

# Patient-Reported Outcomes for Understanding of Instructions and Success Rates in the 65+ Age Group Receiving Home-Based Outpatient Parenteral Antimicrobial Therapy (OPAT)

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## ABSTRACT

### Background

Patients in the 65+ age group and those receiving outpatient parenteral antimicrobial therapy (OPAT) in the home setting are increasing. There is a void in research that investigates OPAT satisfaction and outcomes in the 65+ age group. To better serve the home infusion needs of this population, an investigation of the patient's OPAT success rate and understanding of home infusion instructions is needed. The purpose of this study is to determine if differences exist between OPAT patients aged 18-64 and 65+ in their understanding of home infusion instructions and their therapy success rate.

### Methodology

Study data was obtained from the National Home Infusion Foundation (NHIF) database, including data from the NHIF-validated patient satisfaction survey and status at discharge benchmarking project. Five questions about the patient's understanding of instructions are part of the satisfaction survey. Status at discharge data was used to determine OPAT success since therapy completed, unplanned hospitalizations, and adverse drug reaction (ADR) data were collected. Data analysis included determining if a significant difference ( $p \leq .05$ ) exists between the 18-64 and 65+ age groups.

### Results

Forty-five home infusion providers submitted 3,262 OPAT patient satisfaction surveys, while 15 submitted 4,360 OPAT status at discharge patient cases to the NHIF database. The composite score for the 5 Yes/No questions that assessed the patient's understanding of instructions was 98.45%. The only significant difference detected by the Fisher's Exact Test between the 2 age groups was the response to the question about the patients' understanding of how to wash their hands. "Therapy completed" status at discharge from home infusion accounted for 90.11% of the OPAT 65+ year old patients. The rate of ADRs in the 65+ patient population was 0.25%, while the 18-64 age group rate was higher at 0.42%. Conversely, the unplanned hospitalization rate was higher in the 65+ age group (4.79%) than in the 18-64 age group (3.28%). The results of the Chi-Square analysis indicate a significant difference ( $p=.027$ ) between the 2 age groups and status at discharge.

### Discussion

The patient-reported data collected by NHIF reveals a significant difference ( $p=.009$ ) between the 18-64 age group and older adult (65+) in their understanding of how to wash their hands with the 18-64 age group having a better understanding of the task. When calculated as a composite score, 98.45% of older adults report understanding the instructions provided on how to wash their hands, store medications, care for the IV catheter, administer the IV therapy, and use the equipment.

Significant differences exist ( $p=.027$ ) in the status at discharge between adults 65+ and those 18-64. Older adults are less likely to have an ADR but are more likely to be discharged from home infusion due to an unplanned hospitalization. This difference can be attributed to the higher clinical acuity and co-morbidities associated with increased age. Even so, 90.11% of the patients age 65+ successfully completed OPAT therapy.

### Conclusions

An aging population in the U.S. is driving increased use of home-based OPAT in adults 65+. This study confirms that most older adults understand the instructions related to performing home infusion tasks. While over 90% of older adults in this study were successful in completing their home-based OPAT therapy and had a lower rate of ADRs, there was a significant difference in patients 65+ when compared to patients 18-64 years of age in the reasons for discontinuing home-based OPAT, including higher rates of unplanned hospitalization.

**Keywords:** Home infusion, outpatient parenteral antimicrobial therapy (OPAT), 65+, patient instructions, adverse drug reaction (ADR), therapy complete, unplanned hospitalization

## Background

One of the fastest growing age groups in the United States is 65 years and older.<sup>1</sup> This age group grew by over one-third (34.2% or 13,787,044) during the past decade, and by 3.2% (1,688,924) from 2018 to 2019.<sup>1</sup> It is surmised that the U.S. will experience further growth in this age group for many decades due to the baby boom cohort that began turning 65 years old in 2011.<sup>2</sup> With age comes a decline in health status with 22.2% of this age group who are non-institutionalized in fair or poor health.<sup>3</sup>

Of the Americans 50 and older, 76% prefer to remain at home as they age, and when health issues arise, most patients prefer to recover at home compared to receiving care in a facility setting.<sup>4</sup> Infectious disease physicians report that home is the most common site of care for outpatient parenteral antimicrobial therapy (OPAT) in the U.S. followed by skilled nursing facilities.<sup>5</sup> No studies have been conducted to discern how decisions are made when selecting the site of care for OPAT for older adults. Most patients are referred for OPAT after a brief hospitalization. Factors that influence site of care decisions are presumed to be financial support from the insurance payer, ability to manage the therapy at home (i.e., ability to self-administer medications, having a safe home environment and a capable informal caregiver), concomitant need for physical rehabilitation, and patient preference.

