Comparison of Outpatient Antimicrobial Therapy (OPAT) in a Physician Office Infusion Center (POIC) *vs.* Traditional Home Health Care (HHC)

Infectious Disease Associates

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Abstract (rev.)

Background: OPAT allows patients (pts) with moderate to severe infections who do not require hospitalization to complete treatment using a POIC or traditional HHC. Safety and efficacy in both settings has previously been reported. Objective parameters in both settings as well as hospital (hosp) admissions were evaluated based on location of care.

Methods: Medical records of 3 Infectious Disease (ID) practices for pts treated with OPAT from Oct 1 to Dec 31, 2013 were reviewed. Data extracted were demographics, diagnosis, comorbidities, antimicrobial usage, length of therapy (LOT), pathogens, laboratory monitoring, follow-up visits with ID physician and 30-day hospital admission rates. Significant differences were determined using Chi square or Fisher's exact test (p ≤ 0.05 significant).

Results: 172 pts in the POIC group were compared to 23 pts in the HHC group. The most frequent diagnosis in POIC was skin and soft tissue infections (SSTIs, 51%), respiratory (7%) and intra-abdominal (7%) infections; in HHC was SSTI (39%), osteomyelitis (22%) and septic arthritis (13%). Overall LOT was 28 and 26 days for the POIC and HHC group, respectively. Predominant antibiotics in POIC vs. HHC pts were vancomycin (34% vs. 26%), ceftriaxone (23% vs. 30%) and cefazolin (20% vs.17%). Polymicrobial pathogens were reported for 15/140 pts in the POIC group and 5/21 pts in the HHC group. Laboratory monitoring was performed as ordered for 95% of POIC pts in contrast to 70% of HHC pts (p<0.001). 96% of POIC pts complied with scheduled follow-up physician visits as opposed to 53% of HHC pts (p<0.001). Hosp admissions within 30 days of OPAT were reported for 13 POIC pts (7%) compared to 4 pts in the HHC group (17%, p=0.03). POIC admits included 5 worsening infections (3%), 2 catheter complications (1%), and 4 conditions unrelated to infection (2%). In contrast, the HHC group had one worsening infection (4%), 2 unrelated to infection (9%) and one endocarditis pt (4%) was admitted with dehydration, who eventually expired due to multi-organ system failure.

Conclusion: OPAT through POIC offers a closely supervised setting with significantly higher compliance of laboratory monitoring and follow-up physician visits accompanied by a significantly lower 30-day hospital admission rate compared to the HHC setting.

Introduction

OPAT can be delivered through different modalities depending on availability and pt needs [1-3]. Traditional HHC provides nursing services in the pt's home in order to provide infusion medication and assess health progress [4]. A POIC is supervised by an ID-physician with the support of nursing staff and pharmacist to provide pt-centered infusion therapy, outcome assessment and standardized care [2, 5]. The POIC setting may allow for more consistent monitoring and follow-up as well as lower hosp admission rates than HHC [3-5]. To date, there is limited literature available comparing OPAT provided by POIC and HHC.

This study provides a multicenter comparison of objective parameters and hosp admission rates from POIC vs. HHC pts deriving from the same ID-practice.

Methods

A retrospective chart review from 3 ID-practices was conducted on pts receiving OPAT through either POIC and HHC from Oct 1 to Dec 31, 2013.

❏ Demographic characteristics of POIC vs. HHC were compared using mean ± SD or median and range and the two-tailed Fisher's exact test with statistical significance defined as p ≤ 0.05.

