

The Economic Burden of Adverse Events Requiring Acute Care Service from Outpatient Parenteral Antibiotic Treatment (OPAT)

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Background

- Antimicrobial resistance (AMR) is a growing threat, especially among extended-spectrum beta-lactamase (ESBL)-producing *Enterobacteriales* species within the community setting.¹
- Between 2012–2017, ESBL-producing *Enterobacteriales* infections in hospitalized patients were the only major multidrug-resistant (MDR) pathogen in the U.S. with increasing incidence, driven by a 64% increase in community-onset infections.¹
- Preferred treatments for many MDR gram-negative infections are often currently available in the U.S. only as intravenous (IV) or intramuscular (IM) formulations.^{2,3}
- Patients requiring outpatient parenteral antibiotic treatment (OPAT) services will proportionally increase based on AMR to oral antibiotic treatment options.
- Complications that arise from OPAT, often necessitate acute care services. These complications have been well established in the literature. However, only frequency rates have been described.^{4,5}
- We sought to quantify the costs associated with OPAT adverse events (AEs).

Methods

- A multicenter retrospective claims analysis from the state of Utah's (UT) Public Indicator-Based Information System for Public Health (IBIS) database was performed for 2020.
- OPAT AEs described in the literature were used to query charges. All UT hospitals and common OPAT AE principal diagnosis codes were included in the analysis.
- Continuous longitudinal claims during 2020 were followed for each patient from the index date of diagnosis throughout the hospital length of stay (LOS), as well as discharge status.
- Estimated inpatient (IP) costs associated with common OPAT AEs were calculated from a cost-to-charge ratio by using publicly available data from the Centers for Medicare & Medicaid Services.
- Event counts reported for UT were scaled to estimate total events for the U.S. population.
- Emergency department (ED) incidence rates for OPAT AEs from 2016 to 2020 were also examined.

Results

- During the study period, 248,843 patients met study inclusion for an OPAT AE principal diagnosis (PDX) code.
- The mean age was 60 with majority of patients being white and a slightly higher representation of females at 53.4%.
- Medicare was the most common payer that accounted for 51.2% and discharge status to home or routine represented most patients (54.3%), while discharge to home health was second highest at 32%.
- Other baseline patient demographics are displayed in **Table 1**.
- Both IV complications and central line-associated bloodstream infections accounted for the longest hospital IP LOS at 6.43 days and 7.04 days, respectively.
- Phlebitis had the third longest LOS at 4.51 days. (**Table 2**)
- Among IV-related complications, catheter phlebitis accounted for highest median cost per IP event at \$14,051.
- Other PDX, in order of descending median costs, included catheter blockage and central line-associated bloodstream infections at \$11,237 and \$10,103, respectively, followed by \$9,371 for complications post-injection.
- Thrombotic event costs totaled \$11,915 for deep venous thrombosis and pulmonary embolism, combined.
- Lastly, *C. difficile* infections accounted for a median cost of \$5,284. (**Figure 1**)
- Age-adjusted rates of ED activity related to AEs rose to 17.6 per 10,000 in 2020; this marked an 18% increase from 2016. (**Figure 2**)

