

Clinical and Economic Outcomes of Outpatient Parenteral Antimicrobial Therapy (OPAT) among Indigent Patients: A Retrospective Multicenter Analysis

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Abstract, revised

Background: OPAT is known to be beneficial to patient safety, clinical outcome and cost savings. Earlier hospital discharge of patients requiring intravenous antibiotics (IVAB) allows for increased mobility, better quality of life and cost savings. Establishment of a hospital-funded indigent healthcare program (IHP) allows qualified patients to receive IVAB at a physician office infusion center (POIC). The database presented is an extension of a pilot study of an IHP.

Methods: A retrospective multicenter analysis was conducted among 11 POICs for patients receiving OPAT under the IHP program during 2012. Data extracted include patient demographics, diagnosis, drug treatment, clinical and economic outcomes. Costs were calculated by comparing daily OPAT charges to avoided hospital costs as derived from Healthcare Cost and Utilization Project (HCUP) database 2010. The t-test was used to determine statistical significance.

Results: A total of 90 patients (9 to 77 yrs of age) received IVAB following hospital discharge across 11 POIC sites. The most frequent diagnosis were osteomyelitis (n=25), cellulitis (n=16), endocarditis (n=11), septic arthritis (n=8), genitourinary infections (n=6), and septicemia (n=4). The most commonly prescribed IVABs were vancomycin (37%), cefazolin (17%), and ceftriaxone (15%). The majority of patients (81%) self-administered IVAB at home using elastomeric devices. Eighty-four patients completed therapy of which 73% were clinically cured and 20% were improved with partial resolution of signs and symptoms. Treatment failure rate as defined by worsening of infection or failure to comply with therapy was reported in 7% with 4 of 6 patients failed due to non-compliance. The estimated daily cost per POIC patient was $\$173.6 \pm 12.6$ with a mean length of stay (LOS) of 22 ± 13 days. In comparison, the national estimate for hospital use of uninsured patients is $\$2188.7 \pm 437$ a day with a mean LOS of 7.3 ± 0.9 days. As a result, the average cost per patient using OPAT via POIC were reduced by $\$2015$ per day ($p < 0.0001$) or 76% of inpatient hospital costs.

Conclusion: This study indicates that OPAT via POIC offers a safe and effective option for treating a wide variety of infections in non-resource patients. It provides high-quality, patient-centered care with a significant reduction of healthcare costs.

Background

- According to nationwide inpatient statistics¹ on infectious diseases, 4.2% of total hospital discharges were uninsured with estimated costs of \$837 million in 2011.
- Outpatient Parenteral Antimicrobial Therapy (OPAT) is a safe and clinically effective option to facilitate hospital discharge of patients requiring continuation of intravenous antibiotics.
- A 2011 pilot study indicated clinical success and cost-savings with an Indigent Healthcare Program in one Infectious Disease Physician Office Infusion Center.²

We report clinical and economic outcome data of a hospital-funded **Indigent Healthcare Program** conducted in 11 Infectious Disease Physician Office Infusion Centers (POICs) during 2012 that allowed uninsured patients to discharge from the hospital and continue intravenous antimicrobial therapy in an ID POIC.

¹ Healthcare Cost and Utilization Project (HCUP) nationwide inpatient sample. Source: <http://hcupnet.ahrq.gov>

² Mandel, RM, et al. Successful, Cost-Saving Outpatient Parenteral Antimicrobial Therapy (OPAT) Following Hospital Discharge: Early Pilot Study of an Indigent Healthcare Program between a Physician Office Infusion Center (POIC) and Two Tucson Hospitals, Poster session presented at IDWeek, 2012 Oct 17-21; San Diego, CA.

Methods

- We conducted a retrospective multicenter analysis among 11 POICs in 2012 for patients receiving OPAT under an arrangement with local hospitals to manage IV antimicrobials for indigent patients following discharge. Data was extracted to include patient demographics, diagnosis, microbiology, drug treatment, adverse drug reactions, clinical and economic outcomes.
- Clinical outcomes were evaluated for all patients at the completion of therapy as cured, improved or failed. Cured was noted as resolution of signs and symptoms with no additional antibiotic therapy. Improved was a partial resolution of signs and symptoms or additional oral antibiotic therapy necessary. The failed category included patients with worsening or new signs/symptoms, including hospital readmission or non-compliance.
- Costs were calculated by comparing daily OPAT charges to avoided hospital costs as derived from Healthcare Cost and Utilization Project (HCUP) database 2010. Inpatient costs were obtained from national estimates on hospital use for uninsured patients using HCUP nationwide inpatient sample 2010 and bacterial infection as principal diagnosis category.
- Descriptive statistics were used for demographic data, diagnosis, microbiology, length of therapy and clinical outcomes data. OPAT costs were calculated as the sum of total patient charges billed to hospital under the IHP. Results are presented as a comparison of the difference in total costs over the sum treatment period between OPAT and inpatient therapies. The t-test was used to determine statistical significance.

