

Patient Experiences With Outpatient Parenteral Antibiotic Therapy: Results of a Patient Survey Comparing Skilled Nursing Facilities and Home Infusion

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Objective. This work compares overall patient satisfaction with outpatient parenteral antibiotic therapy (OPAT) care across the skilled nursing facility (SNF) and home healthcare company (HHC) settings; identifies barriers to patient satisfaction in OPAT; and develops a model for OPAT patient satisfaction that can help programs improve the patient experience across both sites of care.

Method. We developed and administered a patient experience survey to 100 patients returning to a single clinic for follow up. The survey consisted of 15 items (Likert scale, multiple choice, and free text responses). Patient characteristics and responses to the survey for patients who received care at home and at SNFs were analyzed and compared.

Results. Of the 100 patients surveyed, 98 completed the survey. Overall, HHC patients were satisfied more with their care than patients in SNFs, with a greater proportion stating they would recommend the site to others (71.7% for HHC and 32.7% for SNFs, $P < .01$). Patients in SNFs had a larger number of complaints about lapses in medical care, infection prevention, and the physical environment than HHC patients.

Conclusions. Patient satisfaction in OPAT is higher for home infusion than SNFs. In order to improve the patient experience, OPAT programs need to engage stakeholders in HHCs and SNFs to improve communication and care delivery.

Key words. health care systems; home infusion; OPAT; patient care team; patient experience; patient satisfaction; safety; skilled nursing facility.

INTRODUCTION

Outpatient parenteral antibiotic therapy (OPAT) is a program that delivers intravenous (IV) antimicrobial drugs to patients in an outpatient setting as an alternative to acute hospital inpatient care. A widely accepted and safe therapeutic option, OPAT treats patients with serious infections requiring long-term IV antibiotics. Implemented in more economically developed countries for over 40 years, OPAT has substantial data to support its clinical efficacy and cost efficacy [1–3]. The potential benefits of OPAT, when delivered in a structured program, include reduced length of stay, lowered demands on inpatient beds, lower out-of-pocket costs for patients, greater patient satisfaction, and reduced nosocomial infections [4–6].

In the United States, OPAT is delivered in a variety of settings including in the home via a home healthcare company (HHC), a skilled nursing facility (SNF), dialysis centers, or ambulatory infusion centers. Determining the site of care for OPAT is a complex decision that takes into account the frequency and types of medications prescribed, wound care needs, the safety of the home environment, patient's access to social support at home, and insurance payor. Patients who cannot care for themselves and have no social support often require SNF placement. However, older patients that have the ability to care for themselves are placed often in SNFs for OPAT care for cost reasons [7].

Medicare, the primary health insurance payor for US adults over 65 years of age [8], is not universally accepted by HHCs and out-of-pocket costs for patients can be unmanageable. As a result, some Medicare patients requiring OPAT are compelled to enter SNFs for treatment. In our view, patients should have the option to choose the site of care that is known to provide the best outcomes and patient experience. However, to our knowledge, there are no reports comparing OPAT patient experiences and satisfaction between HHCs and SNFs in the US. Just as patient experience is a critical metric considered by the

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Centers for Medicare and Medicaid Services (CMS) for value-based purchasing for hospitals, it also should be incorporated into value-based purchasing models for outpatient services like OPAT. However, studies are needed to gather data on patient experiences by OPAT site of care. Therefore, the objectives of this study were to (1) compare overall patient satisfaction with OPAT care across the HHC and SNF settings; (2) identify barriers to patient satisfaction in OPAT; and (3) develop a framework for OPAT patient satisfaction that can help programs improve the patient experience across both sites of care.

METHODS

Ethics Statement

This study was approved by the Johns Hopkins University Institutional Review Board. Informed consent was obtained from all individual participants included in the study.

