

Letters

RESEARCH LETTER

Trends in Urinary Catheter Use by Indication in US Emergency Departments, 2002-2019

In 2015, an estimated 62 700 catheter-associated urinary tract infections occurred in the US,¹ costing approximately \$864 million.² Emergency departments (EDs) are major sources of urinary catheters, with over 2.6 million placed in 2010,³ making them crucial targets in reducing health care-associated infections.

Supplemental content

For more than a decade, hospital-, state-, and national-level initiatives have aimed to standardize urinary catheter use, especially the 2009 Centers for Disease Control and Prevention (CDC) guidelines⁴ and the Choosing Wisely initiative in 2013.⁵ This study examined trends in urinary catheter use in US EDs between 2002 and 2019.

Methods | We analyzed the 2002-2019 National Hospital Ambulatory Medical Care Survey (NHAMCS), an annual survey of US hospital-based ED visits (eMethods in the Supplement). This analysis was exempted from review by the Mass General Brigham institutional review board.

The main outcome was urinary catheter use among ED patients with and without CDC indications (such as perineal wound, urinary retention, or other conditions potentially requiring urinary catheters),⁴ defined with ED visit diagnoses and

dispositions (eTable and eMethods in the Supplement).³ We calculated biannual rates (percentage of ED visits) of urinary catheter use, separating by catheters with and without CDC indications, among ED visits by adults and the subset of these ED visits leading to hospitalizations, including observation and inpatient admissions. Annual trends in ED visit rates were examined using least squares regression with inverse variance weights. All analyses used survey procedures in Stata version 15.0/MP, incorporating complex survey designs and weights. Significance was defined at $P < .01$ with 2-sided tests, as recommended by the National Center for Health Statistics.⁶

Results | Between 2002 and 2019, NHAMCS sampled 407 588 adult ED visits, from 59 016 (11 037 hospitalized; 2798 with CDC indication) in 2002-2003 to 30 726 (5696 hospitalized; 2636 with CDC indication) in 2018-2019. The 2002-2003 and 2018-2019 hospitalization rates remained similar, whereas ED visits with CDC indications, including those who did and did not receive a catheter, increased overall (5.0% to 9.0%; annual trend, 0.15% [95% CI, 0.08%-0.22%]; $P < .001$) and among hospitalized ED visits (16.1% to 33.2%; annual trend, 0.87% [95% CI, 0.66%-1.07%]; $P < .001$) (Table).

Among all ED visits, overall urinary catheter use decreased from 3.1% in 2002-2003 to 1.6% in 2018-2019 (annual trend, -0.12% [95% CI, -0.14% to -0.10%]; $P < .001$) (Figure; Table). In these periods, among all ED visits, catheter use without CDC indications decreased from 2.1% to 0.8%

Table. Urinary Catheter Use Among ED Visits (Total and Those Leading to Hospitalization) in 2002-2003 and 2018-2019^a

	2002-2003		2018-2019		Annual trend % (95% CI)	P value ^b
	Unweighted No.	Weighted % (95% CI)	Unweighted No.	Weighted % (95% CI)		
Overall ED visits	59 016		30 726			
Has CDC indication ^c	2798	5.0 (4.7 to 5.3)	2632	9.0 (8.2 to 9.9)	0.15 (0.08 to 0.22)	<.001
Urinary catheter						
Any	1662	3.1 (2.8 to 3.5)	465	1.6 (1.3 to 1.8)	-0.12 (-0.14 to -0.10)	<.001
Without indication	1096	2.1 (1.8 to 2.4)	250	0.8 (0.7 to 1.0)	-0.09 (-0.11 to -0.07)	<.001
With indication	566	1.1 (0.9 to 1.2)	215	0.7 (0.6 to 0.9)	-0.02 (-0.03 to -0.02)	<.001
ED visits leading to hospitalization ^d	11 037	18.7 (17.7 to 19.8)	5696	18.4 (17.0 to 19.8)	-0.13 (-0.27 to 0.02)	.08
Has CDC indication ^e	1637	16.1 (14.9 to 17.4)	1777	33.2 (29.7 to 37.0)	0.87 (0.66 to 1.07)	<.001
Urinary catheter						
Any	943	9.6 (8.5 to 10.9)	239	4.2 (3.4 to 5.1)	-0.33 (-0.41 to -0.26)	<.001
Without indication	607	6.0 (5.3 to 6.9)	101	1.6 (1.2 to 2.1)	-0.27 (-0.30 to -0.24)	<.001
With indication	336	3.6 (3.1 to 4.3)	138	2.6 (2.0 to 3.3)	-0.06 (-0.10 to -0.03)	.002

Abbreviations: CDC, Centers for Disease Control and Prevention; ED, emergency department.

^a All estimates, CIs, and P values, except unweighted counts, incorporated survey weights and complex sample design of the National Hospital Ambulatory Medical Care Survey.

^b Significance of annual linear trend in ED visit rates estimated with least squares regression with inverse variance weights.

