

Impact of Postsurgical Opioid Use and Adverse Drug Events on Economic Outcomes in Hysterectomy Surgeries

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Abstract

Objectives: To determine the relationship between postsurgical opioid use and opioid-related adverse drug events (ORADE), morphine equivalent dosing (MED) was calculated for the days following surgery in patients undergoing total abdominal hysterectomies (TAH) (open and laparoscopic), and the impact of ORADE on length of stay (LOS), total visit cost, and 30-day readmissions was assessed.

Methods: The Premier database was queried to identify adult inpatients discharged between 2008 and 2010 who received postsurgical opioids following open and laparoscopic TAH. Adverse drug events were identified using ICD-9 diagnosis codes (Respiratory, GI, CNS, GU and other) and postsurgical MED was calculated. Descriptive statistics including the outcomes of LOS, total hospitalization cost, and 30-day readmission were obtained. Comparison of patients with and without ORADE was accomplished through the use of t-tests for continuous variables and chi-squared tests for categorical variables where appropriate. A $p < 0.05$ was declared significant.

Results: There were 55,280 patients with an average age of 47.2 (SD 11.1) that met the study criteria. Overall, 6.6% of patients had an ORADE, ranging from 3.8% in laparoscopic TAH to 7.0% in open TAH. The most common ORADE was GI (4.3%) and CNS (0.2%) was the least common ORADE. The unadjusted mean LOS, total visit cost, and 30-day readmissions were greater for patients with ORADE compared to those without ORADE: LOS: 4.5 vs. 2.6 days, $p < 0.0001$; cost: \$11,108 vs. \$7,492 $p < 0.0001$; readmissions 8.0% vs. 4.0%, $p < 0.0001$. Patients with higher (above median) MED compared to lower (below median) MED had 2-fold greater odds of experiencing anORADE (OR 1.9, 95% CI 1.79–2.06, $p < 0.0001$).

Conclusions: Occurrence of ORADE was associated with increased LOS, total hospitalization cost, and 30-day readmission rates across TAH surgeries. In this study, higher MED were associated with greater incidence of ORADE; more research is needed to determine what impact strategies to decrease opioid use will have on improving outcomes and reducing costs.

Background

- Approximately 70 million surgeries are performed annually in the United States¹ and up to 70% of these patients experience pain post-surgery.²⁻⁴ Even though a majority of patients experience post-operative pain, insufficient management of pain is common and can lead to profound complications. Better management of postsurgical pain is hampered by the reliance on opioid medications, which are associated with numerous and potentially significant side effects. This retrospective study utilized a large, national hospital database to assess the hospital and healthcare burden of opioid-related adverse events (ORADE) on patient outcomes in patients undergoing open and laparoscopic total abdominal hysterectomies (TAH), a procedure known to require significant postoperative pain management.

Objectives

- To assess the relationship between postsurgical opioid use and occurrence of ORADE
- To determine ORADE impact on hospital length of stay (LOS), total visit cost, and 30-day readmission
- To determine the relationship of morphine dosing to the occurrence of ORADE and relationship to outcomes

Methods

Patient Selection

- The Premier database was queried to identify adult female patients having an open or laparoscopic TAH (ICD-9 CM codes 68.4, 68.49, respectively), administered postsurgical opioids, and discharged between 2008 and 2010. Demographics for age, race/ethnicity, geographic region, and urban/rural status were recorded.
- Charge master records were used to identify opioid use and calculate morphine equivalent dosing.
- ORADE were identified using ICD-9 diagnosis codes for respiratory, GI, CNS, and GU events.
- Patients undergoing open or laparoscopic TAH with documented ORADE were compared to those who did not experience an ORADE.
- Patient outcomes included Length of Stay (LOS), Total Hospitalization Cost, and 30-day all cause readmission.

Statistical Analysis

- Descriptive statistics for continuous data included mean, standard deviation and median. T-tests were used to determine statistical significance between ORADE and no ORADE for each surgery.
- Chi-square tests determined significance in categorical and expressed as percentages of patients.
- A p-value of ≤ 0.05 was considered statistically significant.