Study Design

We conducted a single-center, cross-sectional survey of patients seen at our infectious disease (ID) clinic for follow up while receiving IV antibiotics. The details of the OPAT program have been described elsewhere [9]. At the time of this study, OPAT patients were seen by a single ID physician with an average panel size of 7 patients per clinic, with a total OPAT census of 40–50 patients at any given time. The clinic was held once weekly, but most patients were scheduled only once or twice during their course of IV antibiotics. Patients were followed during their entire OPAT course and for at least 2 months after the IV antibiotics were discontinued. The OPAT program case manager, a registered nurse, attended clinic as time permitted. When she attended clinic sessions, she identified qualified patients on the physician schedule and asked them if they were willing to complete a survey about their site of care (convenience sampling). Inclusion criteria for the survey included actively receiving IV antibiotics, age >18, able to provide consent, and the ability to speak English. Paper surveys were distributed to 100 patients over an 18-month period and completed and returned by 98 patients (98%) who received services from 14 SNFs and 4 HHCs. Two patients declined to participate mainly due to time constraints while in clinic. Patients completed the surveys in clinic rooms while waiting to see a provider. The time to survey completion was 5–7 minutes. All but 1 patient chose to identify themselves on the survey to allow us to link their survey with their underlying diagnosis.

For patients who started OPAT after an inpatient discharge (91 patients), we extracted additional information from their electronic medical records: hospital length of stay (LOS), total hospital charges, All Patients Refined Diagnosis Related Groups (APR-DRG) severity of illness score, and ARP-DRG risk of mortality score. The 3M Company developed the APR-DRG methodology to allow analysis of outcomes across cohorts for

a given diagnostic, which are used to measure the complexity of a hospital's patient case mix. These include ARP-DRG scores calculated from patient's discharge billing codes, multiple comorbidities, any complications of the hospitalization, and age. Specifically, 2 ARP-DRG scores were obtained for this study: APR-DRG severity of illness, which measures the extent of physiological decompensation or organ system loss of function, and APR-DRG risk of mortality. Both scores rank the severity of illness or risk of mortality as minor, moderate, major, or extreme [10].

Measurement Instrument

We reviewed the literature and existing online patient satisfaction surveys in use by home health companies, infusion centers, and oncology centers for patient satisfaction surveys relevant to OPAT. We did not find an instrument that was validated or commonly used. Therefore, we selected an online survey in use by a home infusion provider [11] and modified and expanded the questions for OPAT care based on our experiences in caring for OPAT patients and numerous informal conversations with patients about positive and negative experiences during treatment. Because the survey was undertaken with quality improvement in mind, we focused on problems and barriers to care. We incorporated questions to capture feedback that patients often reported spontaneously in clinic. We piloted the survey in clinic with 3 patients. Feedback from the pilot was used to modify the survey to a mixture of Likert scale and free text response questions. The final instrument contained 15 questions and was administered on paper.

Data Analysis

Patients' characteristics and responses to the satisfaction survey for patients who received care at home and at SNFs were compared using the Fisher exact test for categorical covariates and the Mann-Whitney test (median values) for continuous covariates. We compiled free text responses and categorized them using common themes identified by consensus review. Patient reports of problems or negative experiences were considered to be barriers to patient satisfaction, whereas positive experiences were considered to be facilitators of patient satisfaction.

RESULTS

Participants

Both groups of patients who received care at home and at SNFs were similar in terms of age, sex, race, insurance type, source of infection, hospital LOS prior to OPAT, and total hospital charges (Table 1). In both groups, the median age was in the early 60s with the majority of OPAT patients being male, white, and were on Medicare. Bone and joint infections were the most common source of infection, representing more than 50% of all infections in both groups, followed by bloodstream and endovascular infections.

Table 1. Characteristics of Outpatient Parenteral Antibiotic Therapy Study Population by Site of Care (N = 98)^a

