Retrospective cohort analysis of outcomes in patients receiving outpatient parenteral antimicrobial therapy (OPAT)

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BACKGROUND

- OPAT is a unique therapeutic option that allows patients to undergo antimicrobial therapy over an extended period in a setting outside of a clinic or hospital.
- If implemented appropriately, OPAT can shorten inpatient stays, reduce incidence of hospital-acquired conditions, and cut down on costs.
- Intravenous antimicrobials administered through OPAT are associated with more significant adverse effects than oral agents and often require frequent lab monitoring and follow-up.
- Previous data collected from our academic hospital point to the transition period from inpatient to outpatient care as a key target for preventing complications associated with OPAT, specifically those requiring unscheduled medical care.

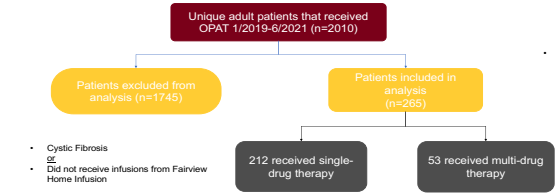
OBJECTIVE

- Characterize the rate at which patients receiving OPAT experience adverse drug events (ADE), Vascular access device (VAD) complications, OPAT-related unscheduled medical care, and clinical failure.

METHODS

- Retrospective cohort study of 265 adult patients that received OPAT from Fairview Home Infusion Services (FVHI) from one academic hospital in Minneapolis, MN
  - Patients were included if they received OPAT from FVHI due to increased likelihood of finding record of clinical follow-up via chart review
- Patient data were collected from electronic records using a standardized REDCap instrument
- Pairwise comparisons were conducted via the Fisher's exact test
- Multivariable logistic regression models were generated to determine predictor variables associated with VAD complications, ADEs, OPAT-related ED visits/rehospitalizations, and clinical failure
  - Mild (transient, requiring no intervention), moderate (alleviated with simple treatment) and severe-serious ADEs (requiring hospitalization and/or associated with potentially life-threatening conditions)
  - OPAT-related unscheduled care had a reason for encounter associated with ADE, VAD complication or clinical failure
  - Forward stepwise variable selection was used based on Akaike's information criterion (AIC)
  - Predictor variables (**Table 1**) identified in both procedures as informative were included in final logistic regression models, fit using Firth's penalized method to account for quasi-complete separation
- Analyses conducted with R versions 4.1.1 and 4.0.4 (R Foundation for Statistical Computing)

Figure 1. Study design



RESULTS

Table 1. Characteristics and outcomes of study population of 265 patients

Subject characteristics	Number (%)
Age (y) (median [IQR])	51.2 [37.9, 62.0]
Male sex	137 (52.1)
BMI category	
Normal	75 (28.3)
Overweight	56 (21.1)
Obese	84 (31.7)
Missing	50 (18.9)
Vascular access device type	
PICC	235 (88.7)
Other	30 (11.3)
CCI (median [IQR])	3.00 [1.00, 6.00]
LOS days (median [IQR])	6.00 [4.00, 9.00]
Planned weeks of OPAT, SD	2.00 [2.00, 6.00]
Multi-drug OPAT therapy	53 (20.0)
≥1 OPAT indication	43 (16.2)
OPAT indication involves infection at the site of a prosthesis	51 (19.8)
OPAT indication involves infection at the site of a malignancy	33 (12.8)
Penicillin allergy	25 (9.4)
OPAT indication	
Bacterial CNS infection	9 (3.4)
Bacterial pneumonia	16 (6.0)
Bloodstream infection, including candidemia	89 (33.6)
Bone or joint infection	46 (17.4)
Endocarditis	13 (4.9)
Fungal infection, excluding candidemia	14 (5.3)
Genitourinary infection	31 (11.7)
Intra-abdominal infection	36 (13.6)
Other	15 (5.7)
Skin or soft tissue infection	42 (15.8)
Viral infection	8 (3.0)
OPAT agent	
Aminoglycoside	1 (0.4)
Azole	1 (0.4)
Beta-lactam/beta-lactamase inhibitor	15 (5.7)
Carbapenem	51 (19.2)
Cephalosporin	141 (53.2)
Echinocandin	2 (0.8)
Lincosamide	2 (0.8)
Lipopeptide	27 (10.2)
Monobactam	1 (0.4)
Nitroimidazole	1 (0.4)
Nucleoside analog	2 (0.8)
Penicillin	15 (5.7)
Pyrophosphate analog	6 (2.3)

RESULTS

- A total of 56 (21%) patients experienced a VAD complication. A total of 82 (31%) patients experienced an ADE of any severity, and 46 (17%) patients experienced an ADE that was moderate/severe/serious.
- A total of 58 (22%) patients had an OPAT-related 90-day ED visit, and 53 (20%) patients were rehospitalized within 90-days for an OPAT-related cause. Clinical failure during OPAT occurred in 15 (6%) patients.

Table 2. Multivariable logistic regression analysis of factors associated with VAD complication, Any ADE, OPAT-related emergency department (ED) visits, rehospitalizations, and clinical failure.

	OR	95% CI	p-value
VAD Complication			
Multidrug vs. single drug therapy	2.97	1.38 – 6.41	<0.01
Adequate vs. inadequate documentation	0.31	0.14 – 0.65	<0.01
Infection at the site of malignancy	0.45	0.11 – 1.40	0.18
BMI, overweight vs. normal	1.74	0.62 – 5.05	0.30
BMI, obese vs. normal	3.11	1.28 – 8.20	0.01
BMI, missing vs. normal	1.25	0.38 – 3.91	0.71
Any ADE			
Adequate vs. inadequate documentation	2.33	1.08 – 5.38	0.03
OPAT indication: CNS infection	5.07	1.14 – 25.44	0.03
OPAT agent: lipopeptide	5.14	2.47 – 10.99	<0.01
OPAT-related 90-day ED visits			
Vascular access device complication	2.73	1.15 – 4.86	0.02
OPAT indication: skin/soft tissue infection	0.26	0.08 – 0.72	<0.01
Adverse drug event	2.19	1.13 – 4.22	0.02
OPAT-related 90-day rehospitalization			
Vascular access device complication	1.85	0.82 – 4.07	0.14
OPAT indication: skin/soft tissue infection	0.30	0.07 – 0.87	0.03
Adverse drug event	3.21	1.59 – 6.58	<0.01
Clinical failure during OPAT			
Vascular access device complication	4.91	1.53 – 16.18	<0.01
Length of stay	0.86	0.68 – 1.02	0.18
Penicillin allergy	0.29	0.00 – 2.50	0.32
OPAT indication: genitourinary infection	0.21	0.00 – 1.73	0.18

CONCLUSIONS

- Patients in the study cohort frequently required unscheduled care for reasons related to OPAT. Specifically, rates of unscheduled care were highest among patients that experienced adverse drug events or VAD complications during OPAT.
- This data emphasizes the need to optimize the selection of antimicrobial agent and duration for OPAT to reduced OPAT-related adverse events and unscheduled care.

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