❏ Categorical variables (diagnosis, length of treatment, antimicrobial usage, culture results where available, frequency of labs ordered and obtained, number of ID-physician visits scheduled and attended, number of emergency department (ED) visits and 30-day hospital admissions) are presented as numbers and percentage of pts within each group. Significant differences between POIC and HHC group were determined using Chi square and Fisher's exact test with p ≤ 0.05 defined as significant.
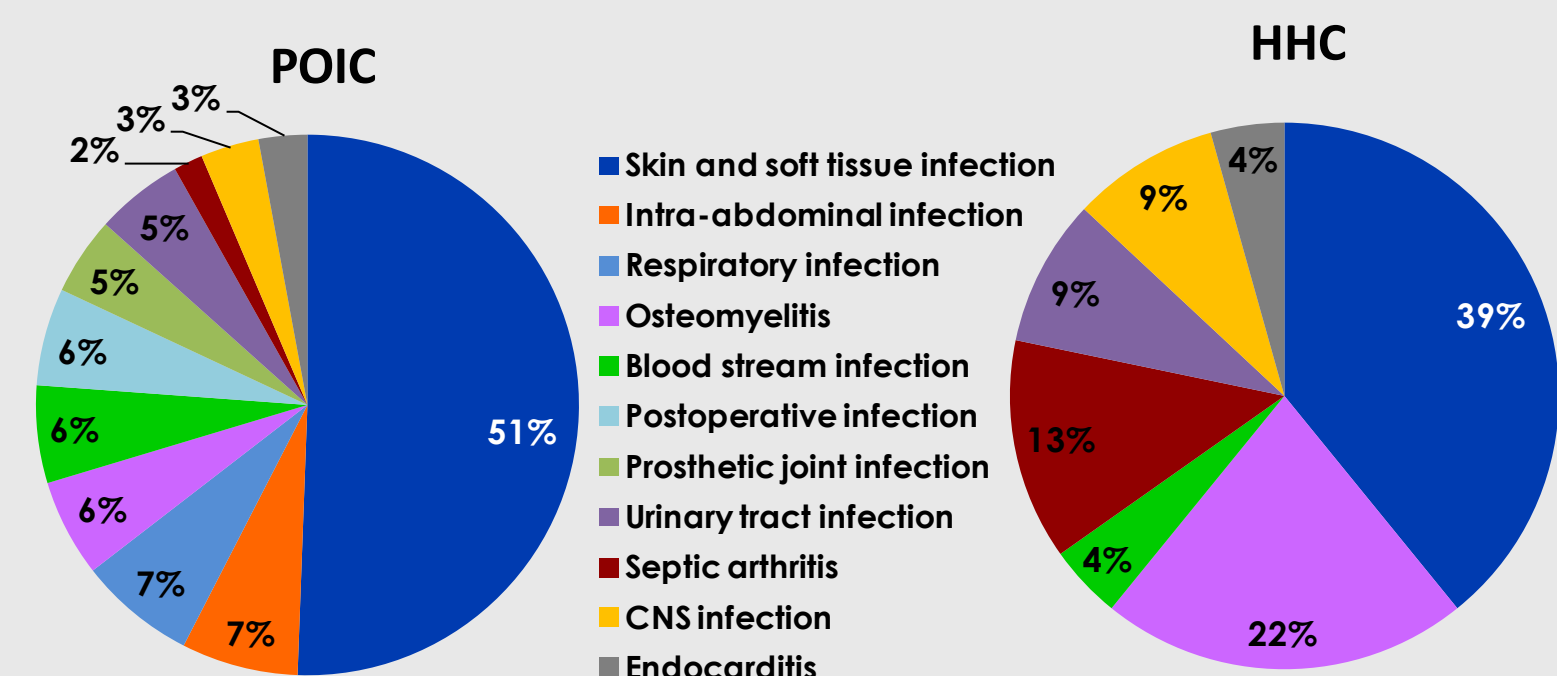
Results