Characteristics	Home Infusion 46 (46.9)	SNF 52 (53.1)	P value
Year			.98
2016	17 (37.0)	18 (34.6)	
2017	29 (63.0)	34 (65.4)	
Age, years (median [IQR])	60.0 [51.2;66.0]	63.0 [50.0;75.2]	.16
Male sex	27 (60.0)	30 (57.7)	.98
Race			.51
White	34 (75.6)	39 (75.0)	
Black	7 (15.6)	11 (21.2)	
Other	4 (8.9)	2 (3.8)	
Insurance			.26
Medicare	18 (40.0)	31 (59.6)	
Medicaid	8 (17.8)	5 (9.6)	
Commercial	17 (37.8)	14 (26.9)	
Other	2 (4.4)	2 (3.8)	
Source of infection			.94
Bone and joint	25 (55.6)	29 (55.8)	
Bloodstream/endovascular	6 (13.3)	9 (17.3)	
Pneumonia	4 (8.9)	4 (7.7)	
Skin and soft tissue	4 (8.9)	4 (7.7)	
CNS	3 (6.7)	1 (1.9)	
Intra-abdominal	2 (4.4)	3 (5.8)	
UTI	1 (2.2)	2 (3.8)	
Hospital LOS prior to OPAT, days (median [IQR]) [*]	8.0 [6.8;11.2]	8.0 [5.0;12.0]	.82
Total hospital charges prior to OPAT, dollars (median [IQR]) [*]	26 677 [17 866;42 091]	26 050 [17 278;44 006]	.89
APR-DRG severity of illness ^b			.01
Minor	5 (12.5%)	1 (2.0%)	
Moderate	13 (32.5%)	15 (30.6%)	
Major	18 (45.0%)	16 (32.7%)	
Extreme	4 (10.0%)	17 (34.7%)	
APR-DRG risk of mortality ^b			.03
Minor	14 (35.0%)	8 (16.3%)	
Moderate	12 (30.0%)	18 (36.7%)	
Major	12 (30.0%)	11 (22.4%)	
Extreme	2 (5.0%)	12 (24.5%)	
OPAT duration			.05
<2 weeks	4 (8.7)	13 (25.0)	
2–4 weeks	12 (26.1)	16 (30.8)	
>4 weeks	30 (65.2)	23 (44.2)	

Abbreviations: APR-DRG, All Patients Refined Diagnosis Related Groups; CNS, central nervous system; IQR, interquartile range; LOS, length of stay; OPAT outpatient parenteral antibiotic therapy; SNF, skilled nursing facility; UTI, urinary tract infection.

^a All values shown are n (%) unless otherwise indicated.

^b For inpatient discharges only.

Patients who started OPAT after an inpatient discharge in both groups had a median hospital LOS of 8 days and their total hospital charges were approximately between \$26 000 and \$27 000.

Home healthcare company patients had statistically significant lower APR-DRG severity of illness scores compared with SNF patients (minor, 12.5% vs 2.0%; moderate, 32.5% vs 30.6%; major, 45.0% vs 32.7%; and extreme, 10.0% vs 34.7%; $P = .01$). Patients of HHC also had statistically significant lower APR-DRG risk of mortality scores compared with SNF patients (minor, 35.0% vs 16.3%; moderate, 30.0% vs 36.7%; major, 30.0% vs 22.4%; and extreme, 5.0% vs 22.4%; $P = .03$) (Table 1).

The difference in OPAT treatment duration was significant with a greater proportion of HHC patients having longer treatment durations, especially longer than 4 weeks (65.2%), compared with SNF patients (44.2% >4 weeks) ($P = .05$).

Overall Differences in Patient Satisfaction by Site of Care

The majority (65.2%) of HHC patients were extremely satisfied with the quality of the services they received compared with 30.8% of SNF patients ($P < .01$). Moreover, the majority of HHC patients reported that they definitely would use the same HHC in the future and that they were likely to recommend it

to a friend, family member, or colleague (69.8% and 71.7%, respectively) compared with 28.3% and 32.7%, respectively, of SNF patients ($P < .01$). In fact, 57.7% of SNF patients reported that they were unlikely to recommend the SNF where they received care to a friend, family member, or colleague (Table 2, Supplementary Figure 1).

Patients of both HHCs and SNFs had comparable levels of satisfactions in terms of the tolerability of the antibiotics (76.1% and 63.3% were happy with the antibiotic itself, respectively; $P = .25$). There was a statistically significant difference regarding satisfaction with the infusion team: 82.6% of HHC patients reported being happy with their home infusion team, compared with 45.8% of SNF patients reporting being happy with their SNF infusion team ($P < .01$).

The majority of HHC and SNF patients felt “great” or “OK” while receiving antibiotics. A greater proportion of HHC patients rated their happiness higher than SNF patients (54.3% vs 36.5%; $P = .24$), but the difference was not statistically significant.

Barriers to Patient Satisfaction

Patients reported numerous problems occurring during their OPAT course that were predicted based on our prior experience (reflected in the multiple-choice questions), and new problems that we did not predict (reflected in the free text response questions).