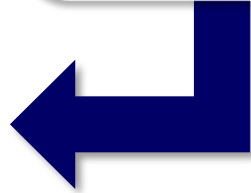
Indigent Healthcare Program 2012



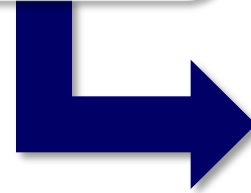
Early Hospital Discharge
of **90** indigent patients



OPAT in 11
physician office
infusion centers



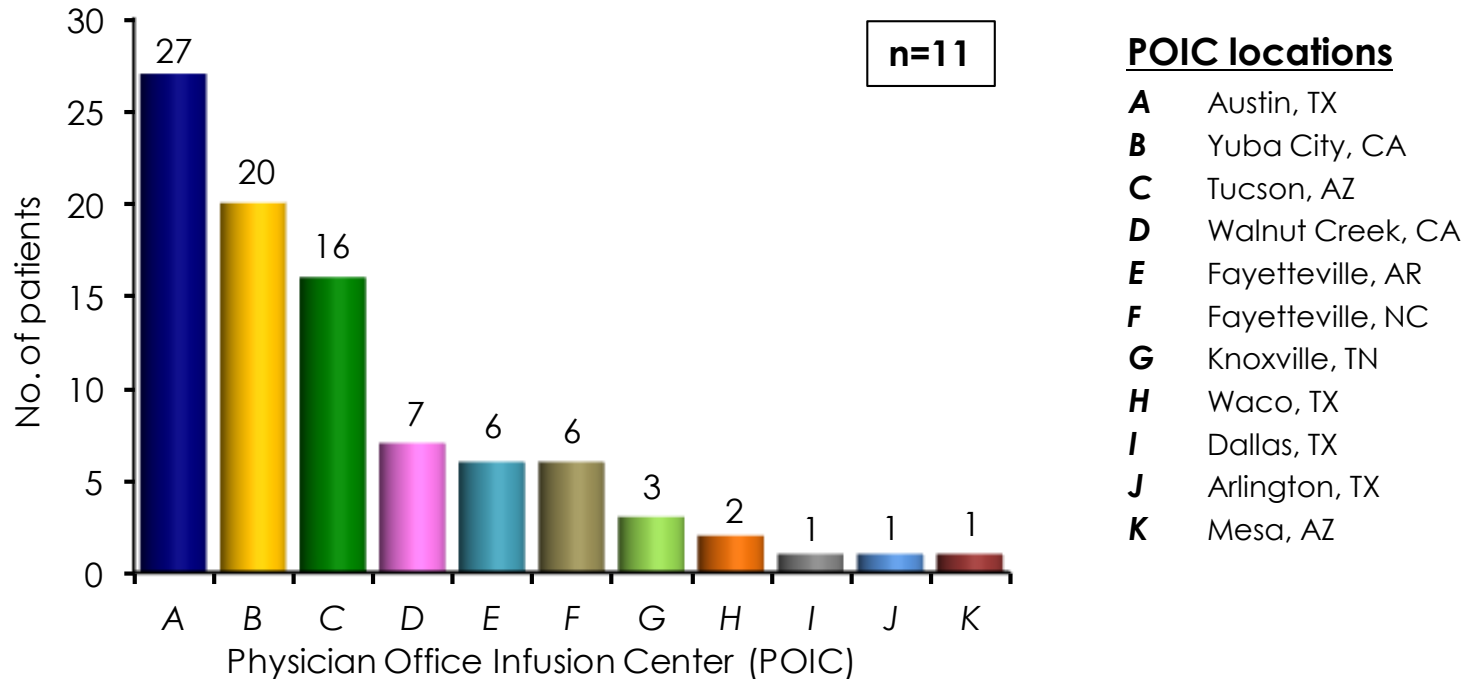
Clinical Outcome



Economic Outcome



Participating Physician Office Infusion Centers



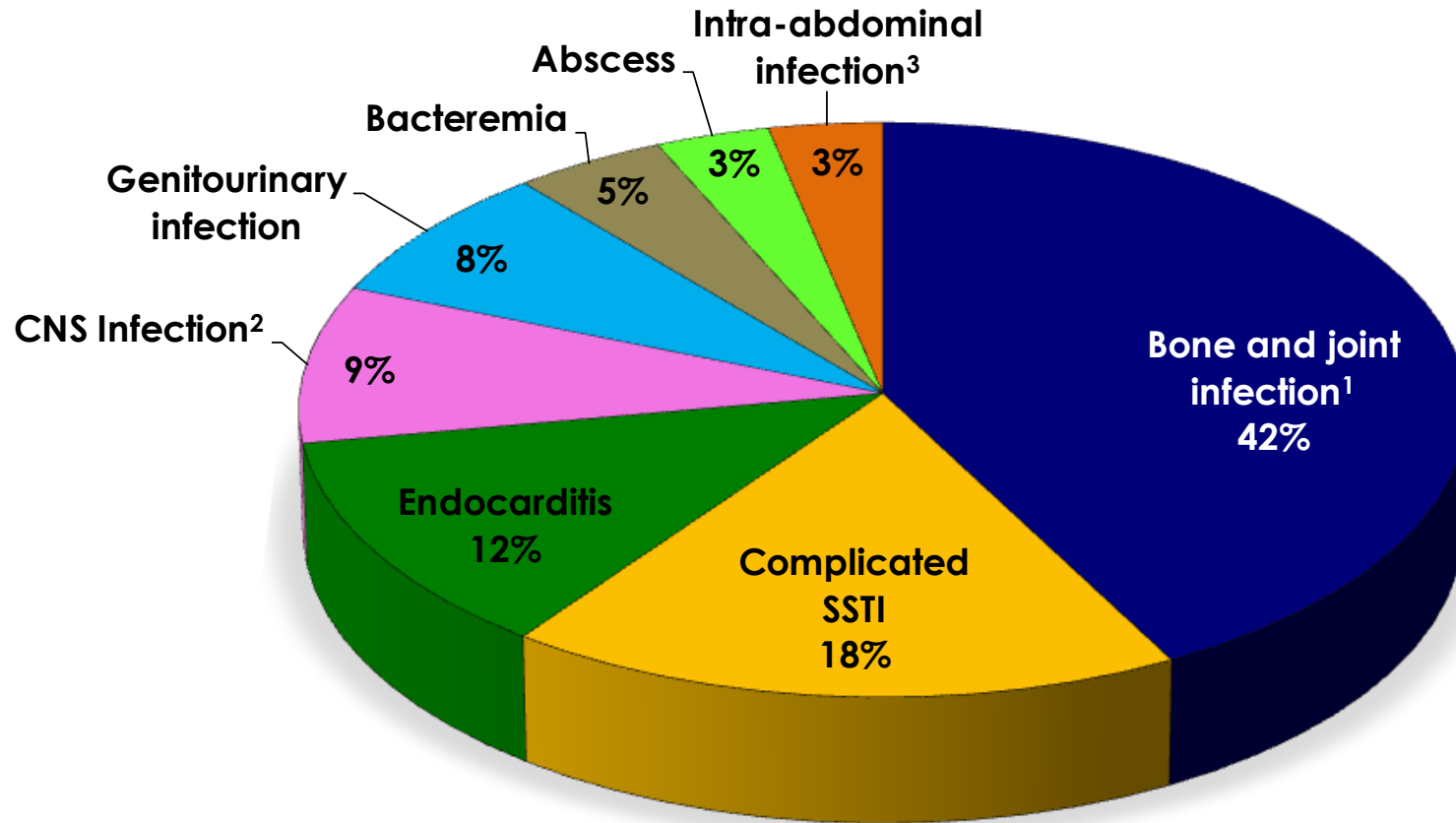
Retrospective multicenter analysis of patient records (n=90) in 2012:

- ✓ demographics
- ✓ primary diagnosis
- ✓ treatment regimen & adverse events
- ✓ clinical & economic outcome data

Indigent Patient Population

Baseline Characteristics	Results
Gender (n=90)	
Male (%)	62 (69%)
Age at time of POIC admission (years)	
Mean (range)	43 (9-77)
< 30; no. of patients (%)	17 (19%)
30-49; no. of patients (%)	42 (47%)
50-64; no. of patients (%)	30 (33%)
≥ 65; no. of patients (%)	1 (<1%)
Comorbidities (no. of patients; %)	
Hypertension	36 (40%)
Diabetes Mellitus	34 (38%)
Cardiovascular Disease	16 (18%)
Psychiatric Disorder	12 (13%)
Renal Disease	7 (8%)
Asthma/COPD	4 (4%)
Comorbidities per patient (no. of patients; %)	
0	17 (19%)
1	25 (28%)
2	20 (22%)
≥ 3	28 (31%)
Length of hospital stay (days)	
Mean (Range)	8 (1-28)