Table 1. Patient demographics

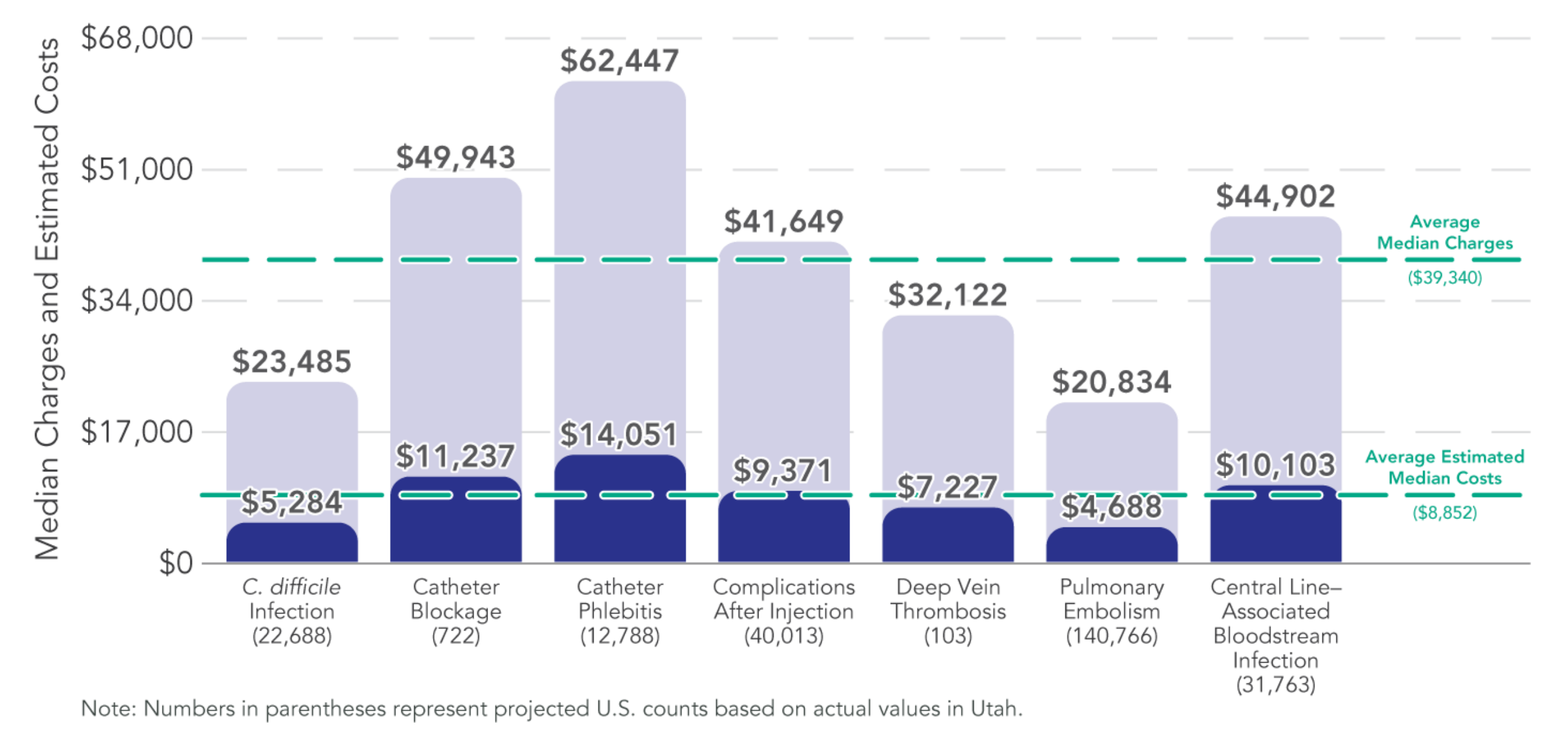
Demographics	Utah 2020	U.S. 2020	(%)
N	2,404	247,913	
Mean Age	60.3	60.3	
Sex			
Male	1,114	114,881	46.3%
Female	1,283	132,309	53.4%
Race			
American Indian / Alaska	18	1,856	0.7%
Asian	24	2,475	1.0%
Black / African American	44	4,538	1.8%
White	2,168	223,575	90.2%
Other	99	10,209	4.1%
Unknown	8	825	0.3%
Native Hawaiian or Other Pacific Islander	45	4,641	1.9%
Payer			
Medicare	1,232	127,050	51.2%
Medicaid	308	31,763	12.8%
Other Government	39	4,022	1.6%
Private Health Insurance	651	67,134	27.1%
Blue Cross / Blue Shield	113	11,653	4.7%
Managed Care, Unspecified	3	309	0.1%
Unknown	52	5,363	2.2%
Other	5	516	0.2%
Discharge Status			
Routine	1,306	134,681	54.3%
Transfer to Short-Term Hospital	39	4,022	1.6%
Skilled Nursing Facility (SNF), Intermediate Care Facility (ICF)	245	25,266	10.2%
Home Health	769	79,303	32.0%
Against Medical Advice	11	1,134	0.5%
Died	33	3,403	1.4%
Discharge Destination Unknown	1	103	0.04%

Table 2. Mean inpatient hospital LOS associated with OPAT AEs

Adverse Event	ICD-10 Code	Mean LOS (days, 95% CI)
<i>C. difficile</i>	A04.72	4.30 (3.78–4.82)
Blockage	T83.091A	2.57 (1.17–3.97)
Phlebitis	T82.868A	4.51 (3.84–5.17)
IV Complications	T80	6.43 (5.87–6.98)
Thrombosis	I82.409, I26.9	2.95 (2.81–3.10)
Central Line-Associated Bloodstream Infection	T80.211A	7.04 (6.39–7.70)