Results

- 6.6% of patients exhibited an ORADE
 - 3.8% in laparoscopic TAH
 - 7.0% in open TAH
- The most common occurring ORADE was gastrointestinal (4.3%)
- The least common occurring ORADE was central nervous system (0.2%)
- Mean LOS was 4.5 days inpatients exhibiting an ORADE vs. 2.6 days in patients not exhibiting an ORADE (p-value <0.0001)
 - Median LOS 4.0 in ORADE patients vs. 2.0 days in patients without an ORADE (p-value <0.0001)
- Mean total cost was \$11,108 (SD 5,555) in patients exhibiting an ORADE vs. \$7,492 (SD 3,451) in patients not exhibiting an ORADE (p-value <0.0001)
 - Median total cost \$9,642 in ORADE patients vs. \$6,707 in patients without an ORADE (p-value <0.0001)
- 30-day Readmissions 8% in patients exhibiting an ORADE vs. 4% in patients not exhibiting an ORADE (p-value <0.0001)
- Laparoscopic TAH patients with an ORADE had approximately 50% shorter mean LOS compared to open TAH patients (4.6 days vs. 2.6 days).
- Patients that exhibited an ORADE with a higher than median post-surgical MED amount had higher mean cost and LOS compared to those below the median post-surgical MED. (\$11,803 vs. \$9,976 and 5.1 days vs. 3.9 days)
 - Event rate with \leq MED was 5% and 2.7%; $>$ MED was 9.3% and 4.9% for Open TAH and Laparoscopic TAH, respectively

TABLE 1. PATIENT DEMOGRAPHICS

Patient Demographics for Selected Surgeries (ORADE vs. No ORADE)						
	Open Abdominal Hysterectomy			Laparoscopic Abdominal Hysterectomy		
	ORADE	No ORADE	p-value	ORADE	No ORADE	p-value
Discharges (<i>n</i>)	3,439	46,008		219	5,614	
Index Age (<i>yrs</i>) (<i>mean ± SD</i>)	52.1±13.4	46.8±10.8	<0.0001	51.1±15.1	47.0±11.5	<0.0001
Race/Ethnicity (<i>n</i> , % <i>white</i>)	2,056 (59.8%)	26,650 (57.9%)	<0.0330	139 (63.5%)	3,949 (70.3%)	0.0293
Geographic Location (<i>n</i> , %)						
<i>Midwest</i>	613 (17.8%)	8,589 (18.7%)	0.2202	53 (24.2%)	1,331 (23.4%)	0.7710
<i>South</i>	1,698 (49.4%)	23,775 (51.7%)	<0.0092	93 (42.5%)	2,178 (38.8%)	0.2745
<i>Northeast</i>	515 (15.0%)	5,186 (11.3%)	<0.0001	33 (15.1%)	1,065 (19.0%)	0.1473
<i>West</i>	613 (17.8%)	8,458 (18.4%)	0.4141	40 (18.3%)	1,060 (18.9%)	0.8190
<i>Urban/Rural (n, % rural)</i>	231 (6.7%)	5,379 (11.7%)	<0.0001	17 (7.8%)	626 (11.2%)	0.1163

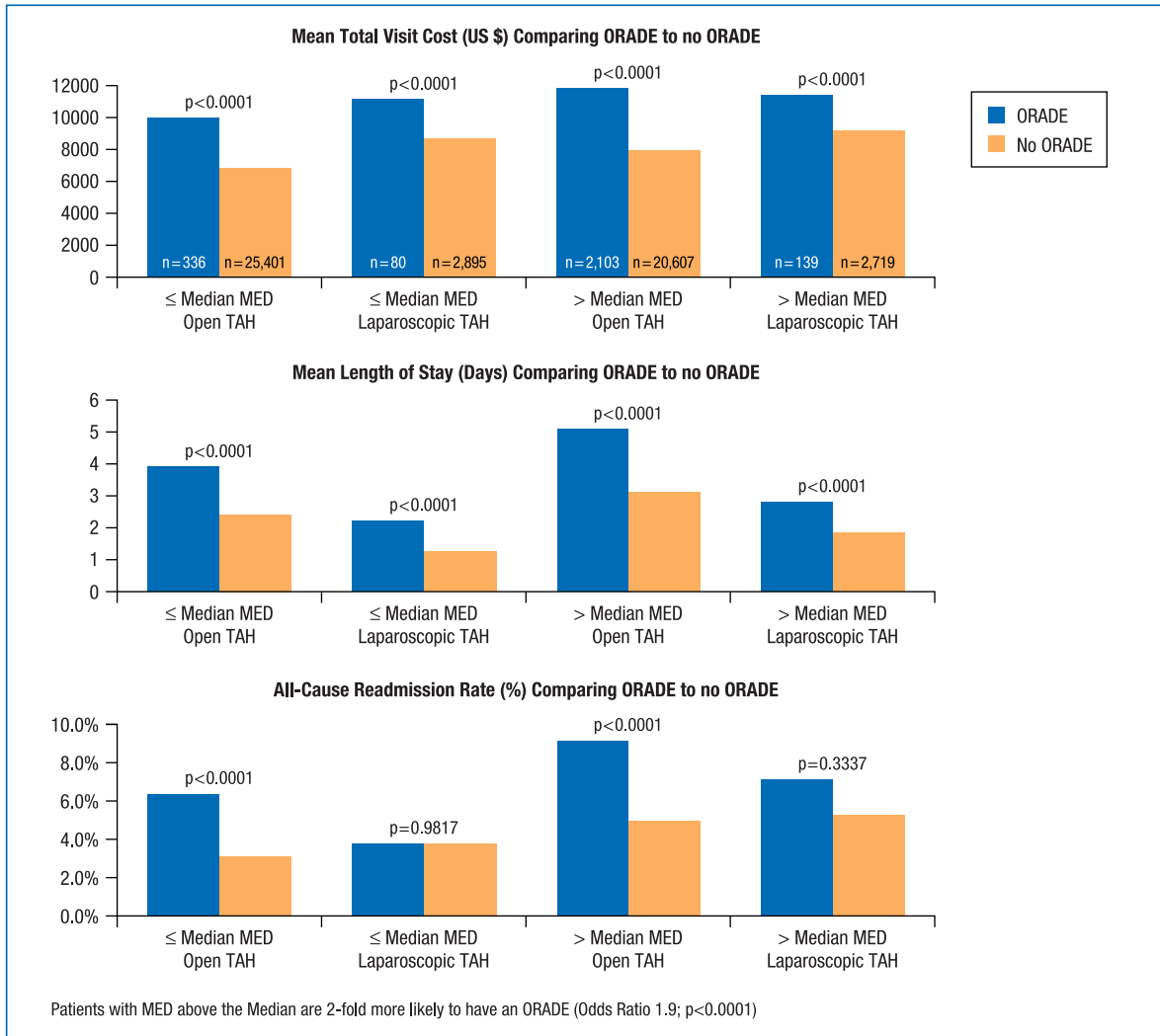
TABLE 2. UNADJUSTED OUTCOMES FOR ALL SURGERIES