Primary Diagnosis of Indigent Patients



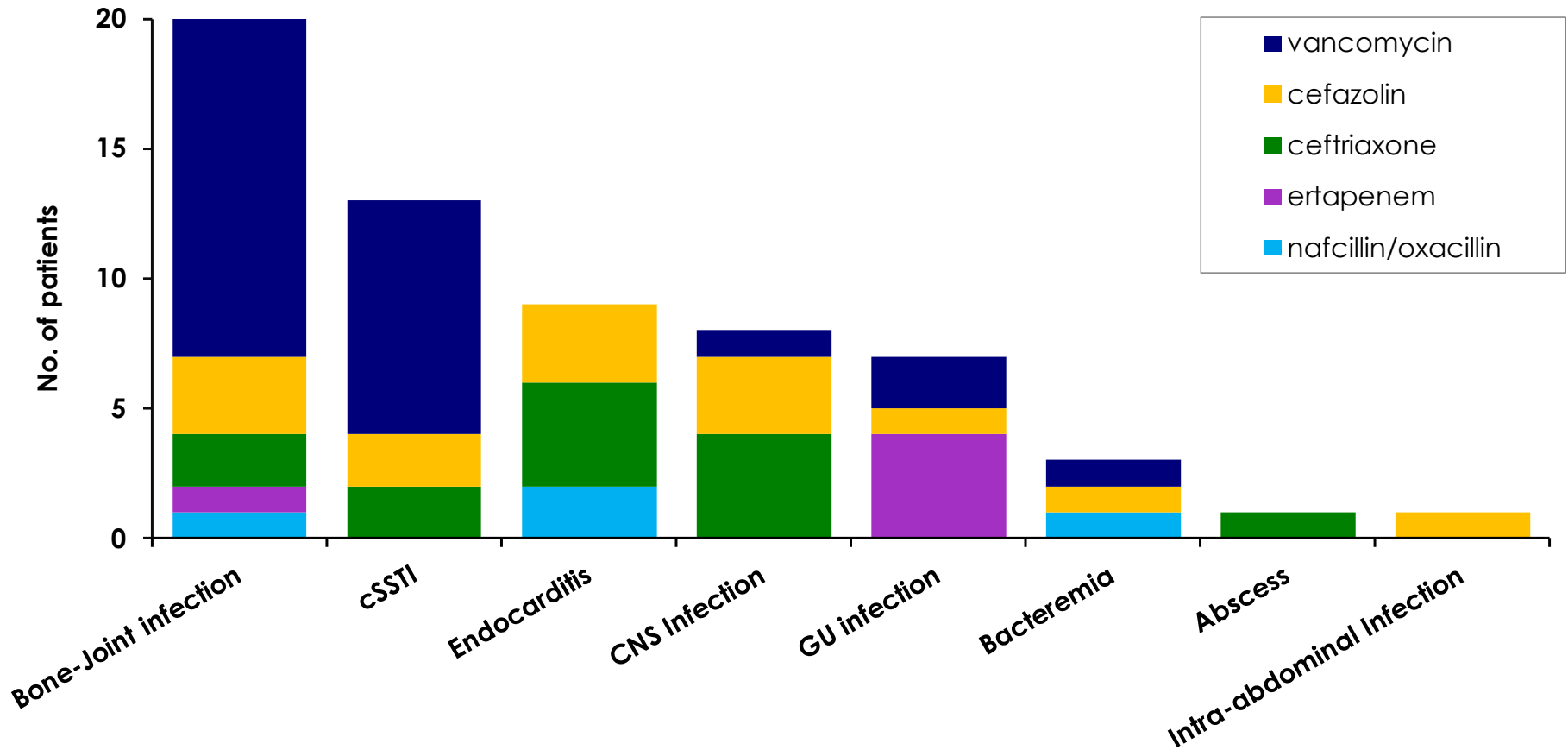
¹ Bone and joint infection includes osteomyelitis(25), septic arthritis (8) and other (5).

² CNS infection includes meningitis (3), neurosyphilis (1), and brain, epidural, intracranial and intraspinal abscesses (4).

³ Intra-abdominal infection includes post-op wound infection (2) and ruptured appendix (1).

Primary Intravenous Antibiotics

- The 5 most prescribed primary antimicrobials were vancomycin (37%), cefazolin (17%), ceftriaxone (15%), ertapenem (6%), and nafcillin/oxacillin (5%).

