

Assessing the Global Economic Burden of Complicated Urinary Tract Infections

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BACKGROUND

Complicated urinary tract infections (cUTIs) arise in patients with structural or functional abnormalities of the genitourinary tract or in those with nonurogenital comorbidities. cUTIs are common in older or catheterized persons and can be associated with high healthcare resource utilization (HCRU).

OBJECTIVE

To conduct a systematic literature review (SLR) to understand the economic burden of cUTI in select countries.

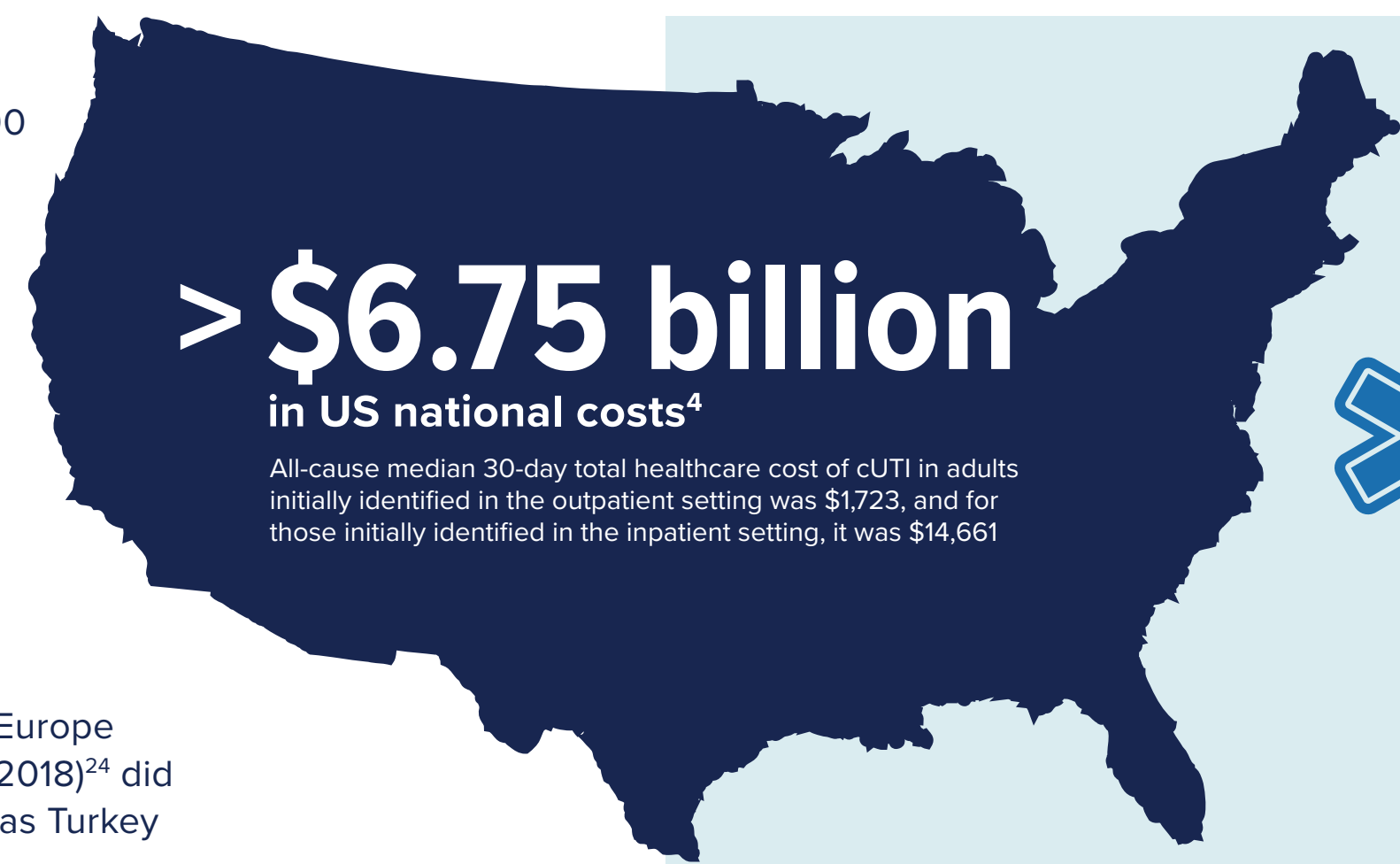
CONCLUSIONS

Available data indicate that the economic burden associated with cUTI is substantial.