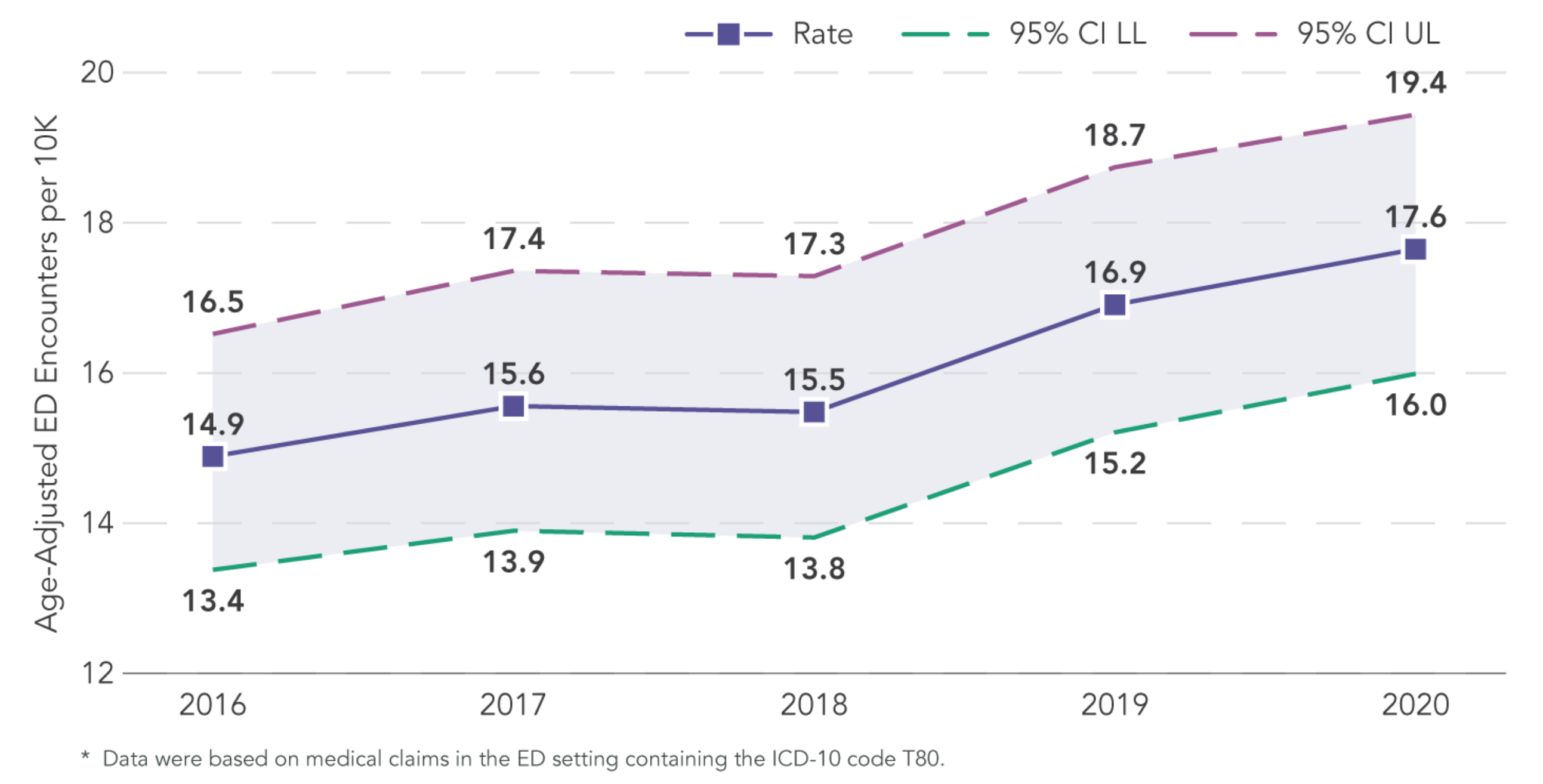
Note: CI is confidence interval. LL is lower limit. UL is upper limit.

Figure 1. Inpatient charges and estimated costs related to OPAT AEs, 2020



Note: Numbers in parentheses represent projected U.S. counts based on actual values in Utah.

Figure 2. ED activity related to complications following infusions or therapeutic injections, 2016–2020*



* Data were based on medical claims in the ED setting containing the ICD-10 code T80.

Summary and Conclusions

- Viable oral antibiotic treatment options in the community setting are limited.
- Patients will require additional OPAT services as AMR rates continue to escalate.
- OPAT services are not without added risks of complications, as many patients will require acute care services.
- These services will increase health care expenditures as seen with IP hospital LOS ranging from 2.57 days to 7.04 days.
- The median cost for an OPAT AE was \$8,852. These costs may be minimized by the addition of new oral antibiotic treatments that overcome AMR, thus improving patient outcomes.

References

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