Although half of all SNF OPAT patients reported having problems during their antibiotic course compared with 37.0% of HHC patients, the difference was not statistically significant. The distribution of concerns reported by OPAT patients differed by site of care, with antibiotic and catheter problems being the most frequently reported problems by HHC patients (47.1% and 41.2%, respectively) compared to 23.1% of patients who reported each of the 2 problems while receiving care at SNFs ($P = .05$). On the other hand, missed doses was the most common problem reported by SNF patients (38.5%) compared with 5.9% of HHC patients ($P = .05$) (Table 2).

Thirty-two patients made 30 comments detailing the negative experiences they encountered during their OPAT care. The vast majority of negative experiences were noted by patients in SNFs ($n = 24$) compared with HHCs ($n = 6$). The comments echoed and expanded upon the problems noted in the previous questions, including missing doses, catheter problems, and antibiotic side effects. However, a number of new issues were raised, including staff not wearing gloves, not changing wound dressings as ordered, and a lack of communication between providers and patients about the plan of care. Patients described feeling ignored and depersonalized, staff not answering call bells in a timely manner, inattention to symptoms, and being “treated as a number.”

Several of the problems experienced during the OPAT course were expected based on our experience, previous studies, and commonly reported issues in the literature, such as catheter complications, treatment delays, and antibiotic side effects. However, our patients commented frequently about how communication and caring expressed during the troubleshooting process either restored or damaged their confidence in the care team. For instance, 1 patient who reported high satisfaction with care had a problem with the catheter leaking. Patients reporting high satisfaction liked how problems were handled, for example, “the visiting nurse and pharmacist responded quickly and skillfully,” “The visiting nurse was not skilled at unclogging. The nursing supervisor came with him and walked him through the steps. I liked this,” and the case manager “was very reassuring and answered all questions and took care of all problems.” In contrast, patients who reported low satisfaction commented that when they had a problem, “no one cared,” “not enough effort was made,” and “nothing was done.”

A Framework for OPAT Patient Satisfaction

In reviewing the literature, we did not find any models of OPAT satisfaction, though there were comprehensive models of OPAT processes [12]. The consensus review of patient comments concluded that the following 5 themes encompassed a majority of the comments and captured main barriers to overall patient satisfaction (Table 3). In order of frequency of patient comments, the important themes were: (1) lapses in medical management ($n = 9$); (2) lapses in communication and organization ($n = 9$); (3) lapses in infection prevention ($n = 6$); (4) lack of attention to symptoms ($n = 3$); and (5) difficulties in the physical environment ($n = 3$). Patients in SNFs had a larger number of complaints about lapses in medical care, infection prevention, and the physical environment than patients who received care at home.

Inferring patient expectations from the survey findings, we concluded that patients expect the following “facilitators of OPAT success” from the team. Using these facilitators, we have developed a set of possible strategies to improve patient-centered OPAT care delivery (Table 4). Successful medical management includes timely administration, appropriate dosing, and monitoring of antibiotics, as well as diagnosis and management of treatment complications. Satisfactory infection prevention includes meticulous catheter care, frequent dressing changes, and rapid diagnosis and control of *Clostridium difficile*. Successful communication includes a staff that quickly responds to patient needs, professionalism and compassion in all interactions, explanations of the plan of care, communication with the hospital OPAT team, and efficient coordination of OPAT logistics including blood draws and appointments. Acceptable symptom management entails assessment and management of pain and other side effects related to infection treatment. A satisfactory physical environment includes a quiet, clean, and well-maintained facility.

Table 2. Patient Satisfaction Survey Responses About Outpatient Parenteral Antibiotic Therapy Course by Site of Care (N = 98)^a