However, except for the US, direct costs were missing or reported in only 1 or 2 studies for the countries examined. Similarly, HCRU outcomes were missing or reported in only a few studies, except for those in the US and Spain.

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• Mean hospitalization costs per cUTI varied by country, from \$2,747 in China to \$32,790 for hospital-acquired CAUTI in US children.^{7,8,12,13,17,21,24}

• US national all-cause median 30-day total healthcare costs of cUTIs were estimated at > \$6.75 billion.⁴ The highest costs were observed in patients with multidrug-resistant infections.

• No studies of direct cUTI costs were identified for France, Germany, Japan, and the UK.

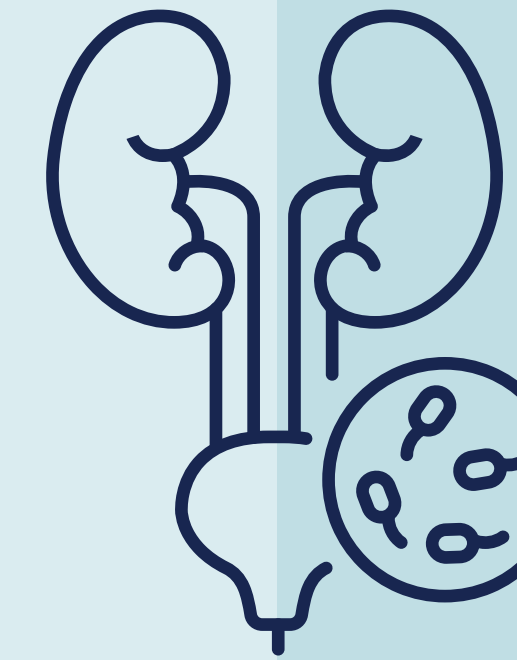
• No study encompassed cUTI costs in all of Europe (as a region), although Vallejo-Torres et al. (2018)²⁴ did include several European countries as well as Turkey and Israel.

Mean all-cause 30-day Medicare spending for cUTI, **\$7.8 billion¹⁰**

Mean cUTI-related 30-day Medicare spending for cUTI, **\$4.6 billion¹⁰**

In 2009, the estimated aggregated CAUTI-attributable cost for all Medicare beneficiaries was **\$178.1 million¹⁵**

(\$142.7 million for patients with CAUTI and an ICU stay and \$35.4 million for patients with CAUTI and no ICU stay)¹⁵



In 2010, the total aggregate hospital cost for CAUTI in adults aged ≥ 18 years was **\$1.9 billion⁵**