Demographics

Patient Characteristics	POIC (n=172)	HHC (n=23)	p value
Gender, No. of pts (%)			
Female	68 (40%)	12 (52%)	0.550
Age, years			
Mean (Range)	57.9 (16-93)	54.4 (28-75)	0.278
Comorbidities, No. of pts (%)			
Body Mass Index ≥ 30[1]	71 (41%)	15 (65%)	0.255
Endocrine dysfunction[2]	87 (51%)	18 (78%)	0.219
Hypertension	77 (45%)	6 (26%)	0.291
Musculoskeletal disease	62 (36%)	6 (26%)	0.654
Cardiovascular disease	49 (29%)	3 (13%)	0.308
Diabetes mellitus	46 (27%)	5 (22%)	0.808
Neoplasms[3]	46 (27%)	1 (4%)	0.055
Pulmonary disease	40 (23%)	2 (9%)	0.267
Psychiatric disorder	36 (21%)	5 (22%)	1.000
Comorbidities per patient (%)			
0	13 (8%)	0 (0%)	0.369
1	24 (14%)	7 (30%)	0.148
2	29 (17%)	6 (26%)	0.406
≥ 3	106 (62%)	10 (44%)	0.449
Prior Hospitalizations			
No. of pts with prior hospitalizations	101 (59%)	18 (79%)	0.394
Median hospital stay in days (range)	6 (1 - 32)	7.5 (1 - 20)	0.306

[1] Body Mass Index ≥25: overweight and ≥ 30: obese; [2] includes obesity; [3] includes current or prior presence of neoplasm. P-values were determined using two-tailed Fisher's exact test with p ≤ 0.05 significant.

Diagnosis and Length of Treatment

Primary Diagnosis

POIC / HHC pie charts legend:
- Skin and soft tissue infection
- Intra-abdominal infection
- Respiratory infection
- Osteomyelitis
- Blood stream infection
- Postoperative infection
- Prosthetic joint infection
- Urinary tract infection
- Septic arthritis
- CNS infection
- Endocarditis

❏ The 3 most frequent diagnosis in the **POIC** setting were SSTI (n=87, 51%), respiratory (n=12, 7%) and intra-abdominal (n=12, 7%) infections.

❏ The 3 most frequent diagnosis in the **HHC** group were SSTI (n=9, 39%), osteomyelitis (n=5, 22%) and septic arthritis (n=3, 13%).

❏ More severe cases, not reported in the HHC group, involved intra-abdominal (n=12), respiratory (n=12), post-operative (n=10) and prosthetic joint (n=8) infections.
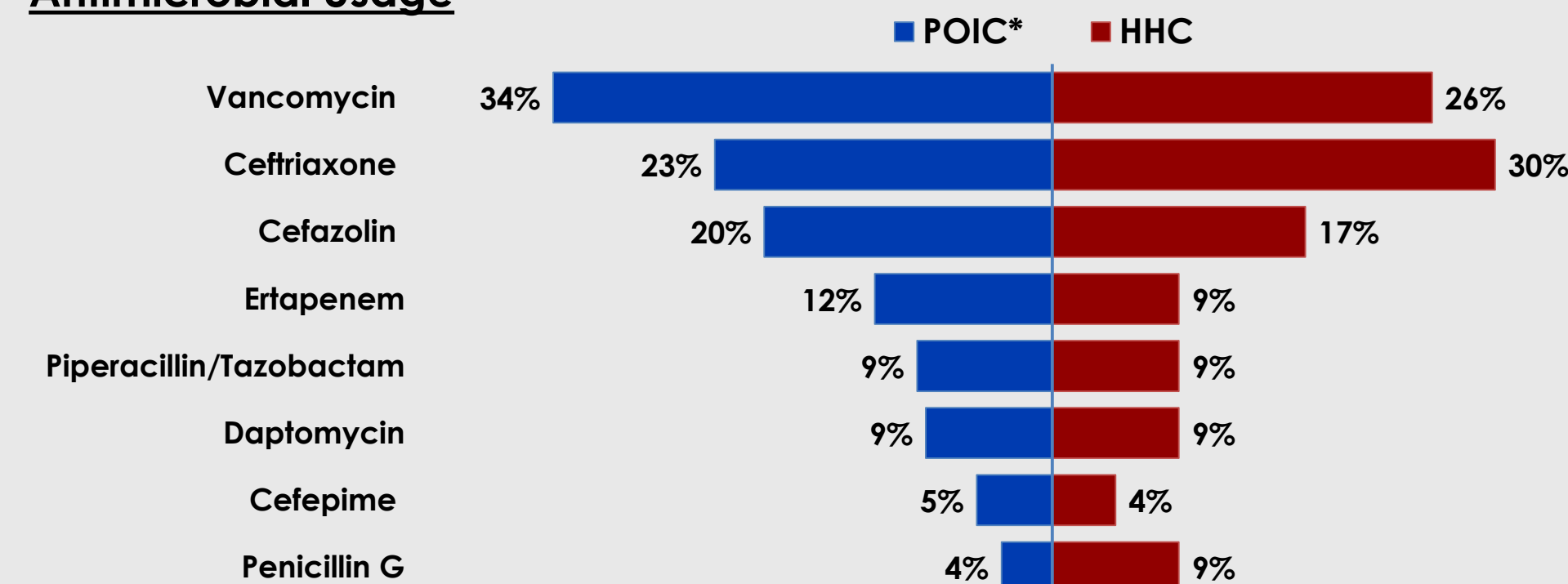
Total Length of Treatment (LOT)*

