

THE IMPACT OF RESPIRATORY DEPRESSION FOLLOWING INPATIENT SURGERIES ON HOSPITAL CHARGES ACROSS THE UNITED STATES

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BACKGROUND

- Postoperative respiratory depression can stem from a variety of causes, including opioid-induced respiratory depression or residual paralysis due to the use of neuromuscular blocking agents
- If not addressed in a timely manner, postoperative respiratory depression can result in adverse outcomes, such as severe brain damage or mortality¹
- The occurrence of respiratory depression can be costly
 - Treatment to address respiratory depression may lead to extended time in the operating room or the post-anesthesia care unit
 - A study showed that patients who experienced respiratory failure that resulted in a transfer to the ICU had excess hospitalization costs of approximately \$26,500²

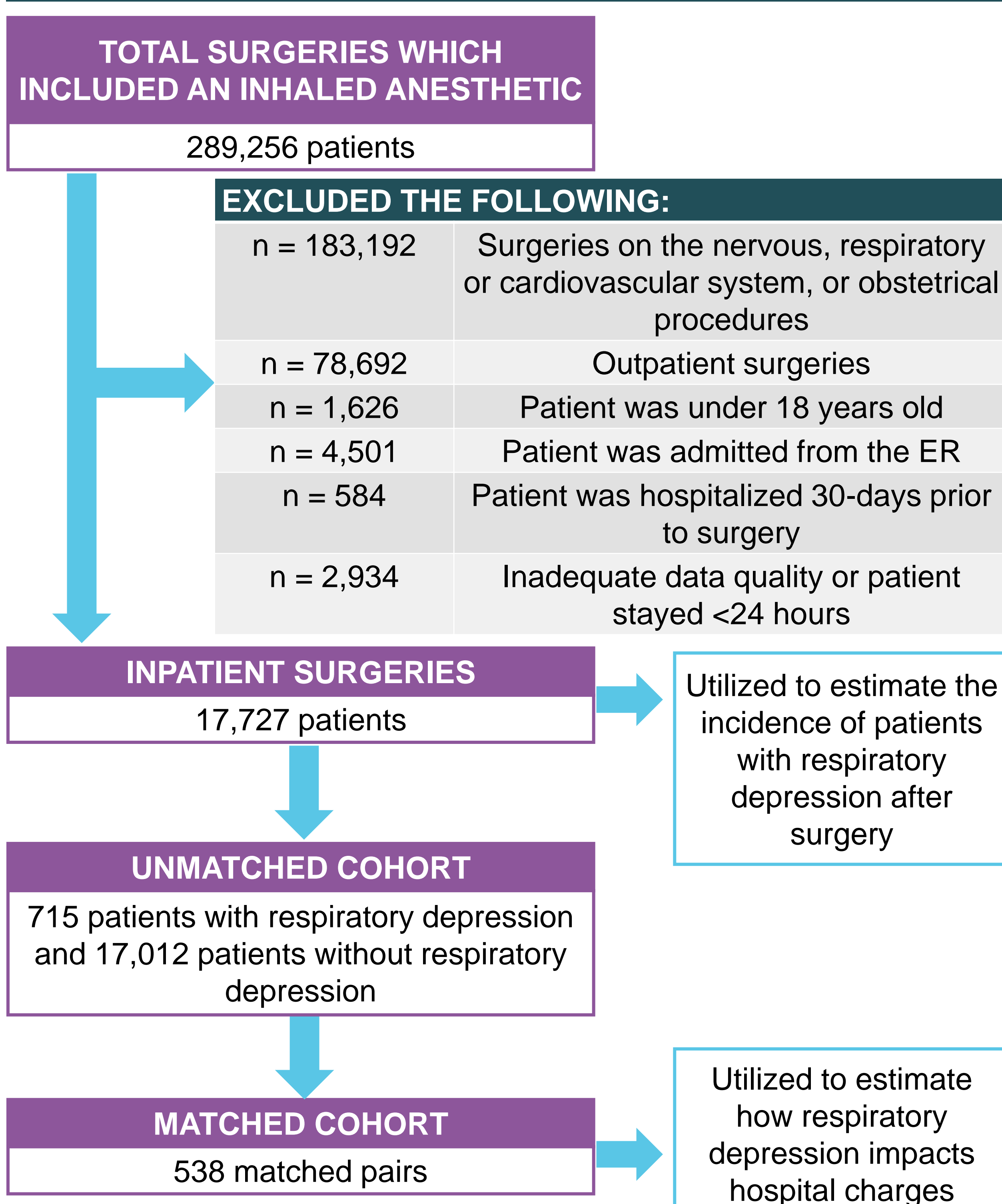
OBJECTIVE

- To determine the incidence and incremental cost of treating patients with postoperative respiratory depression after inpatient surgery