Aggregate cost of cUTI in the ED in 2018, **\$3.7 billion¹⁸**

Comparative Direct Costs of cUTI in US Studies



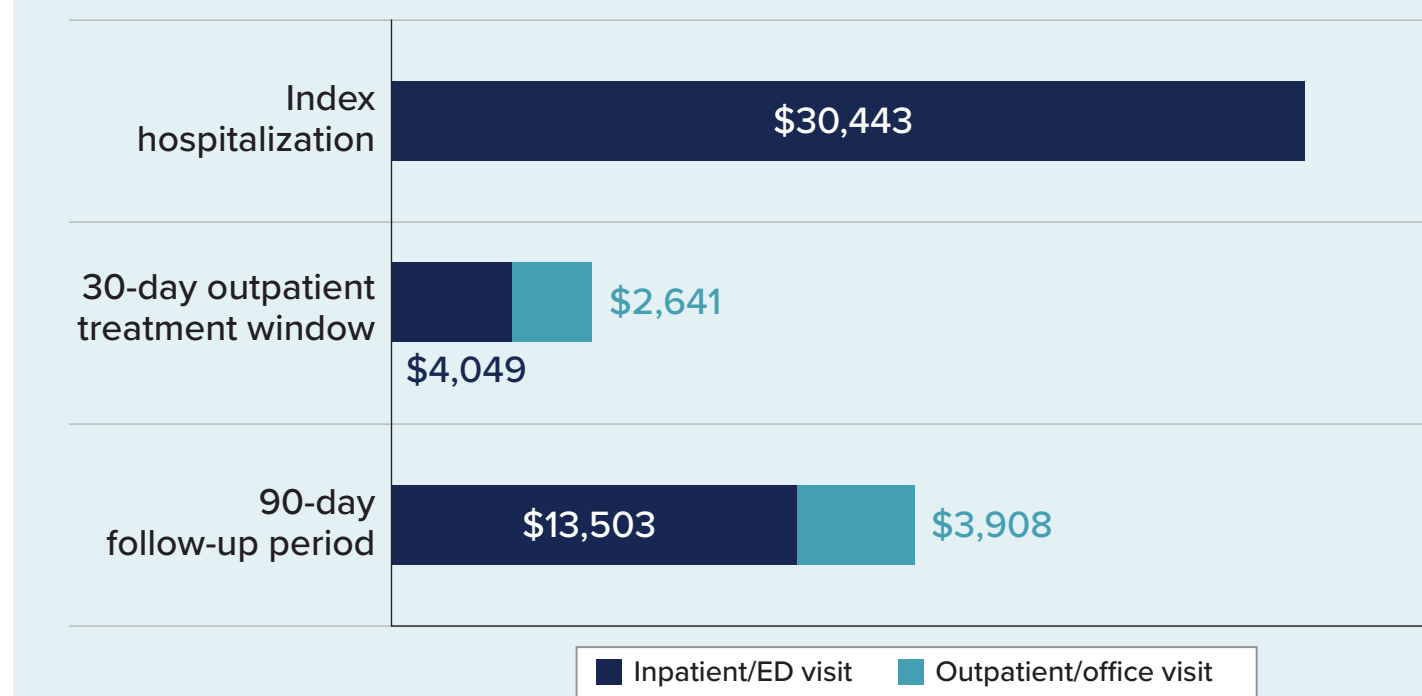
Mean all-cause 30-day Medicare spending per hospitalization for patients with cUTI¹⁰ **\$16,862**

Mean cUTI-related 30-day Medicare spending per hospitalization for patients with cUTI¹⁰ **\$15,843**

