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National incidence and outcomes of postoperative urinary retention in the Surgical Care Improvement Project

Alex K. Wu, M.D.[a,*], Andrew D. Auerbach, M.D.[a], David S. Aaronson, M.D.[a,b]

[a]Department of Urology, University of California San Francisco, San Francisco, CA, USA; [b]Department of Urology, Kaiser Permanente Medical Group, Oakland, CA, USA

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Abstract

BACKGROUND: The national incidence of postoperative urinary retention (POUR), its risk factors, and associated outcomes are not well understood.

METHODS: We identified patients undergoing one of the Surgical Care Improvement Project surgeries using the National Inpatient Sample. By using International Classification of Diseases, 9th revision, Clinical Modification codes (ICD-9-CM), we identified POUR and the outcomes urinary tract infection, noninfectious catheter-related complications, length of stay, and posthospitalization care. Multivariable analysis identified predictors of POUR and its associated outcomes.

RESULTS: A total of 415,409 patients, representing 2,077,045 nationally, underwent one of the Surgical Care Improvement Project procedures with 43,030 (2.1%) developing POUR. Age, sex, type of surgery, and medical comorbidities were predictive of POUR with a .71 area under the curve. Patients with POUR had greater odds of having urinary tract infections (odds ratio [OR], 2.3; 95% confidence interval [CI], 2.2–2.5), suffering catheter-related complications (OR, 5.2; 95% CI, 3.8–7.0), and needing additional posthospitalization care (OR, 1.3; 95% CI, 1.25–1.4), and they had a greater length of stay (.24 extra days).

CONCLUSIONS: Patients at risk for POUR can be identified, and they may benefit from interventions to prevent POUR.

Efforts in the United States to reduce postoperative morbidity have resulted in such regulatory and advisory agencies as the Centers for Medicaid and Medicare Services and the Joint Commission to promote the use of quality metrics for 7 of the most commonly performed major surgical procedures, as part of the Surgical Care Improvement Project (SCIP), a national quality partnership of organizations with the charge of improving the safety of surgical care through the reduction of postoperative complications.[1] These metrics attempt to target mechanisms to prevent the known morbidities of surgery, including wound infection and venous thromboembolism.

A morbidity that has not been a target of improvement by these agencies is postoperative urinary retention (POUR). POUR is a common postoperative event for both inpatient and outpatient surgeries that occurs after up to 41% of surgeries involving general anesthesia.[2] However, prior studies on POUR are predominantly small or single institutional studies.[2] POUR oftentimes requires prolonged urethral catheterization, which is associated with both infectious[3] and noninfectious complications,[4] increased patient distress, and increased health care use.

* Corresponding author. Tel.: +1-415-353-2200; fax: +1-415-731-4201

E-mail address: Wuak@urology.ucsf.edu

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The national incidence of this common postoperative morbidity is not clearly defined. Understanding its incidence and its consequences is a necessary step before consideration as a quality metric for surgical care. In addition, if POUR were to become a quality metric, then exploration of predictors of POUR would allow for appropriate risk adjustment of hospital rates. To this end, we sought to describe the national incidence of POUR and its association with patient factors and outcomes. We hypothesized that for patients undergoing one of the SCIP procedures, POUR would associate with deleterious patient outcomes and increased length of stay.

Methods

We performed a cross-sectional analysis of US patients identified through the 2007 National Inpatient Sample (NIS), a nationally representative administrative data set composed of inpatient hospital discharge records from a 20% stratified sampling of all nonfederal US hospitals.[5] The NIS is a database of inpatient discharge records, which include patient demographics, length of stay (LOS), discharge diagnosis, and prehospital comorbidities.

We identified patients within the NIS undergoing 1 of the 7 surgical procedures currently monitored through the Joint Commission's SCIP using International Classification of Diseases, 9th revision, Clinical Modification (ICD-9-CM) codes.[6]

The SCIP procedures included coronary artery bypass grafting (CABG), major vascular surgery (aneurysm repair, thromboendarterectomy, vein bypass), hip and knee arthroplasty, hysterectomy, other cardiac surgeries, and colon surgery. Patients who developed POUR were identified with ICD-9-CM codes for "benign prostatic hyperplasia with obstruction" and/or "urinary retention."

Predictors of POUR

The Student *t* test and chi-squared analysis were used to test if POUR was associated with age and/or sex, respectively. Multivariable logistic regression analysis was performed to identify predictors of POUR. We controlled for age, sex, hospital, comorbidities as identified in the NIS, and type of procedure. For this analysis, CABG was used as the standard procedure to which the other procedures were compared. Comorbidities were defined in the severity file by the Elixhauser et al[7] classification, which is a system used in calculating risk-adjusted mortality rates. A receiver operating characteristic curve was generated based on this analysis and area under the curve was calculated.

Outcomes of POUR

To determine the effects of POUR, for each type of surgery, we used multivariable logistic regression analysis, controlling for age, sex, hospital, and underlying comorbidities, to determine how POUR associated with UTIs, noninfectious catheter-related complications, LOS, and need for posthospitalization care. Noninfectious catheter-related complications were identified through ICD-9-CM diagnostic codes for urethral false passage (599.4); mechanical injury due to indwelling catheter (996.31); other mechanical complication due to genitourinary device (996.39); other complications due to genitourinary device, implant and graft (996.76); and surgical misadventure due to urethral catheterization (ecode, E879.6). Need for posthospitalization care was defined as transfer to a short-term hospital, a skilled nursing facility, an intermediate care facility, or requiring home nursing.

Stata/SE version 10.0 (StataCorp, College Station, TX) software was used to perform all analyses. A 2-sided significance level of .05 was used. All analyses used the discharge weights provided in the NIS to calculate nationally representative data. This study was exempt from institutional review board approval because no patient identifiers are listed in the NIS.

Results

A total of 415,409 patients identified in the NIS, representing 2,077,045 patients nationally, underwent 1 of the 7 SCIP procedures. Of these patients, nationally, 43,030 (2.1%) were found to endure POUR. A total of 697,390 patients (35.1%) were men and 1,291,906 patients (64.9%) were women. The mean patient age was 62 years (standard deviation, 14.9 y). The mean LOS was 5.5 days (standard deviation, 6.4 d). Rates of UTI and catheter-related complications were 4.2% (85,709 patients) and .08% (1710 patients), respectively. A total of 1,066,996 patients (50.3%) were able to be discharged home without any additional posthospitalization care (Table 1).

Predictors of POUR

Patients who developed POUR were found to be older (67.7 vs 62.0 y; $P < .0001$) and male predominant (60.9% vs 35.1%; $P < .0001$) (Table 1).

In multivariable logistic regression analysis, sex, age, surgery type, and several comorbidities were associated significantly with the development of POUR. Female patients were less likely to develop POUR (odds ratio [OR], .24; 95% confidence interval [CI], .22–.25), although for each year of age, the odds of developing POUR increased by 4% (OR, 1.04; 95% CI, 1.03–1.04). Patients undergoing major vascular surgery were less likely to develop POUR (OR, .87; 95% CI, .76–.98), whereas those receiving knee, hip, or colon surgery were more likely to develop POUR (OR, 1.38; 95% CI, 1.27–1.5; OR, 1.43; 95% CI, 1.31–1.56; OR, 1.64; 95% CI, 1.49–1.79, respectively) as compared with those receiving CABG. Non-CABG cardiac surgery