with providing information; stay in one healthcare system. | No cost and minimal personnel time required for standardized communication protocols, EHR-based solutions, or ensuring follow-up appointments scheduled. |
| Instruction is rushed.                                                 | 10 (4 home infusion employees; 3 home care coordinators; 3 patients or caregivers) | Early identification of patients who may require OPAT followed by immediate initiation of instruction; algorithms for specific infusion cases; consider patient’s prior experiences; consider letting patients stay overnight for more training; ensure a home infusion nurse is present at the patient’s home on the day of discharge; practice infusion prior to discharge; provide written and visual instruction. | No cost and minimal personnel time for algorithm development or to develop instructional materials; additional personnel time required for immediate instruction initiation in hospital and ensuring personnel in patient home immediately on discharge. |
| The patient is unsure how to keep their IV line dressing dry while bathing. | 8 (1 home infusion employee; 1 home care coordinator; 6 patients and caregivers) | Use sticky cling wrap; use clean dry bags; ensure patients given supplies in the hospital on discharge; evaluate dressing integrity frequently; standardized instructions; detachable shower head; not washing chest or arm. | Minimal supply costs required. |
| There is a lack of standardized instructions provided to the patient or caregiver(s); for example, nurses in hospitals give different instructions than. | 6 (1 home infusion employee, 4 home care coordinators; 1 patient or caregiver) | Standardized instructions provided to patients; require checklists at the time of discharge for the nurse, at arrival to the home for the home infusion nurse, and for the patient that include constant re-teaching and reinforcement. | Minimal personnel costs required for standardized instruction and checklist development and implementation. |
| Issue Description                                                                 | Action Taking Place                                                                 | Cost Required |
|----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------|
| The patient receives different supplies than they were expecting.                | Teach using the same supplies in hospitals as in the home; improve processes in the warehouse; explain shipping process to patients; use a video to show how to use the supplies. | No additional cost required; likely personnel time savings due to more efficient processes. |
| The patient and caregiver(s) struggle to contact healthcare providers about complications that arise or questions related to the patient’s care. | Collaboration across health systems; have one designated infusion worker to follow up with each patient. | No additional cost required; likely personnel time savings due to more efficient processes. |
| The patient’s or caregiver’s physical condition makes the IV therapy task difficult to perform, such as flushing the IV line or attaching the medication. | Choose caregivers with physical abilities that will allow them to perform tasks. | No additional costs to the health system. |
| The patient and caregiver(s) struggle with understanding medical terms or instructions. | Do not discharge patients late in the evening; repeat instructions; ensure understanding with teach-back. | Additional costs for late discharge; minimal additional personnel time for enhanced instructions. |
| The patient may sweat, which may make it harder for the IV line dressing to stay in place. | Ensure close follow-up to ensure IV line dressing remains intact; evaluate dressing more than weekly for need for change. | Additional personnel time required for closer evaluation of IV line dressing, but telehealth could reduce additional personnel time. |
| The patient or caregiver(s) does not understand the purpose of the IV line, the risks of the IV line, or what to expect from IV therapy in the home at the time of hospital discharge. | Improved communication between infectious diseases clinicians and patients prior to discharge. | Minimal additional personnel time. |
| The patient and caregiver(s) must devote a lot of time for tasks associated with IV therapy in the home. | Schedule medications to be taken at same time; use pumps; choose less frequently-dosed medications; ensure home infusion nurses arrive. | No additional personnel time; slight additional cost for pump. |
with IV therapy in the home, especially for frequently-dosed medications.  

| Problem | Solution | Additional Personnel Time |
|---------|----------|---------------------------|
| The IV line gets caught as the patient moves around the home. | Clear a path in the home; place extra line in their pocket or pump bag. | Minimal additional personnel time. |
| Delivery people leave supplies outdoors in the heat or cold, which may make medications less effective or expire sooner. | Provide more advance notice to patients and caregivers; ensure accountability by delivery staff. | Minimal additional personnel time. |
| Healthcare providers may be unsure who is responsible for certain aspects of a patient’s care, or unsure who can place orders. | Require a clear following physician to be assigned prior to discharge. | No additional personnel time. |
| Pets tug on IV lines, which may cause the IV line to come out. | Provide guidance for patients who have pets. | Minimal additional personnel time. |
| The patient and caregiver(s) forget portions of the training. | Provide checklists with instructions; provide video instructions. | Additional personnel time for checklist development. |
| The patient and caregiver(s) are unsure when medications are done infusing (e.g., the bag is empty, when to start or stop a pump), and may stop infusions too early. | Provide guidance on infusion completion when patients are discharged; phone number to access help. | Minimal additional personnel time for enhanced education. |
| The covers used over the IV line dressing do not fit well, so the dressing becomes wet while bathing. | Use sticky cling wrap; use clean dry bags. | Minimal supply costs required. |
| The patient needs to prevent the IV line from getting exposed to soil or dirt in the outdoors. | Carefully cover IV line dressing as discussed for keeping IV line dressing dry while bathing; avoid gardening. | Minimal supply costs required. |

Abbreviations: EHR: Electronic health records