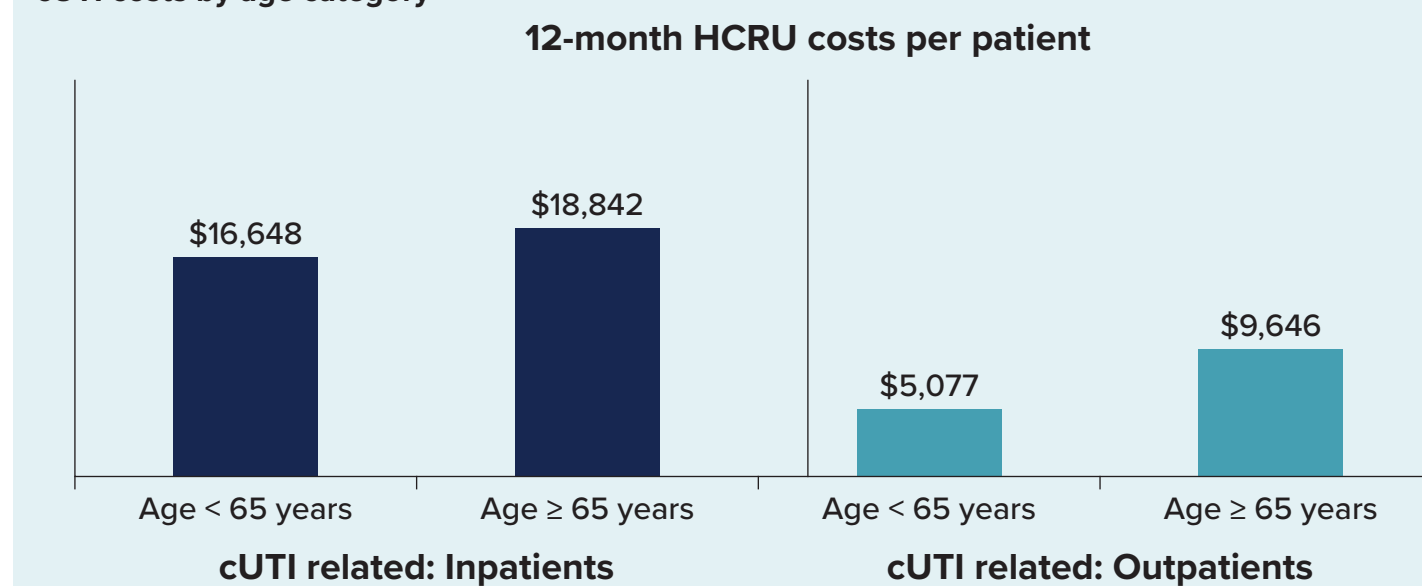
Main cost driver for 30-day UTI-related Medicare spending was **acute care hospitalizations¹⁰**

Inpatient vs. Outpatient

Median all-cause healthcare costs during follow-up by treatment setting in adults with cUTI (January 2006 to July 2013)¹⁴