Location	No. of pts	Mean LOT ±SD (days)
POIC	172	27.8 ± 11.4
HHC	23	25.6 ± 12.1

*; including all diagnosis

Intravenous Antimicrobial Usage and Microbiology

Antimicrobial Usage

Legend: POIC* / HHC

Antimicrobial	POIC*	HHC
Vancomycin	34%	26%
Ceftriaxone	23%	30%
Cefazolin	20%	17%
Ertapenem	12%	9%
Piperacillin/Tazobactam	9%	9%
Daptomycin	9%	9%
Cefepime	5%	4%
Penicillin G	4%	9%

*; Other antimicrobials used in the POIC setting included ampicillin (2%), aztreonam (2%), amikacin, meropenem, micafungin, and nafcillin (1% each) and ampicillin/sulbactam, cefotaxime, cefuroxime, doxycycline, imipenem, and linezolid (<1% each).

❏ 8% of pts in the POIC and 9% of pts in the HHC group required concomitant therapy with multiple antimicrobials.

❏ A change in antimicrobial was required in 14% of pts in the POIC and 9% of pts in the HHC group.

Microbiology

Location	Staphylococcus aureus	E. coli	Enterococcus spp	Pseudomonas spp.	Polymicrobial pathogens	No growth reported
POIC, n (%)	45 (32%)	8 (5%)	9 (6%)	6 (4%)	15 (11%)	19 (13%)
HHC, n (%)	13 (62%)	2 (10%)	2 (10%)	2 (10%)	5 (24%)	3 (14%)