Despite the lack of a comprehensive benefit for home-based OPAT under the Medicare program, the percentage of home-based OPAT patients that comprise the 65+ age group has grown from 23% in 2010 to 30% in 2020.<sup>6</sup> The National Home Infusion Foundation (NHIF) speculates that increasing enrollment in Medicare Advantage is a primary driver of this trend as these plans are more likely to offer a home infusion benefit.

As documented, a growing number of patients in the 65+ age group receive OPAT in the home setting. A literature review shows a void in research that investigates OPAT satisfaction and outcomes in the 65+ age group. To better serve the home infusion needs of this population, there is a need to investigate the OPAT 65+ age group's success rates and satisfaction with their home infusion experience. Given that the patient's home infusion success is

often related to their understanding of instructions, this study investigates patient-reported outcomes pertaining to how well they understood instructions for performing critical home infusion-related tasks. The purpose of this study is to determine if differences exist among levels of understanding of home infusion instructions, and success rates in the OPAT 65+ age group when compared to the 18–64-year-olds. The information gained from this study will assist in better understanding and serving the 65+ age group.

## Methodology

The NHIF administers national data collection and benchmarking programs to assess patient satisfaction, hospital readmission rates, and patient status at the end of home infusion therapy.<sup>7</sup> These programs are based on a need to monitor the home infusion patient experience and outcomes. Home infusion provider locations participate in these programs voluntarily by submitting their patient data quarterly using a formatted data entry Excel® file and participant guide. Additionally, provider locations must use the standardized definitions associated with each program. Provider confidentiality is maintained, and all patient data is de-identified before entry into the formatted data entry file. For this reason, the study protocol was exempt from institutional review board (IRB) review. The data used in this investigation was derived from the 2021 patient satisfaction surveys and status at home infusion discharge data submitted to NHIF. Status at discharge data was used to determine OPAT success because therapy completed, unplanned hospitalizations, and adverse drug reactions (ADRs) are all standard variables used in the medical arena to measure patient success.<sup>8</sup>

### *Patient Satisfaction*

In 2018, using Delphi methodology, home infusion patient satisfaction survey questions and response options were written by the NHIF using a 15-member home infusion expert panel to validate and establish consensus for the questions. Test-retest method of assessment for reliability was also implemented ( $r=0.90$ ). The final survey includes 12 questions with 22 data points.<sup>9</sup> Five of the survey data points pertain to the patient's understanding of instructions and used a Yes/No/NA response option. Data from these questions were used in this study.

FIGURE 1  
Status at Discharge Variables and Definitions

Discharge Variable	Definition
Therapy complete	Applies when a physician discontinues the home infusion therapy because the patient has achieved sufficient clinical improvement and/or met the goals in the plan of care.
Patient expired	Patient expired (unrelated to the infusion therapy)
Unplanned hospitalization	When a patient requires an unplanned, inpatient admission to an acute care facility for any reason.
Change in home infusion eligibility	Includes, but is not limited to unsafe home environment, no available caregiver, affordability, patient choice, unable to comply with treatment.
Insufficient response/ complication	Applies when the patient stops treatment due to an exacerbation of disease or non-response to therapy.
Adverse drug reaction (ADR)	An undesirable response, other than a known side effect, that compromises efficacy and causes toxicity.
Access device related	When 1 of the following results in discontinuation of therapy: migration, dislodgement, occlusion, phlebitis, skin integrity impairment, infection, damage, breakage, or thrombosis.
Change infusion provider	When the patient changes their infusion provider for any reason.
Other	All reasons that cannot be otherwise classified.

Providers participating in this data program were required to use the NHIF validated patient satisfaction survey instrument and validate their sample populations, ensuring that survey data was only collected for a defined population of patients who received infused therapies at home. Patients represented in this study were either: 1) discharged patients who were active to the home infusion provider for 7 or more days and received at least 1 infusion treatment at home, or 2) active home infusion patients who had been on service for at least 6 months.