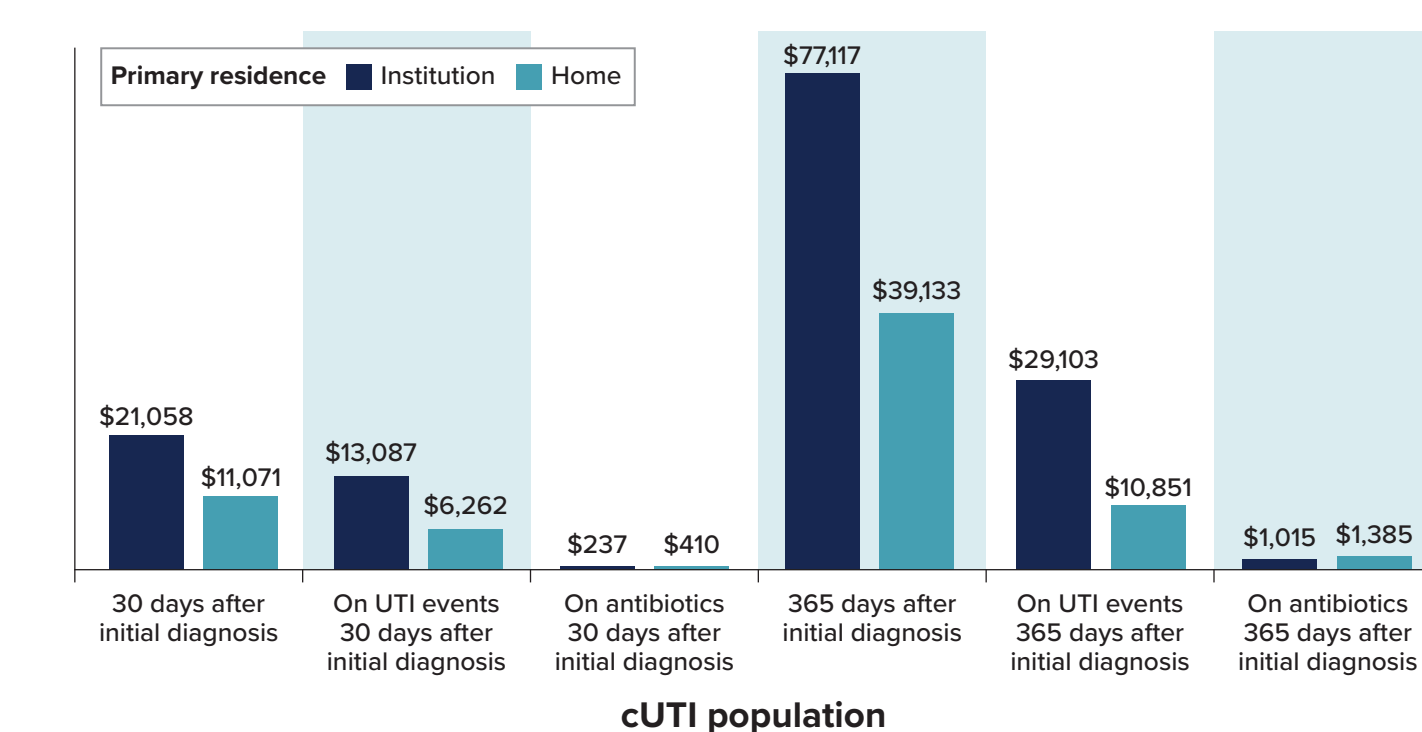


cUTI costs by age category⁹



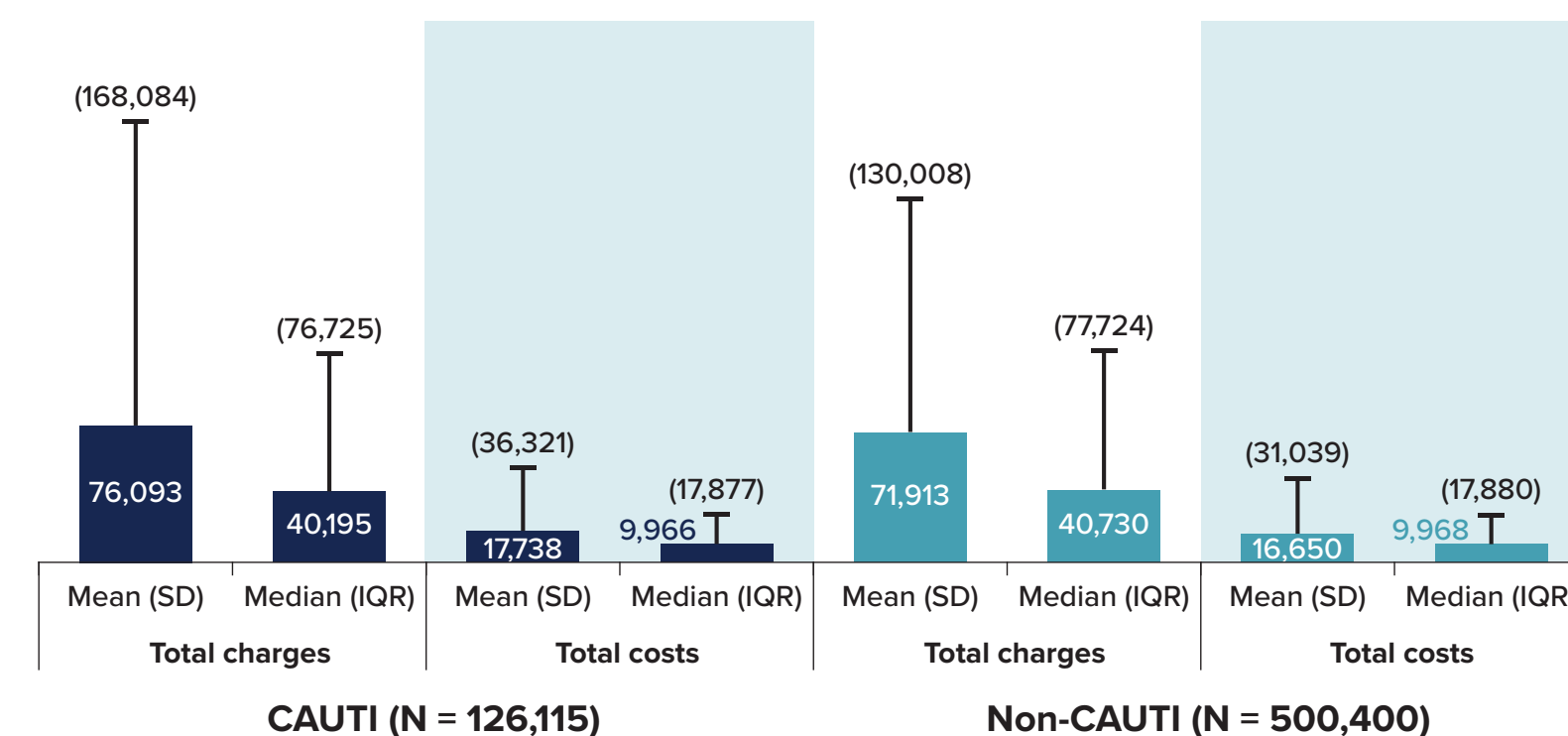
Notes: Treatment settings are based on where patients' cUTI was initially identified. HCRU costs were from 1 July 2016-30 June 2020.