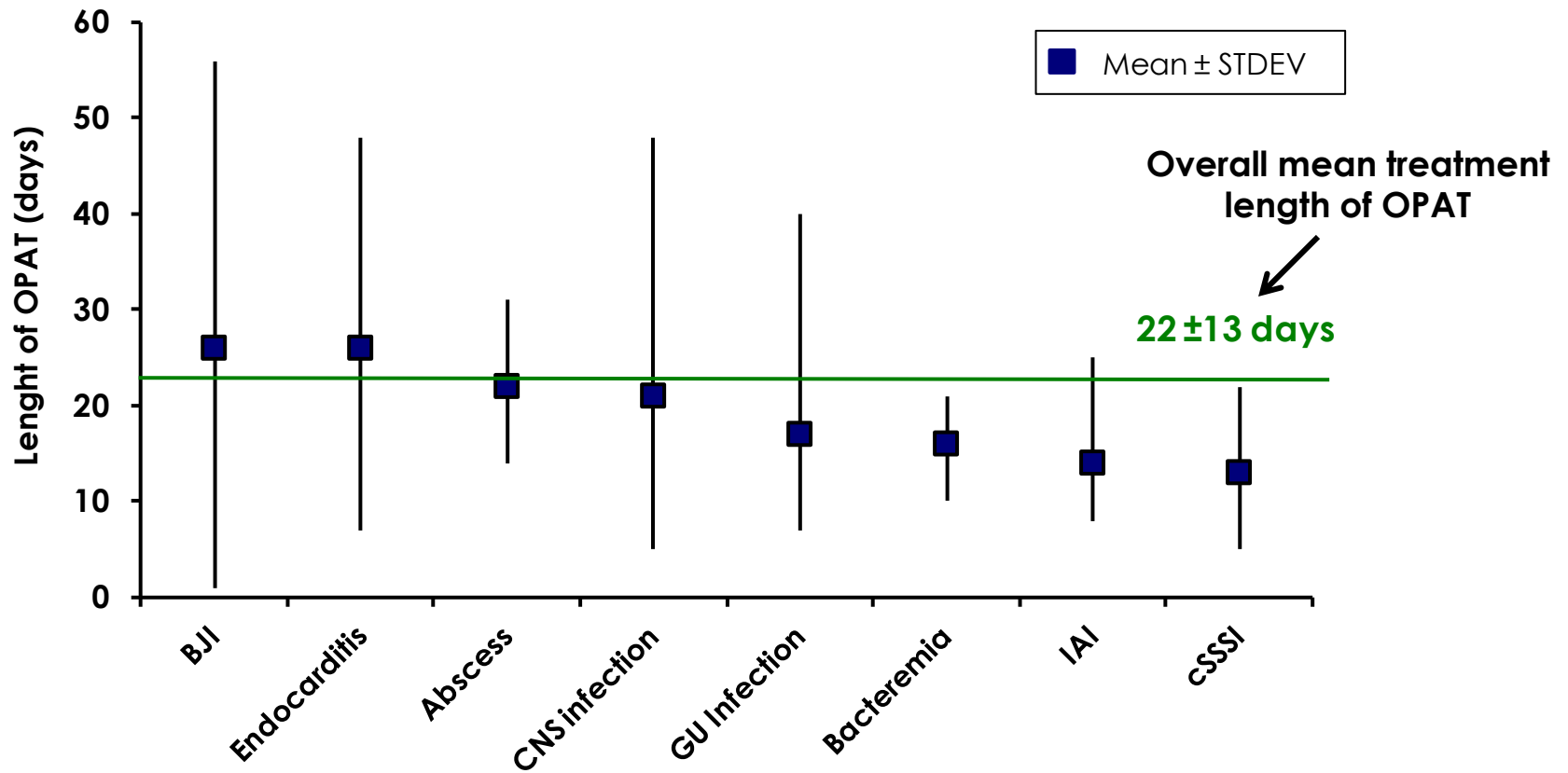


Overall Intravenous Antibiotic Usage

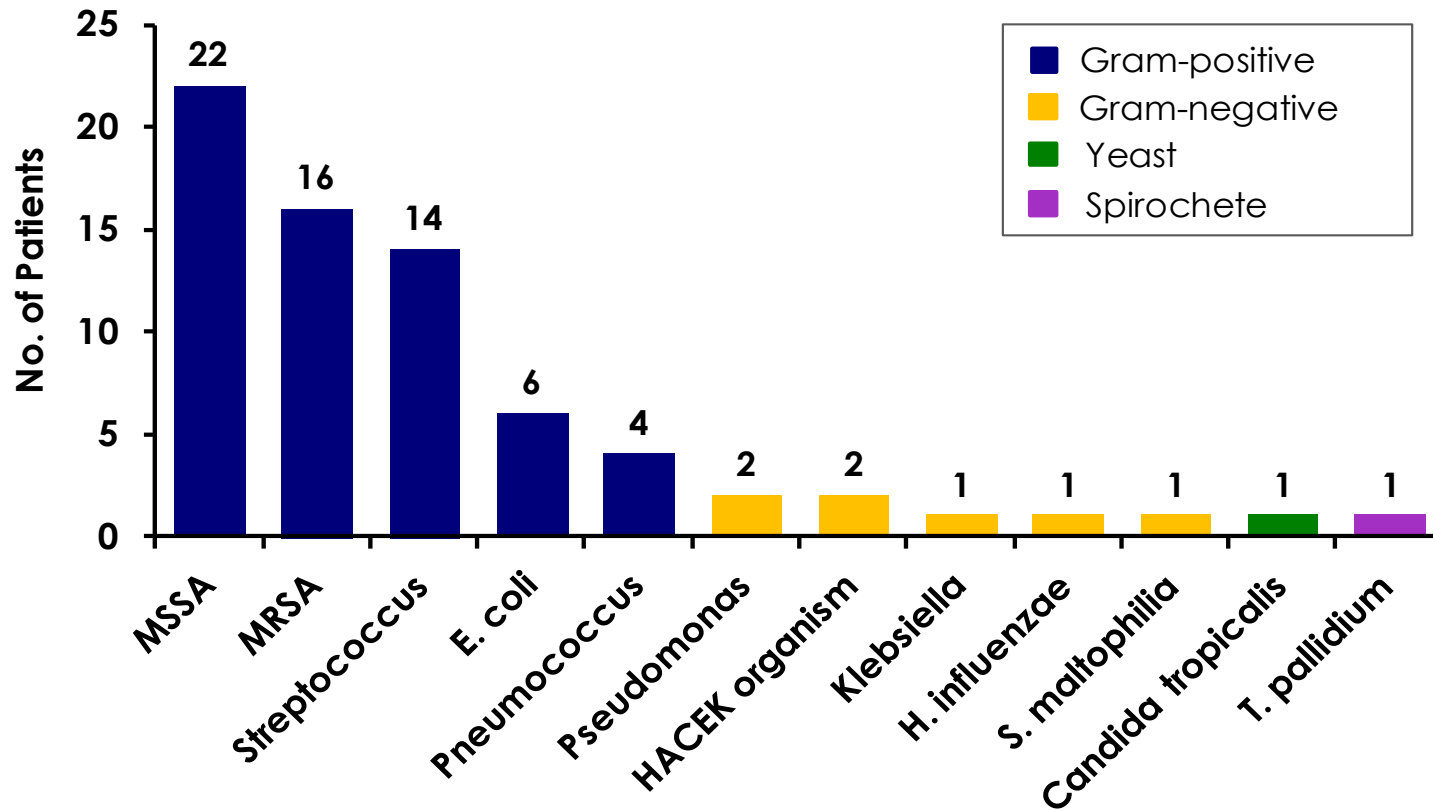
- Vancomycin was the predominant antimicrobial, accounting for 50% of the drug use in bone and joint and complicated skin and skin structure infections.
- 6 patients received combined antibiotic therapy.

Primary Diagnosis (No. of patients)	vancomycin	cefazolin	ceftriaxone	ertapenem	naftillin/ oxacillin	penicillin G	piperacillin/ tazobactam	ampicillin/ sulbactam	clindamycin	cefepime	daptomycin	ampicillin	imipenem/ cilastin	micafungin	tircacillin/ clavulanate
Bone and joint infection (n=38)	18	3	2	1	1	3	2	3		2	2				1
Complicated skin and soft-tissue infection (n=16)	9	2	2						2			1			