#### *Patient Status at Discharge from Home Infusion Therapy*

A research team comprised of professionals with experience in home infusion nursing, pharmacy, and administration was established. After reviewing the literature and discussion, the research team determined 9 “status at discharge” variables and definitions that would be used to describe the reason for discontinuing home infusion services (Figure 1).

#### Analysis

Since this study focuses on comparing OPAT patients in the 65+ age group with patients in the 18-64 group, data from patients under 18 years of age and those representing other therapy types was deleted from the study data sets before analysis, as shown in Figures 2 and 3.

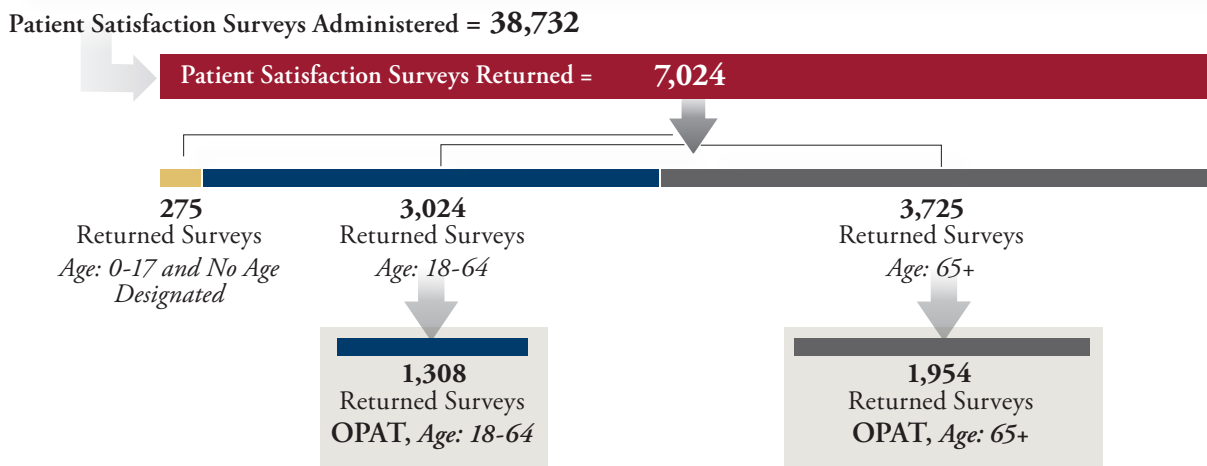
#### *Patient Satisfaction Survey*

The frequency and percentage of patients who selected each response option were determined for questions about the patient’s understanding of instructions. Fisher’s Exact Test was conducted to determine if a significant difference existed between the 2 age groups and the responses to the survey questions.

#### *Status at Discharge*

The percentage of 18-64 and 65+ OPAT patients discharged for the following reasons was calculated: therapy completed, unplanned hospitalization, ADR, access device related, and other, which included

FIGURE 2  
Patient Satisfaction Survey OPAT Sample



patient expired, change in home infusion eligibility, insufficient response/complication, and change infusion provider. Using Chi-Square analysis, the 18-64 and 65+ age group data were compared to determine if there was a significant difference. Frequency and percent were also determined for each discharge reason.

## Results

### Patient Satisfaction

In 2021, the 45 home infusion providers administered 38,732 patient satisfaction surveys with 7,024 returned for a return rate of 18.13%. Of the surveys, 3,725 were from patients 65 or older, of which 1,954 were from OPAT patients. OPAT patients 18-64 years of age

had 1,308 surveys returned. As shown in Figure 2, the 1,308 surveys from the 18-64 age group and the 1,954 surveys from the 65+ OPAT patients were used for the patient experience (satisfaction) portion of this study which also included questions about the patient’s understanding of instructions.