Average Medicare 30-day and 12-month spending after cUTI diagnosis²⁰

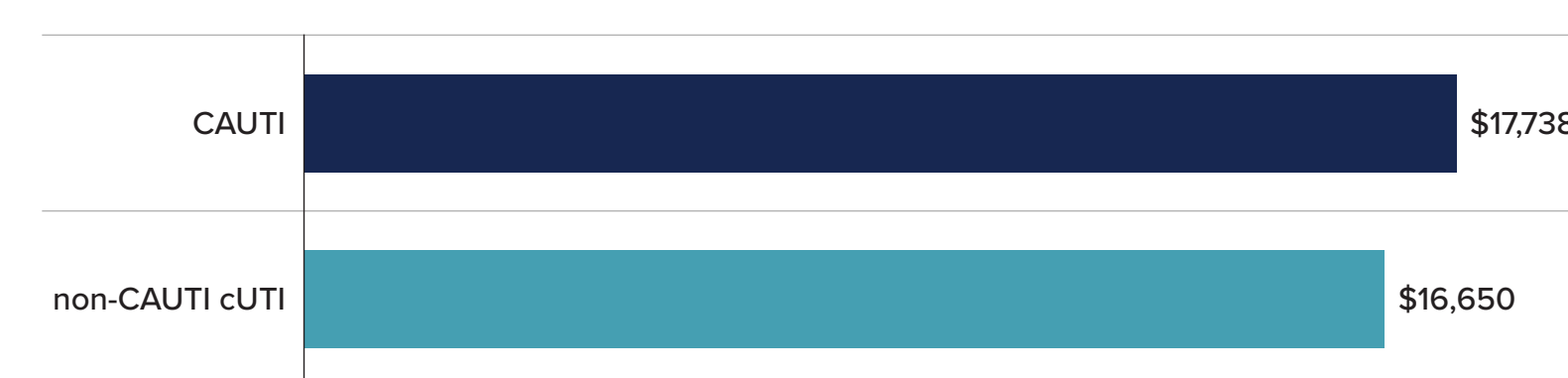


CAUTI vs. non-CAUTI

Total hospital charges and costs for adults with CAUTI vs. adults without CAUTI in 2018¹⁹



Mean total inpatient cost of CAUTI vs. non-CAUTI cUTI were similar in 2018¹⁹



Estimated LSM hospitalization costs for hospital-acquired CAUTI in children aged 1-17 years vs. matched controls (2009-2011)⁷

Cases (n = 1,513)	Controls (n = 16,200)	Relative difference ratio
\$32,790	\$22,701	1.44 (95% CI, 1.09-1.87)

Other Economic Burden

HCRU

- LOS was the most common HCRU outcome reported, and in the multicountry studies, median LOS was similar among studies (7 days, with days ranging from 5 to 13).^{24,52,53}
- Patients with CAUTI had longer LOS than controls^{15,27,44,50,51} or patients with cUTI.^{52,53}