Question	Home Infusion 46 (46.9)	SNF 52 (53.1)	P value
Did you have any problems during your antibiotic course?			.27
Yes	17 (37.0)	26 (50.0)	
If yes, what kind of problems?			.05
Antibiotic problem (side effects)	8 (47.1)	6 (23.1)	
Catheter problems	7 (41.2)	6 (23.1)	
Missed doses	1 (5.9)	10 (38.5)	
Other	1 (5.9)	4 (15.4)	
After your course of antibiotics, how were you feeling about your infection?			.37
Great, the antibiotics cleared my infection 100%	25 (54.3)	26 (50.0)	
OK, the antibiotics seemed to help somewhat	20 (43.5)	21 (40.4)	
Bad, the antibiotics did not work	1 (2.2)	5 (9.6)	
How would you rate your overall happiness while you were receiving antibiotics?			.24
Great, I was happy most days	25 (54.3)	19 (36.5)	
OK, I had some good days and some bad days	19 (41.3)	29 (55.8)	
Bad/depressed	2 (4.3)	4 (7.7)	
How satisfied were you with the facility or home infusion agency's on call system when you had problems or issues?			<.01
Extremely satisfied	35 (76.1)	10 (19.6)	
Moderately satisfied	7 (15.2)	11 (21.6)	
Slightly satisfied	1 (2.2)	6 (11.8)	
Neither satisfied nor dissatisfied	0 (0.0)	10 (19.6)	
Slightly dissatisfied	3 (6.5)	14 (27.5)	
How would you rate the overall quality of the facility or home infusion services that you received?			<.01
Extremely good	30 (65.2)	16 (30.8)	
Moderately good	11 (23.9)	14 (26.9)	
Slightly good	1 (2.2)	7 (13.5)	
Neither good nor bad	2 (4.3)	7 (13.5)	
Slightly bad	2 (4.3)	8 (15.4)	
How likely are you to use that facility or home infusion agency in the future?			<.01
Definitely will	30 (69.8)	13 (28.3)	
Probably will	8 (18.6)	8 (17.4)	
Might or might not	5 (11.6)	12 (26.1)	
Probably won't	0 (0.0)	5 (10.9)	
Definitely won't	0 (0.0)	8 (17.4)	
How likely is it that you would recommend that facility or home infusion agency to a friend, family member, or colleague?			<.01
Likely	33 (71.7)	17 (32.7)	
Neutral	4 (8.7)	5 (9.6)	
Unlikely	9 (19.6)	30 (57.7)	
Please rank your satisfaction with the following element of your outpatient antibiotic experience			
The antibiotic itself (tolerability of the drug)			.25
Happy	35 (76.1)	31 (63.3)	
Neutral	7 (15.2)	15 (30.6)	
Sad	4 (8.7)	3 (6.1)	
Infusion team at the facility or home agency			<.01
Happy	38 (82.6)	22 (45.8)	
Neutral	5 (10.9)	19 (39.6)	
Sad	3 (6.5)	7 (14.6)	

Abbreviations: ID, infectious disease; OPAT, outpatient parenteral antibiotic therapy; SNF, skilled nursing facility.

^a All values shown are n (%).

We propose a 5-part model for OPAT that could help guide programs to patient-centered initiatives to improve overall satisfaction (Figure 1). In the center of the model is overall patient satisfaction, and surrounding it are the 5 themes from our survey that

represent different domains of OPAT delivery. The home icon signals the 3 domains that were highlighted by patients receiving care at home, whereas the SNF icon signals that all 5 domains surfaced as important for patients receiving OPAT in SNFs.

Table 3. Full List of Patient Quotations About Problems They Experienced During Their OPAT Course, Grouped by Theme and Site of Care