METHODS

- A retrospective analysis was conducted using billing data from the QuintilesIMS Hospital Charge Data Master database, which covers information from over 450 hospitals per month
- Inclusion Criteria:
 - Adult patients who underwent elective surgery between July 1, 2014 and June 30, 2015
 - Administration of an inhaled anesthetic (sevoflurane, isoflurane or desflurane)
 - Hospital stay for >24 hours
- Excluded: Patients undergoing obstetrical surgeries or surgeries of the nervous, respiratory, or cardiovascular systems
- Respiratory depression: Defined as the occurrence of any of the following diagnosis or procedure codes during the patient's hospital stay:
 - Cricothyroidotomy on the same day of surgery
 - Re-intubation (defined as the occurrence of ≥1 intubation codes)
 - Mechanical ventilation
 - Hypoxia diagnosis
 - At least one administration of naloxone
 - A second administration of neostigmine on the same day as the first administration
 - Placement of nasal trumpet or oral airway
 The incidence of respiratory depression captured in this analysis excludes the instances of any of the aforementioned procedures if they were used as an inherent part of surgery
- Hospital charges were used as a proxy for costs
 - No cost-to-charge ratio was applied in this analysis
- Patients with respiratory depression (cases) were matched to patients without respiratory depression (controls)
 - First, patients were directly matched on:
 - The major category of the admission diagnosis code (e.g. diseases of the digestive system)
 - The exact procedure code
 - Second, patients were matched using propensity score matching (nearest neighbor approach)
 - The propensity score was created using the following variables: Age, gender, payor type, hospital region, hospital location, hospital teaching status, hospital bed size

SAMPLE SELECTION



DISCUSSION AND CONCLUSIONS

- In this study, 4.0% of patients (715 out of 17,727) had respiratory depression after their inpatient surgery
- Patients with respiratory depression had significantly higher hospital charges compared to patients without respiratory depression
- Adverse events caused by medicines used in the perioperative setting could be a risk factor for respiratory depression
 - Many studies have shown that side effects from using perioperative drugs may be associated with the patient's genetic background³
 - Future studies should evaluate how pharmacogenetics may help predict the variability in medication response that is due to genetics

RESULTS

Table 1. Demographics of matched cohorts

	Patients with respiratory depression		Patients without respiratory depression		P-Value
	N	%	N	%	
Sample size (N)	538	100.0%	538	100.0%	
Age: Mean (SD)	59.1	(14.2)	58.9	(14.5)	0.4513
Sex (%)					
Female	309	57.43%	300	55.76%	0.1599
Payor type (%)					
Third Party	380	70.63%	394	73.23%	0.5778
Medicare	21	3.90%	20	3.72%	
Medicaid	127	23.61%	117	21.75%	
Cash	10	1.86%	7	1.30%	
Hospital region (%)					
Northeast	90	16.73%	90	16.73%	0.9118
South	129	23.98%	128	23.79%	
West	235	43.68%	230	42.75%	
Midwest	84	15.61%	90	16.73%	
Hospital bed size (%)					
<200	202	37.55%	205	38.10%	0.4967
<500	238	44.24%	236	43.87%	
500+	98	18.22%	97	18.03%	
Hospital teaching status (%)					
Teaching	257	47.77%	258	47.96%	0.8759
Hospital location (%)					
Urban	505	93.87%	508	94.42%	0.0833