- In general, patients with ESBL-producing pathogens or drug-resistant pathogens had longer LOS than those without.^{11,13,17,34,42,47,48}

- ICU admissions in patients with ESBL-positive cUTI ranged between 3% and 27.4%.^{6,23,26,33,34,47}

China

Total hospitalization cost in US \$:
mean, \$2,747;
median, \$1,700²¹

Spain

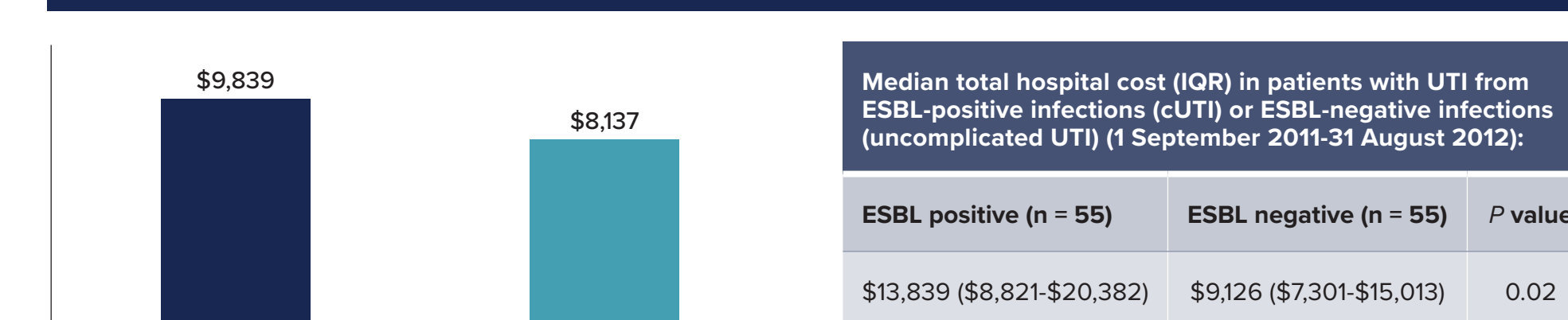
Mean total cost per hospitalized patient with cUTI,
\$9,128²⁴

Resistance Comparisons in US Studies



Antibiotic costs were a significantly higher percentage of hospitalization costs for ESBL-positive patients than for ESBL-negative patients (0.5% vs. 0.1%; $P < 0.001$)¹¹