Theme	Patient Quotes (Home Healthcare Company)	Patient Quotes (Skilled Nursing Facility)
Lapses in medical management	1. <i>"Wrong dosage given for 3 weeks. Lost hearing as a side effect. It was a sad and terrible experience. Also was told each visit (x3) that the doctor's office had no record of me being a patient."</i>	<ol style="list-style-type: none"> 1. <i>"Sometimes doses were not on time."</i> 2. <i>"Levels weren't therapeutic for approx. 2 weeks of my stay at the NH. Skipped doses due to understaffing."</i> 3. <i>"Medication changes were not discussed with treating provider."</i> 4. <i>"Not receiving meds timely or not at all."</i> 5. <i>"The rehab center did not give him his medicine on Saturday until that evening. He missed 2 doses. His family raised hell with them and reminded them of the importance of not missing doses."</i> 6. <i>"Missed dose; antibiotics could be ordered in rehab only after patient is in the facility, leaving a window of no dose for 24 hours."</i> 7. <i>"On 4/14 thru a body fluid cell count, I had Clostridium difficile. After weeks in rehab, no one knew, then they discovered I had it and put me on meds and isolation. Here it was 2 mths [sic] after the fact, something was done and discovered."</i> 8. <i>"The staff at [SNF] took 2 days to change my wound dressing when it is supposed to be done every day."</i>
Lapses of communication and organization	<ol style="list-style-type: none"> 1. <i>"There were problems getting the home visits by the nurses organized."</i> 2. <i>"Had a couple of questions for the home care nurse but didn't always get a call back."</i> 3. <i>"RN that came out to the home initially was in a rush and did not spend much time explaining things."</i> 4. <i>"First nurse did not report occlusion."</i> 	<ol style="list-style-type: none"> 1. <i>"Sometimes staff didn't answer the call bell for +/- 30 minutes"</i> 2. <i>"LabCorp papers were not completed correctly, proper results were not handled correctly to me, no information, had to keep asking and still many questions need answers?... I have been treated as a number, no one seems interested?? I keep asking questions."</i> 3. <i>"Some staff don't know how to talk to people."</i> 4. <i>"Confusion about appointment. Told to keep appointment, which was 2 days after rehab. I thought I should change the appt to Thursday or Friday because he had nurse Wednesday morning. Found out only Wednesday appt after cancelled. Was fussed out by person on phone for cancelling."</i> 5. <i>"Questions were not clearly answered."</i> 6. <i>"I was given a bladder scan that wasn't even ordered for me."</i>
Lapses in infection prevention		<ol style="list-style-type: none"> 1. <i>"Peripherally-inserted central catheter (PICC) line was not adequately flushed."</i> 2. <i>"Second RN left blood in syringe for over 30 minutes on table before putting in tubes (blood started separating)."</i> 3. <i>"My intravenous dressing hasn't been changed since last Monday. It's dirty and falling off. Nursing staff barely wear gloves. I've been here since Friday night, room hasn't been cleaned. There are no gloves in the room."</i> 4. <i>"Infection set in, culture PICC tip was sent to the lab in the wrong container, follow up is needed... Last year, infection set in had to be removed and inserted in the other arm. NO MORE."</i> 5. <i>"Nursing home kept losing the cap for the PICC line."</i>
Lack of attention to symptoms	1. <i>"I called them a week ago to tell them it hurt but I had to call again to finally get someone to come back."</i>	<ol style="list-style-type: none"> 1. <i>"Not enough effort was made to control diarrhea."</i> 2. <i>"Chronic pain - would like to see pain management doctor. Very rushed and inattentive. Only stays 3 minutes when he sees me, once every 3 weeks."</i>
Difficulties in physical environment		<ol style="list-style-type: none"> 1. <i>"Elevators stayed broke."</i> 2. <i>"It's nasty there."</i> 3. <i>"Too much noise at night."</i>

Interestingly, the domains that we found to be important to patients in our survey closely align with the measures represented in the nationally validated and utilized Consumer Assessment of Healthcare Providers and Systems (CAHPS) surveys [13]. The CAHPS surveys are validated thoroughly and used to evaluate patient experience within acute care hospitals, nursing homes, and home health agencies, so the alignment of our findings with these instruments is encouraging. A comparison of the domains identified by this study for OPAT patients with the domains currently covered by the CAHPS surveys is presented in [Supplementary Table 1](#). Issues with infection prevention seem to be more important to OPAT delivery than to other sites of care.

DISCUSSION

In our study, we found that patients receiving OPAT care at home via HHCs were more satisfied with their care than those receiving care in SNFs. Our survey identified a number of barriers to patient satisfaction and incorporated these into a model for improvement, which is useful for understanding and improving the patient experience for OPAT.

When considering the OPAT process differences in SNFs versus at home using this proposed model, it becomes clear why SNFs have a more difficult time meeting patient expectations. Patients at home have control over their own physical environment, medications for symptom management (in most cases), and are not exposed to other patients with communicable

Table 4. Facilitators of Outpatient Parenteral Antibiotic Therapy Patient Satisfaction and Proposed Change Ideas to Improve Outpatient Parenteral Antibiotic Therapy Patient Satisfaction in Skilled Nursing Facilities