Figure 1. Incidence of patients with respiratory depression

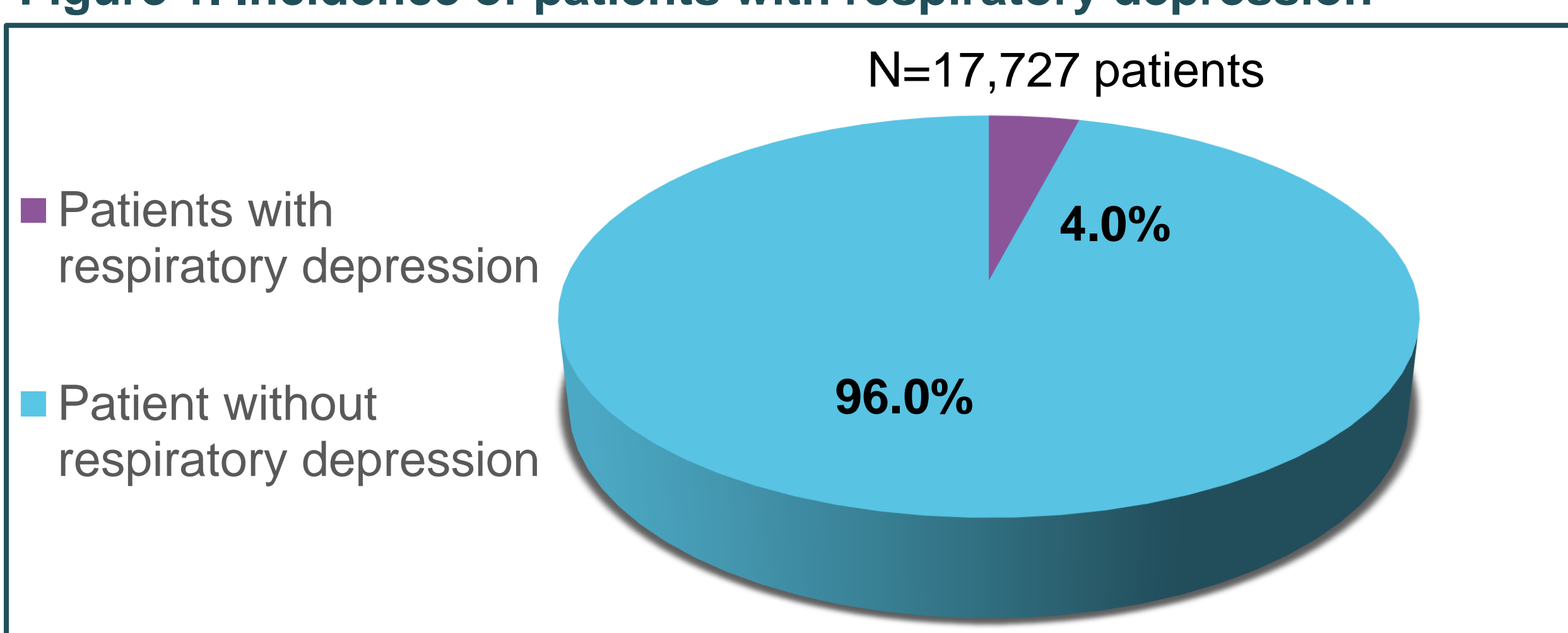
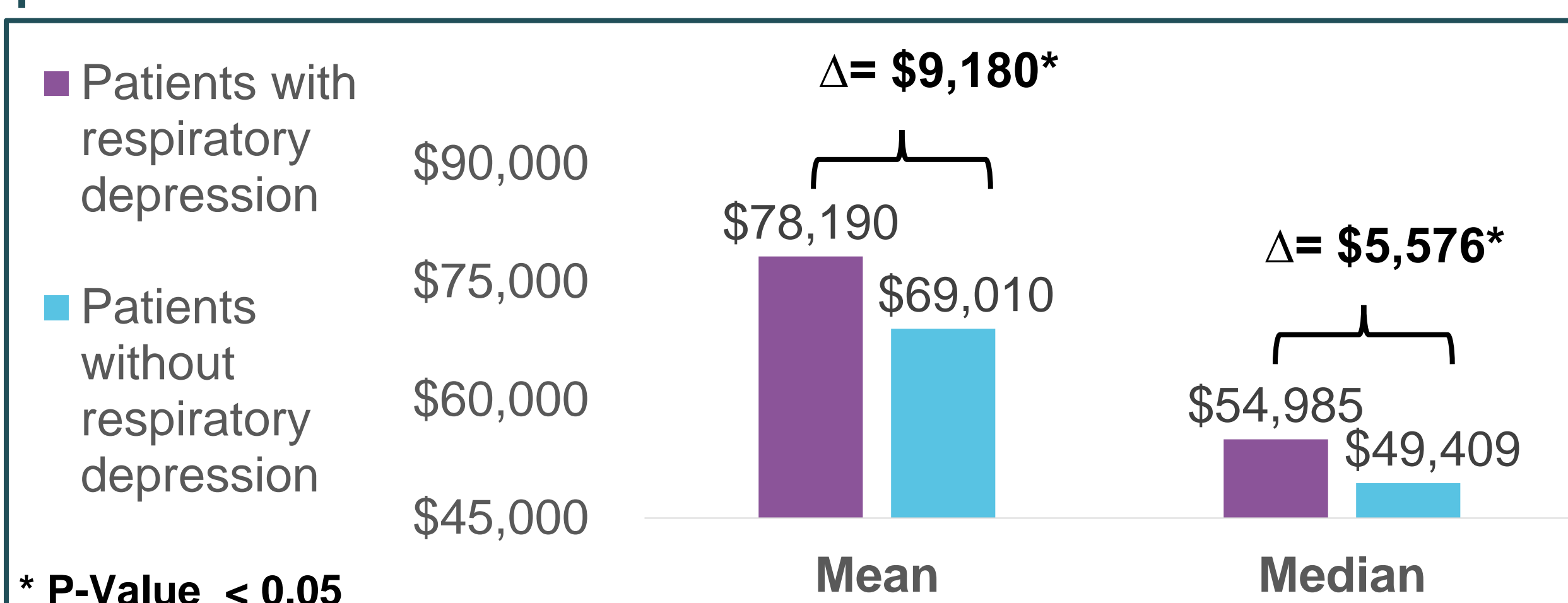


Figure 2. Mean and median total charge of the hospital stay per patient



LIMITATIONS

- This study has limitations inherent to the use of billing data
- This study could not capture respiratory depression events that only required interventions that are not billed for (e.g. use of bag-valve-mask)
- A hypoxemia diagnosis may be due to reasons other than respiratory depression (e.g. cardiac failure)
- This analysis excluded major categories of surgeries, which limits the external validity of this study

REFERENCES

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