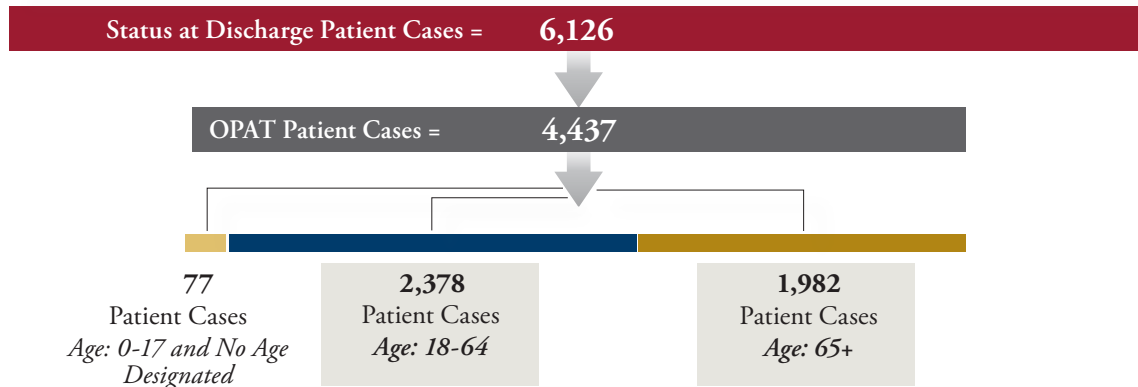
Of the 65+ OPAT patient cases, the mean patient age was 74.84 (SD=6.89), with the oldest being 98 years old. Males represented 60.63% of the population, while females were 39.37%. For the 18-64 age group, the mean age was 53.98 (SD=9.97) years, with males and females representing 55.86% and 44.14%, respectively.

TABLE 1  
Age Group Comparison of Response to Patient Understanding of Instructions

Survey Question	18-64 Age Group (n=1,308)		65+ Age Group (n=1,954)		Fisher’s Exact Test
	Yes%	No%	Yes%	No%	
I understood the instructions provided for how to wash my hands.	99.43	0.57	98.46	1.54	<i>p</i> =.009
I understood the instructions provided for how to give home infusion medication(s).	99.29	0.71	98.78	1.22	<i>p</i> =.116
I understood the instructions provided for how to care for the IV catheter.	98.54	1.46	98.20	1.80	<i>p</i> =.293
I understood the instructions provided for how to store the home infusion medication(s).	99.38	0.62	99.31	0.69	<i>p</i> =.506
I understood the instructions provided for how to use the home infusion pump.	98.31	1.69	97.52	2.48	<i>p</i> =.203
Composite Score for “Understanding Instructions”	98.99	1.01	98.45	1.55	

FIGURE 3

Status at Discharge OPAT Patient Sample



The 5 patient satisfaction survey questions that assessed the patient’s understanding of home infusion instructions are shown in Table 1. The Fisher’s Exact Test revealed a significant difference in the patient responses between the 2 age groups in 1 patient “understanding of instructions” question, “I understood the instructions for how to wash my hands.” The results suggest that patients in the 18–64 age group better understood the hand washing instructions than the 65+ patients.

*Status at Discharge*

Sixteen home infusion providers submitted 6,126 patient cases to NHIF for the status at discharge from home infusion therapy project. Of these cases, 4,437 were OPAT patients. Of the OPAT patients,

1,982 were in the 65+ age group, and 2,378 were in the 18–64 group, as shown in Figure 3.

The mean patient age for the 65+ age group was 75.07 (SD=7.47), with the oldest patient being 101 years of age. “Therapy completed” status at the time of discharge from a home infusion service accounted for 90.11% of the OPAT 65+-year-old patients, followed by “unplanned hospitalization” (4.79%). Table 2 provides a comprehensive breakdown of the status at discharge for the 18-64 and 65+ study cases. The rate of ADRs as a reason for discontinuation of home-based OPAT in the 65+ patient population was 0.25%, while the 18-64 age group rate was higher at 0.42%. Conversely, the unplanned hospitalization rate was higher in the 65+ age group (4.79%) than

TABLE 2  
Patient Status at Discharge by Age Group

		Age Group		
		18-64	65+	Total
Therapy completed	Count	2,194	1,786	3,980
	% within Age Group	92.26	90.11	91.28
Unplanned hospitalization	Count	78	95	173
	% within Age Group	3.28	4.79	3.97
ADR	Count	10	5	15
	% within Age Group	0.42	0.25	0.34
Access device related	Count	15	9	24
	% within Age Group	0.63	0.45	0.55
Other	Count	81	87	168
	% within Age Group	3.41	4.39	3.85
Total	Count	2,378	1,982	4,360
	% within Age Group	100.00	100.00	100.00

There is a significant difference ( $p=.027$ ) between the age groups and status for discharge.

in the 18-64 age group (3.28%). The results of the Chi-Square analysis indicate a significant difference ( $p=.027$ ) between the 2 groups and status at discharge from home infusion therapy.