Emergency Department Visits and 30-Day Admission Rates

Legend:
- ED visits during OPAT
- Hosp admission within 30 days of OPAT

POIC: 5.2%, 7.5% (p =0.49)
HHC: 8.7%, 17.4% (p =0.03*)
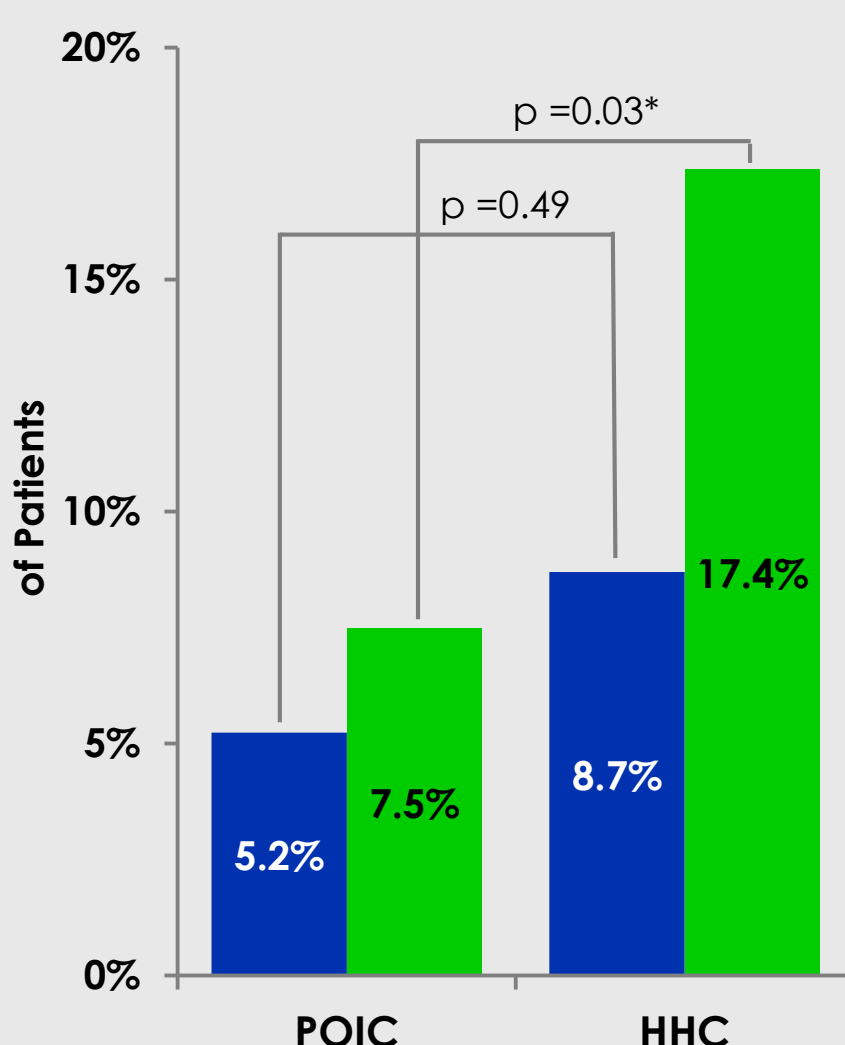
*; Fisher's exact test (significant: p<0.05)

POIC group

❏ 5.2% (9/172) POIC pts had a visit to the ED.

❏ 7.5% (13/172) POIC pts were admitted to the hosp within 30 days of OPAT completion. Of those, 31% (4) pts had an emergency room visit and 77% (10) were discharged from the hosp prior to OPAT initiation.

❏ Reasons for hosp admissions: 5 worsening infections (3%), 2 catheter complications (1%), 2 drug-related adverse events (1%) and 4 conditions unrelated to admitting infection (2%).

HHC group

❏ 8.7% (2/23) HHC pts visited the ED during OPAT, both resulted in subsequent hospitalization.

❏ 17.4% (4/23) HHC pts were admitted to the hosp within 30 days of OPAT completion. Of the 4 pts admitted, all pts were discharged from the hosp prior to initiating OPAT.

❏ Reasons for hosp admissions: 1 worsening infection (4%), 2 conditions unrelated to infection (9%), and 1 HHC pt treated for endocarditis was admitted with dehydration and expired in the hosp due to multi-organ system failure.