Endocarditis (n=11)		3	4		2	1							1		
CNS infection (n=8)	1	3	4												
Genitourinary infection (n=7)	2	1		4											
Bacteremia (n=4)	1	1			1				1						
Abscess (n=3)			1				2								
Intra-abdominal infection (n=3)		1		1										1	
Total # of Prescribed Antimicrobials	31	14	13	6	4	4	4	3	3	2	2	1	1	1	1

Length of OPAT per Diagnosis



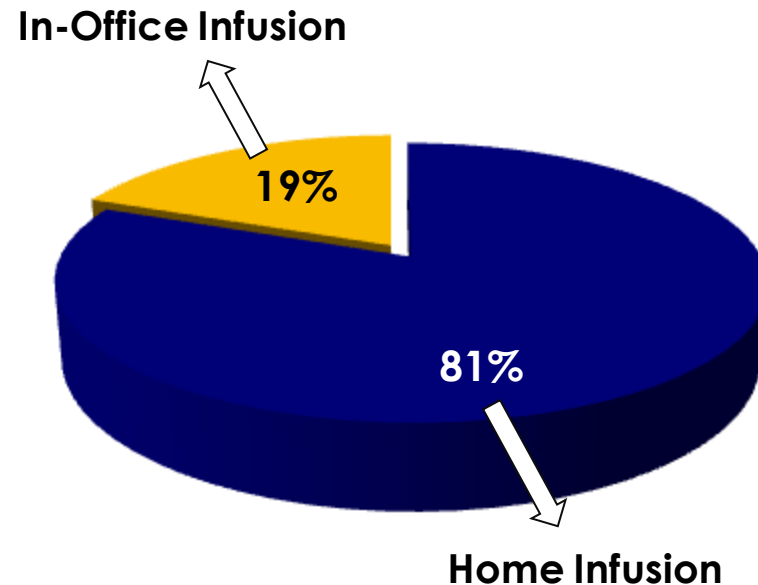
Microbiology



- Microbiology reports were available from 73 patients (81%):
 - ✓ Gram positive organisms identified in 50/73 pts (68%)
 - ✓ Gram negative organisms identified in 9/73 pts (12%)
 - ✓ 3 patients had polymicrobial infections
- *Staphylococcus aureus* was the predominant pathogen (n=38) including 16 with methicillin-resistant (MRSA) strains.