Unadjusted Outcomes (ORADE vs. No ORADE)			
Outcome	Total Abdominal Hysterectomy Surgeries		
	ORADE	No ORADE	p-value
Discharges (<i>n</i>)	3,658	51,622	
Length of Stay (<i>days</i>) (<i>mean±SD</i>)	4.5±2.5	2.6±1.3	<0.0001
Total Cost (<i>US \$</i>) (<i>mean±SD</i>)	11,108±5,551	7,492±3,451	<0.0001
Readmission (<i>n, %</i>)	293 (8.0%)	2,087 (4.0%)	<0.0001

TABLE 3. UNADJUSTED OUTCOMES FOR OPEN AND LAPAROSCOPIC TOTAL ABDOMINAL HYSTERECTOMIES

Unadjusted Outcomes (ORADE vs. No ORADE)						
Outcome	Open Abdominal Hysterectomy			Laparoscopic Abdominal Hysterectomy		
	ORADE	No ORADE	p-value	ORADE	No ORADE	p-value
Discharges (<i>n</i>)	3,439	46,008		219	5,614	
Length of Stay (<i>days</i>) (<i>mean±SD</i>)	4.6±2.5	2.7±1.3	<0.0001	2.6±1.5	1.5±0.8	<0.0001
Total Cost (<i>US \$</i>) (<i>mean±SD</i>)	11,093±5,630	7,318±3,426	<0.0001	11,336±4,117	7,318±3,426	<0.0001
Readmission (<i>n, %</i>)	280 (8.1%)	1,833 (4.0%)	<0.0001	13 (5.9%)	254 (4.5%)	<0.0001

FIGURE 1. UNADJUSTED OUTCOMES FOR OPEN AND LAPAROSCOPIC TOTAL ABDOMINAL HYSTERECTOMIES (TAH) ASSESSING MORPHINE EQUIVALENT DOSING (MED) AND OPIOID-RELATED ADVERSE EVENT RATES



Conclusions

Occurrence of ORADE was associated with increased LOS, total hospitalization cost, and 30-day readmission rates across TAH surgeries. In this study, higher MED are associated with greater incidence of ORADE; more research is needed to determine what impact strategies to decrease opioid use will have on improving outcomes and reducing costs.

Limitations

Use of observational administrative databases has noted limitations which include selection bias and reliance on accurate and complete ICD-9 coding and billing, as utilized in this study.

References

1. Cullen KA, Hall MJ, Golosinskiy A. Ambulatory surgery in the United States, 2006. *Natl Health Stat Report*. Jan 28 2009(11):1-25.
2. Apfelbaum JL, Chen C, Mehta SS, Gan TJ. Postoperative Pain Experience: Results from a National Survey Suggest Postoperative Pain Continues to Be Undermanaged. *Anesthesia & Analgesia*. August 1, 2003 2003;97(2):534-540.
3. Warfield CA, Kahn CH. Acute Pain Management: Programs in U.S. Hospitals and Experiences and Attitudes among U.S. Adults. *Anesthesiology*. 1995;83(5):1090-1094.
4. Morrison RS, Magaziner J, McLaughlin MA, et al. The impact of post-operative pain on outcomes following hip fracture. *Pain*. Jun 2003;103(3):303-311.

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