## Discussion

The home-based OPAT process is methodical and follows a standard of care, resulting in a high success rate. The process begins with assessing the patient's eligibility and setting expectations for home-based therapy. These steps often precede hospital discharge and primarily involve the physician and personnel responsible for facilitating the transition of care from hospital to home. Hospital and home infusion staff can be involved in this process; however actual procedures vary and depend on the companies involved.

Nurses are an integral part of the home-based OPAT process, with one of their goals to teach the patient how to self-administer the IV medications. The purpose of the initial nursing visit is to assess the patient and home environment; provide instruction on medication storage, equipment use, and self-administration; and teach patients how to care and aseptically maintain the patency of the IV catheter. The number of nursing visits required to reach patient/caregiver independence with self-administration of medications varies and depends on individual patient acuity and the complexity of the administration method. Follow-up nursing visits are performed (usually weekly) to assess the patient's progress, draw labs, and perform sterile dressing changes for the IV catheter. Between nursing visits, a series of actions will usually involve the patient visiting the prescriber, the home infusion pharmacist reviewing lab results, and communicating with the nurse, patient, and caregivers. These actions assist in evaluating whether the goals of therapy are being met. Based on assessments and lab results, pharmacists will propose interventions to the prescriber to modify the plan of care when necessary. Protocols for managing home-based OPAT vary across practice settings, and the level of communication and coordination fluctuates based on physician preferences. Assessing patient understanding of home infusion tasks and instructions is a means of evaluating the teaching methods and the effectiveness of the transition of care process.

The patient-reported data reveals a significant difference ( $p=.009$ ) between the 18-64 age group and older adults (65+) in their understanding of how to wash their hands with the 18-64 age group having a better understanding of the task. However, when calculated as a composite score, 98.45% of older adults (mean age 74.84,  $SD=6.89$ ) served by 45 pharmacy-based home infusion providers report understanding the instructions provided on how to wash their hands, store medications, care for the IV catheter, administer the IV therapy, and use the equipment. Based on these findings, the existing methods and collaborative approach by physicians and hospital discharge and home infusion personnel for identifying eligible patients for home-based OPAT appear to be effective in selecting and referring patients capable of managing home-based OPAT.

Significant differences exist ( $p=.027$ ) in the status at discharge from home infusion services between adults over age 65 and adults between the ages of 18-64. Older adults (mean age 75.07,  $SD=7.47$ ) are less likely to have an ADR. Still, they are more likely than younger adult patients to be discharged from home infusion services due to an unplanned hospitalization (4.79% vs. 3.28%) or for other reasons such as insufficient response, change in eligibility, or expiring while on service. This difference is attributed primarily to the higher clinical acuity and potential for co-morbidities associated with increased age. Even so, 90.11% of the 1,982 home-based OPAT patients age 65+ in this study successfully completed OPAT therapy according to prescriber orders and exhibited the desired amount of clinical improvement at the time of discontinuation of therapy.

## Limitations

Home-based antimicrobial therapy is one of several types of home infusion therapies. This study focused on home-based OPAT patients; thus, the study results should only be generalized to this therapy type. Even though the NHIF patient satisfaction survey used in this investigation is a valid and reliable instrument, there are limitations to survey methodology. First, due to a response rate of 18.13%, there is the possibility of non-response error. Specifically, it is unknown if the respondent's results would be similar to those of the non-respondents. Furthermore, respondents may not be 100% truthful with their answers for various reasons. Survey methodology is the most used method to measure patient satisfaction and collected patient-reported outcomes. The data used for the status at discharge section of

this study included 4,360 patient cases. However, the data was from only 15 unique provider locations. The generalizability of the data might be questioned even though the sample size is adequate.

## Conclusions

An aging population in the U.S. is driving increased utilization of home-based OPAT in adults 65 years of age and older. This study confirms that most

older adults understand the instructions related to performing home infusion tasks. While over 90% of older adults in this study were successful in completing their home-based OPAT therapy and had a lower rate of ADRs, there was a significant difference in adults over age 65 when compared to patients 18-64 years of age in the reasons for discontinuing home-based OPAT, including higher rates of unplanned hospitalization.

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