Infusion Devices

- 81% of patients (n=73) self-administered IVAB at home using a disposable elastomeric device.
- 19% of patients utilized ambulatory (n=10) and syringe pumps (n=7) with in-office administration.

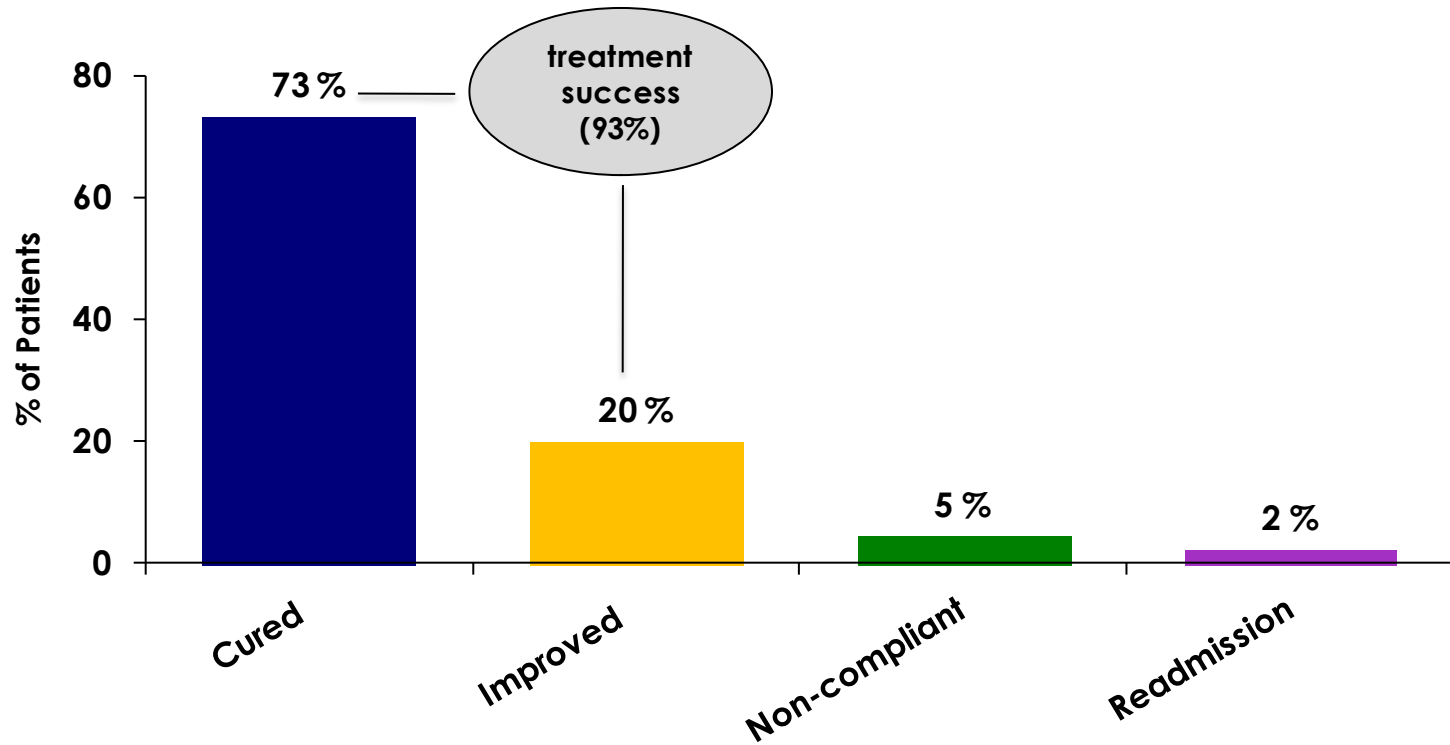


Adverse Drug Events (ADE)

- ADEs were reported in 19 patients (21%).
- All ADEs occurred in patients receiving either vancomycin, cefazolin, or ceftriaxone.
- All ADEs resolved or were managed using OTC medication (i.e.; probiotics, laxatives, diphenhydramine and antipyretics).
- No discontinuation of antibiotic or drug switches were necessary due to ADEs.