Keep patients at home when possible	<ol style="list-style-type: none"> 1. Advocate for full coverage of home infusion for Medicare patients [7] 2. Develop a shared savings program for OPAT in which hospitals subsidize home infusion services using the savings generated by the OPAT program 3. Develop a self-OPAT program for patients without home infusion coverage [17]
Timely administration of antibiotics	<ol style="list-style-type: none"> 1. Strengthen the pipeline of antibiotic delivery to SNFs 2. Consider sending first doses from the hospital with the patient 3. Develop COE for OPAT, which have expanded antibiotic formularies 4. Monitor delays in antibiotic administration via patient reported surveys or routine audits and provide feedback to facilities
Appropriate dosing and monitoring of antibiotics	<ol style="list-style-type: none"> 1. Ensure rapid access of OPAT pharmacist to patient laboratory values via electronic data portals 2. Measure compliance of laboratory testing and reporting for local SNFs and report back to facility leadership and to patients 3. Establish COE, which have ID pharmacy expertise and rapid access to laboratory results 4. Provide hospital-based OPAT pharmacy resources to SNF providers and pharmacies 5. Establish therapeutic drug monitoring agreements within which OPAT pharmacists can communicate orders on behalf of the OPAT team
Early diagnosis and management of treatment, complications, and symptom management	<ol style="list-style-type: none"> 1. Implement a weekly rounding time (phone or telemedicine) between the OPAT team and a provider at the SNF in order to proactively identify treatment complications 2. Educate patients prior to discharge on signs and symptoms of antibiotic side effects and worsening infection 3. Develop COE with lower patient: nurse staffing ratios for OPAT patients
Communication with the hospital OPAT team	<ol style="list-style-type: none"> 1. Implement a weekly rounding time (phone or telemedicine) between the OPAT team and a provider at the SNF 2. Allow hospital OPAT team electronic access to real time laboratory data for OPAT patients in the SNF 3. Establish standard discharge documentation for all OPAT patients with a thorough plan of care 4. Establish a single phone number for OPAT that patients and SNFs can call with questions or problems 5. Dedicate a liaison to serve as an intermediary between patients and SNFs, such as a program case manager
Infection prevention	<ol style="list-style-type: none"> 1. Monitor line infection rates for OPAT patients in local SNFs and avoid placing patients in high risk facilities 2. Advocate for infection prevention measures and infection rates to be publicly reported to consumers
Staff responsiveness, professionalism, compassion	<ol style="list-style-type: none"> 1. Develop COE with lower patient: nurse staffing ratios for OPAT patients 2. Regularly review patient satisfaction data for local SNFs and share with patients prior to placement 3. Regularly solicit feedback from patients on staff interactions and report to facility leadership 4. Preferentially utilize SNFs with high patient care ratings on Nursing Home Compare^a
Physical environment	<ol style="list-style-type: none"> 1. Conduct annual site visits to local SNFs and report back to patients prior to placement decisions 2. Regularly solicit feedback from patients on facility environment and report complaints to facility leadership 3. Utilize local complaint pathways for nursing home quality when safety issues are identified

Abbreviations: COE, Centers of Excellence; ID, infectious disease; OPAT, outpatient parenteral antibiotic therapy; SNF, skilled nursing facility.

^a<https://www.medicare.gov/nursinghomecompare/search.html>

diseases. On the other hand, patients in SNFs are dependent on the environment and staff to manage their symptoms and prevent transmission of infections. As our data make clear, achieving high patient satisfaction in a SNF environment remains challenging because SNFs have to replace the home environment and provide ongoing care to large numbers of complex patients simultaneously.

We also considered that a patient's severity of illness might have had an impact on their overall satisfaction, which could partially explain why SNF patients had lower satisfaction (because SNF patients had higher APR-DRG severity and risk of mortality scores compared with HHC patients). However, previous research has demonstrated that complex patients with high burdens of chronic illness are not necessarily less satisfied with their care. Rather, their satisfaction is related to the support systems in place that help them manage their illnesses [14]. In addition, the types of negative experiences detailed by SNF patients, such as poor hand hygiene and inattentive staff, would not be expected to differ based on the level of illness of the patient.

Using this model and also the experience from our institutional OPAT program, we generated a series of change ideas

that could help improve the overall patient experience in OPAT care. Some of these change ideas are within the scope and control of hospital-based OPAT programs and should be low hanging fruit for programs with adequate institutional support. However, many of the changes needed to improve OPAT care require ongoing engagement with community partners in the home health and long term care sector or national policy changes that are beyond the reach of single institutions.