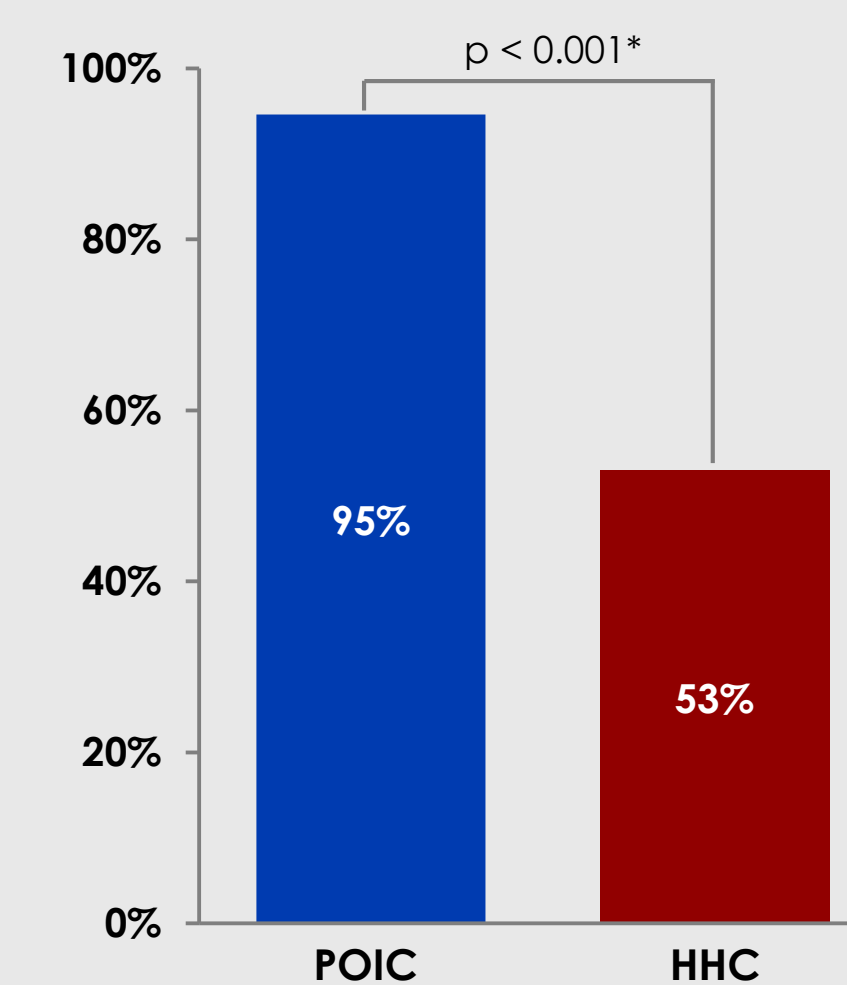### Laboratory Monitoring

Adherence (completed as ordered)

POIC: 95%, HHC: 70% (p < 0.001*)
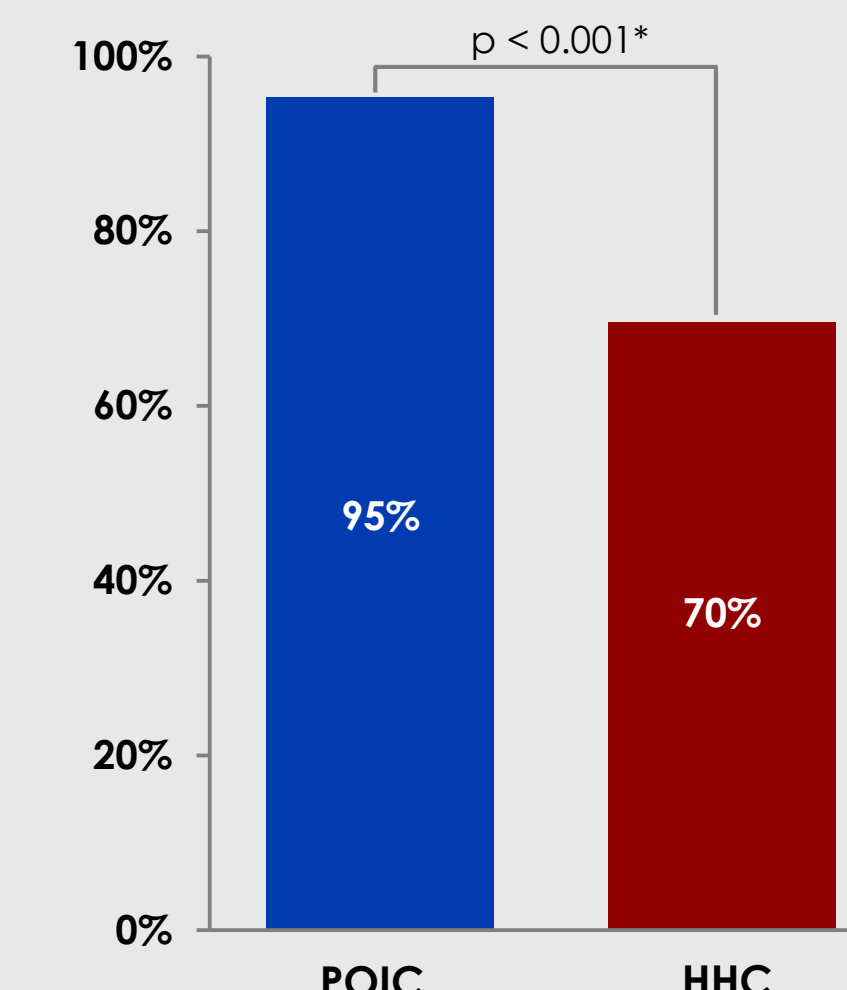
*; Chi square test (significant: p<0.05)