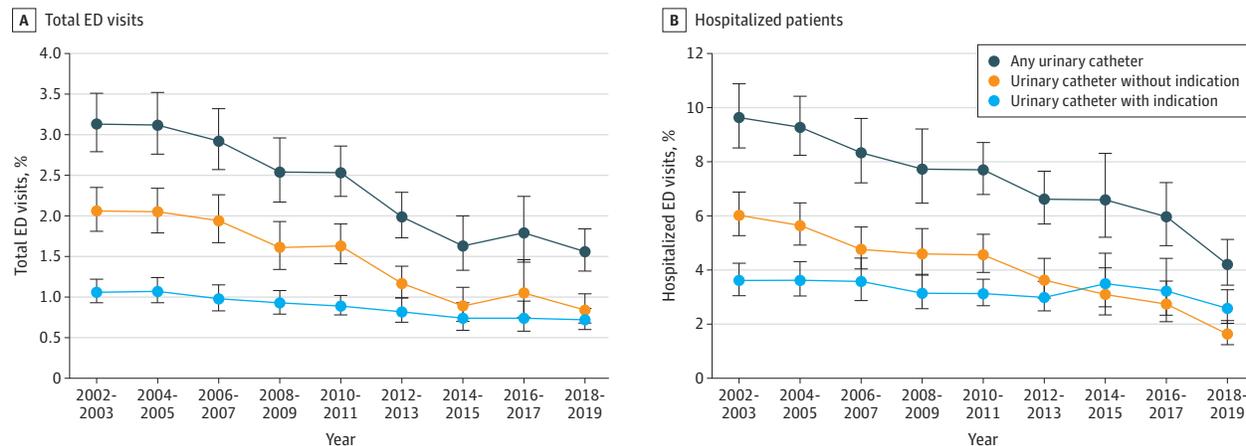
^c The proportion of ED visits with CDC indication for urinary catheter use

(including patients who did and did not receive a catheter), as defined with ED diagnoses and patient disposition (eTable and eMethods in the Supplement).

^d The proportion of overall ED visits in which the patient was hospitalized, including both inpatient and observation stays.

^e The proportion of hospitalized ED visits with CDC indication for urinary catheter use (including patients who did and did not receive a catheter), as defined with ED diagnoses and patient disposition (eTable and eMethods in the Supplement).

Figure. Biannual Rates of Urinary Catheter Use in US Emergency Department (ED) Visits



The estimation of catheter use rates and 95% CIs used survey procedures incorporating survey weights and complex sample designs of the National Hospital Ambulatory Medical Care Survey. A, Data from all ED visits. B, Data from ED visits that led to hospitalization.

(annual trend, -0.09% [95% CI, -0.11% to -0.07%]; $P < .001$), and use with CDC indications decreased from 1.1% to 0.7% (annual trend, -0.02% [95% CI, -0.03% to -0.02%]; $P < .001$). In 2018-2019, 53.9% (95% CI, 48.4%-59.3%) of urinary catheter use was without CDC indications.

Among hospitalized patients, between 2002-2003 and 2018-2019, urinary catheter use decreased from 9.6% to 4.2% (annual trend, -0.33% [95% CI, -0.41% to -0.26%]; $P < .001$) (Figure; Table). In these periods, among hospitalized patients, catheter use without CDC indications decreased from 6.0% to 1.6% (annual trend, -0.27% [95% CI, -0.30% to -0.24%]; $P < .001$); with CDC indications, from 3.6% to 2.6% (annual trend, -0.06% [95% CI, -0.10% to -0.03%]; $P = .002$). In 2018-2019, 38.7% (95% CI, 31.5%-46.4%) of urinary catheter use among hospitalized ED visits was without CDC indications.

Discussion | Between 2002 and 2019, urinary catheter use in US EDs overall and among hospitalized patients decreased, with much of the decline attributed to the decrease in catheter use without CDC indications. Despite increased visits with CDC catheter indications, suggesting higher visit complexity, catheter use with CDC indications decreased. The observed decrease in urinary catheters likely resulted from combined efforts across the health care system, including using alternatives among patients with CDC indications.⁴ However, continued work to reduce ED urinary catheter use among those without indications is warranted.

The study has several limitations. First, this study was retrospective with the possibility of misclassification; however, its effect likely remained similar over time. Second, the NHAMCS did not differentiate in-and-out catheterization from indwelling catheters. As indwelling catheters have a greater risk of associated infections, further studies should examine changes in the type of catheters used. Third, although the definition of CDC indications identified visits that potentially need urinary catheters, it cannot determine the clinical appropriateness of urinary catheters.

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1. Magill SS, O'Leary E, Janelle SJ, et al; Emerging Infections Program Hospital Prevalence Survey Team. Changes in prevalence of health care-associated infections in US hospitals. *N Engl J Med*. 2018;379(18):1732-1744. doi:10.1056/NEJMoa1801550

2. Estimating the additional hospital inpatient cost and mortality associated with selected hospital-acquired conditions. Agency for Healthcare Research and Quality. November 2017. Accessed July 18, 2022. <https://www.ahrq.gov/sites/default/files/publications2/files/hac-cost-report2017.pdf>

3. Schuur JD, Chambers JG, Hou PC. Urinary catheter use and appropriateness in US emergency departments, 1995-2010. *Acad Emerg Med*. 2014;21(3):292-300. doi:10.1111/acem.12334

4. Gould CV, Umscheid CA, Rajender AK, Kuntz G, Pegues DA. Guideline for prevention of catheter-associated urinary tract infections. Centers for Disease Control and Prevention. 2009. Updated February 2017. Accessed March 23, 2022. <https://www.cdc.gov/infectioncontrol/guidelines/cauti/>

5. ABIM Foundation. Choosing Wisely. Accessed March 23, 2022. <https://www.choosingwisely.org/>

6. Ambulatory health care data. National Center for Health Statistics, Centers for Disease Control and Prevention. Accessed June 14, 2022. <https://www.cdc.gov/nchs/ahcd/index.htm>