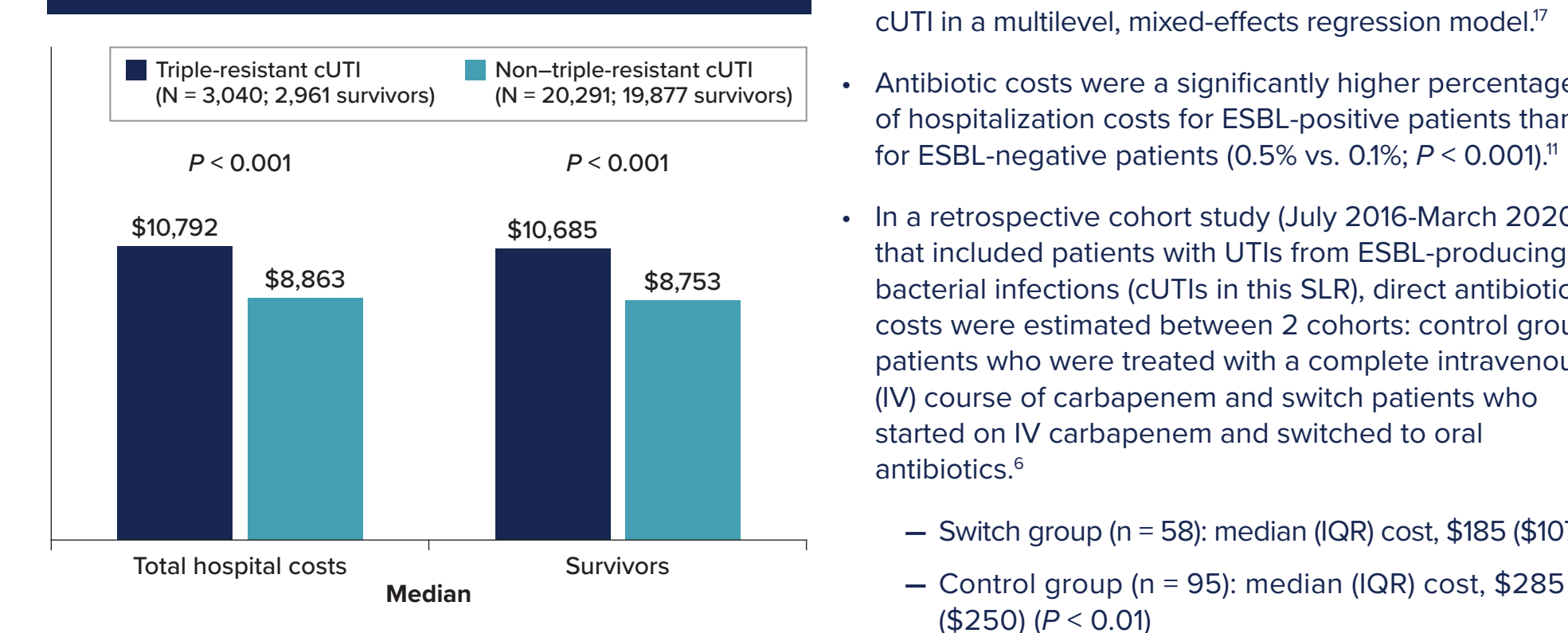
Mean total hospitalization cost per case of cUTI in 78 hospitals (January 2013-September 2015)¹³



Median total hospital cost (IQR) in patients with UTI from ESBL-positive infections (cUTI) or ESBL-negative infections (uncomplicated UTI) (1 September 2011-31 August 2012):

ESBL positive (n = 55)	ESBL negative (n = 55)	P value
\$13,839 (\$8,821-\$20,382)	\$9,126 (\$7,301-\$15,013)	0.02

Total hospital costs (2013-2018) in adults with triple- vs. non-triple-resistant cUTI¹¹



- In a 2013-2018 database study, triple-resistant cUTI was associated with an excess of \$805 (95% CI, \$434-\$1178) in-hospital costs compared with non-triple-resistant cUTI in a multilevel, mixed-effects regression model.¹²

- Antibiotic costs were a significantly higher percentage of hospitalization costs for ESBL-positive patients than for ESBL-negative patients (0.5% vs. 0.1%; $P < 0.001$).¹¹

- In a retrospective cohort study (July 2016-March 2020) that included patients with UTIs from ESBL-producing bacterial infections (cUTIs in this SLR), direct antibiotic costs were estimated between 2 cohorts: control group patients who were treated with a complete intravenous (IV) course of carbapenem and switch patients who started on IV carbapenem and switched to oral antibiotics.⁶

- Switch group (n = 58): median (IQR) cost, \$185 (\$107)
- Control group (n = 95): median (IQR) cost, \$285 (\$250) ($P < 0.01$)

Mean cost of MDR UTIs using HCUP NIS (n = 595), **\$10,162¹²**

The linear regression model from UTI with MDR records showed lower costs most robustly correlated with White race ($P < 0.05$), whereas LOS ($P < 0.0001$) and female sex ($P < 0.05$) correlated with higher costs.

ABBREVIATIONS

CI = confidence interval; ED = emergency department; ESBL = extended-spectrum beta-lactamase; HCUP = Healthcare Cost and Utilization Project; ICU = intensive care unit; IQR = interquartile range; LOS = length of stay; LSM = least squares mean; MDR = multidrug resistance; NIS = National Inpatient Sample.

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