❏ 95% (163/171) POIC pts received laboratory tests as ordered.

❏ 70% (16/23) HHC pts received laboratory tests as ordered.

Physician Follow-Up Visit

Pt Compliance

POIC: 95%, HHC: 53% (p < 0.001*)

*; Chi square test (significant: p<0.05)

❏ 95% (157/166) POIC pts attended ID-physician follow-up visits as scheduled.

❏ 53% (8/17) HHC pts attended ID-physician follow-up visits as scheduled.

Discussion

This retrospective study compared OPAT treatment provided in a POIC vs. traditional HHC. Analysis included various objective parameters in compliance with IDSA monitoring guidelines [3], ED visits and hosp admissions following OPAT. All pts were evaluated from 3 ID-sites nationwide with 172 pts in the POIC group (mean age: 58 years, 40% female) and 23 pts (mean: 54 years, 52% female) in the HHC group.

❏ Demographic characteristics were comparable among both groups.

❏ The most frequent OPAT diagnosis was SSTI in both POIC (51%) and HHC (39%) settings followed by respiratory (7%) and intra-abdominal (7%) infections in the POIC group and osteomyelitis (22%) and septic arthritis (13%) in the HHC group.

❏ Vancomycin, ceftriaxone, and cefazolin were the most utilized antimicrobials and *Staphylococcus aureus* was the most common pathogen identified in both settings.

❏ Hosp admission rates were significantly lower in the POIC vs. HHC group (7.5% vs. 17.4%, p=0.03). ED visits occurred less frequently in the POIC than HHC group (5.2% vs. 8.7%), but it was not statistically significant.

❏ Adherence to laboratory monitoring was significantly higher in the POIC than HHC group (95 % vs. 70%, p<0.001).

❏ Significantly more pts complied with scheduled ID-physician follow-up visits in the POIC vs. HHC group (95% vs. 53%, p<0.001).

Key elements resulted in significantly improved results in the POIC group. The POIC allows for on-site physician supervision, with enhanced coordination and communication between pt, physician and POIC staff. This resulted in improved adherence to laboratory monitoring and more frequent follow-up visits. Importantly, this setting of care resulted in fewer ED visits and significantly lower hosp admission rates compared to HHC. Data on clinical outcomes and safety were not included due to limited availability from HHC pts and would be warranted to confirm overall improved outcomes.

Conclusions

OPAT delivered through an ID-POIC offers safe and high-quality care with significantly improved adherence to laboratory monitoring, higher pt compliance with ID-physician follow-up visits and a significantly lower 30-day hosp admission rate in comparison to traditional HHC.

References

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