Adverse Drug Event	Total Episodes	Occurrence by Drug		
		vancomycin	cefazolin	ceftriaxone
Diarrhea	5	3	2	
Constipation	1	1		
Bloody stool	2			2
Rash, itching	4	2		2
Nausea, vomiting	1	1		
Fever	1			1
Cough	1			1
Pain (back, hip or leg)	5	3		2
Night sweats	1		1	
Elevated blood pressure	1			1
Fatigue, weakness	2	2		
Anxiety	3	2		1

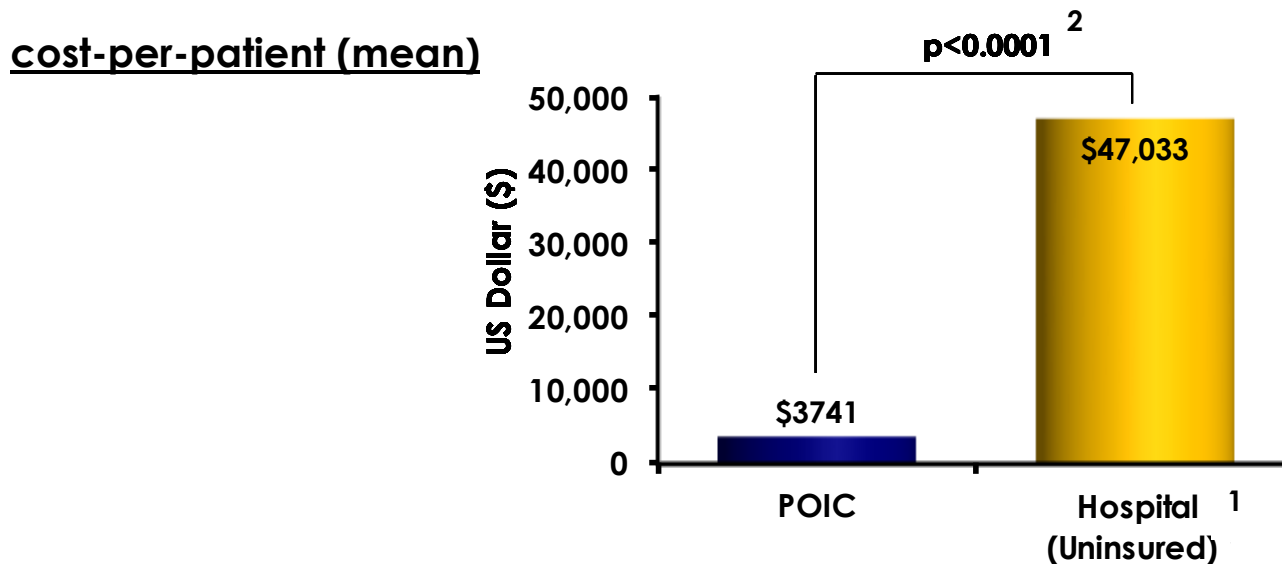
Clinical Outcome



- 93% of patients (n=84) had a successful clinical outcome, of which 73% (n=66) were cured (no evidence of infection) and 20% (n=18) improved with either partial resolution of signs and symptoms or switch to oral therapy.
- 4 patients were non-compliant, and 2 patients were readmitted to the hospital for disease exacerbation.

Cost Comparison: OPAT versus Inpatient Care

- Mean daily treatment cost for OPAT was \$174 versus \$ 2,189 for inpatient-only care indicating a saving of \$2,015 per day.
- Overall mean cost per patient was calculated to be \$ 3,741 for outpatient and \$47,033 for inpatient care representing a saving of \$43,292 per patient (graph below).
- **Total cost savings realized was \$3.9 million** for these 90 patients receiving a total of 1936 days of OPAT care compared to inpatient stay only.



¹ Healthcare Cost and Utilization Project (HCUP) nationwide inpatient sample. Source; <http://hcupnet.ahrq.gov>

² Unpaired t-test with 95% confidence interval (GraphPad InStat software)

Summary: Indigent Healthcare Program 2012



Early Hospital Discharge
of **90** indigent patients



OPAT in 11
physician office
infusion centers

Clinical Outcome

Cured: 66 patients (73%)
Improved: 18 patients (20%)



Successful Outcomes: 93% pts

Economic Outcome

Outpatient Care: \$3,741/pt
Inpatient Care: \$47,033/pt



Total savings: \$43,292/pt

Conclusions

- This Indigent Healthcare Program enabled non-resource patients with infectious diseases to receive OPAT at an ID POIC, with high-quality, patient-centered care.
- Successful outcomes were reported in 93% of patients.
- Statistically significant cost savings of \$2015 per day, \$43,292 per patient or \$3.9 million for all patients in this study were achieved compared to inpatient care only.

This program offers an important value to the healthcare system and community.