On a local level, hospital leadership within our care management department has taken a great interest in preventing readmissions to our hospital for all patients in post-acute care, including OPAT patients. Our leaders have invested in a local OPAT program that has resulted in significant headway in streamlining communications processes, medical decision making, and outcomes for OPAT patients [9]. Our leadership subsequently spearheaded a regional post-acute care collaboration in order to bring together medical directors, administrators, and executives to discuss issues of quality. The initial collaborative is mostly focusing on SNFs, though some HHC stakeholders attend meetings. A subgroup of this collaborative has been tasked with developing



Figure 1. A proposed model of the 5 domains contributing to overall Outpatient Parenteral Antibiotic Therapy patient satisfaction at home (home icon) and in skilled nursing facilities (SNF icon).

local “Centers of Excellence” (COEs) for OPAT care in order to operationalize many of the change ideas presented in Table 4. The core principle behind COEs is that a hospital’s investment of time, money, and expertise into a small number of nearby facilities will return more efficient and quality care for our OPAT patients.

The COE process started by establishing OPAT accountability metrics for local SNFs, and this includes OPAT volume, compliance with laboratory testing, and clinic visits. Metrics are fed back to medical directors on a monthly basis in an effort to foster accountability and transparency. We then identified 3 local facilities who are interested in becoming COEs for OPAT. The next step is to establish standards and expectations for COEs around medication delivery, catheter care, wound care, communication, treatment of substance use disorders, and clinic visits. Reaching agreement on these expectations has proven challenging given the financial limitations that SNFs face given the bundled payment structure of long-term care. Creative avenues for shared risk and reward between hospitals and SNFs are needed.

A limited number of studies have assessed OPAT patient satisfaction comparing HHCs and SNFs. Our study provided an in-depth comparison of OPAT patient satisfaction across the HHC and SNF settings, including barriers to and facilitators of patient satisfaction during OPAT. Additionally, we propose 1 of the first OPAT patient satisfaction models. Nevertheless, our study has several limitations. First, the small sample size and having the survey only in English limit the generalizability of our findings. We did not survey patients treated in infusion centers or dialysis centers, who represent a small but important element of OPAT.

We did not capture all OPAT patients treated during this time period and focused on patients seen in clinic; hence, we may have missed patients who were too ill to come to clinic or in other ways were different from those we surveyed. Also, although we were able to obtain several important factors related to patients’ conditions, we were not able to measure factors that could be potentially relevant such as social support and financial ability.

The issue of patient choice is central to informed consent and shared medical decision making, but the current state of OPAT in the US makes informed choice very difficult for patients. First, there is a paucity of outcome data for HHC and SNF OPAT programs. Second, infection prevention metrics for HHCs and SNFs, such as bloodstream infections and *C. difficile* rates, are not publicly available as they are for acute care hospitals. Data related to catheter complications for patients at home are also relatively common [15], which may account for some payor hesitancy around covering infusion services at home. The lack of data on these important OPAT measures limit the ability of patients, providers, and payors to choose the best option. However, previous studies have highlighted the frequency of line complications both at home and in SNFs. Third, home infusion coverage is variable or poor for certain insurance plans, including Medicare. The issue of home infusion coverage has implications both for OPAT outcomes and patient satisfaction. Data from our previous studies demonstrate that patients going to SNFs have a higher risk of being lost to follow-up, having line-related adverse events, and being readmitted to the hospital within 30 days than patients treated at home [9, 16]. These findings, and the patient satisfaction data from this study, raise the possibility that Medicare’s decision not to cover home infusion services for OPAT is not in the best interest of patients.

Patient satisfaction is higher for patients receiving OPAT at home than those receiving OPAT in a SNF. Hospital-based OPAT programs need to advocate for ways to keep patients at home when possible and also partner with HHCs and SNFs to improve the overall care of OPAT patients.

Supplementary Data

Supplementary materials are available at *Open Forum Infectious Diseases* online. Consisting of data provided by the authors to benefit the reader, the posted materials are not copyedited and are the sole responsibility of the authors, so questions or comments should be addressed to the corresponding author.

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