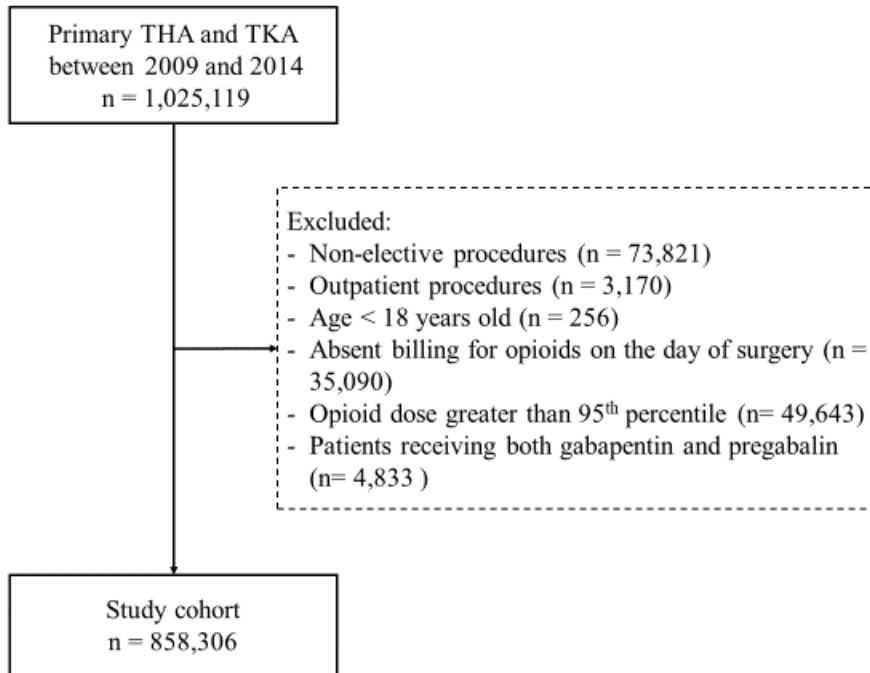


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**Appendix Figure 1. Study flow chart.**



THA, total hip arthroplasty; TKA, total knee arthroplasty

## Appendix Table 1. Opioid Dose Conversions

The following were considered equivalents to 10 mg parenteral (iv, sc, im) Morphine  
Same conversion for short or long acting

Morphine parenteral	10 mg
Morphine oral (po)	30 mg
Codeine	200 mg
Hydromorphone parenteral	1.5 mg
Hydromorphone oral	7.5 mg
Oxycodone po	20 mg
Hydrocodone po	30 mg
Oxymorphone parenteral	1 mg
Oxymorphone rectal	10 mg
Oxymorphone oral	15 mg
Levorphanol parenteral	2 mg
Levorphanol oral	4 mg
Methadone parenteral	10 mg
Methadone oral	20 mg
Fentanyl parenteral	0.1 mg
Fentanyl transdermal	Approximate equivalent doses for oral morphine, IV/SQ morphine, and TD fentanyl 60 mg/day oral $\approx$ 20 mg/day IV/SQ $\approx$ 25 micrograms/hour TD 120 mg/day oral $\approx$ 40 mg/day IV/SQ $\approx$ 50 micrograms/hour TD 180 mg/day oral $\approx$ 60 mg/day IV/SQ $\approx$ 75 micrograms/hour TD 240 mg/day oral $\approx$ 80 mg/day IV/SQ $\approx$ 100 micrograms/hour TD
Fentanyl oral	0.1 mg
Buprenorphine parenteral	0.3 mg
Buprenorphine transdermal	0.01 mg /hour
Tapentadol	75 mg
Tramadol	100 mg
Meperidine	300 mg
Pentazocine	180 mg
Propoxyphene	65 mg
Nalbuphine	2.5 mg
Alfentanil iv	0.5 mg
Remifentanil iv	0.1 mg
Sufentanil iv	0.01 mg

Morphine 10 mg parenteral = Morphine 30 mg oral = Hydromorphone 1.5 mg parenteral = Hydromorphone 7.5 mg oral.

### Steps in Dose Conversion

- A. **Change route, keeping drug the same (e.g. oral to IV morphine)**
  - Example: Change 90 mg q12 Extended Release Morphine to Morphine by IV continuous infusion
    1. Calculate the 24 hour current dose: 90mg q 12 = 180 mg Morphine/24 hours
    2. Use the oral to parenteral equianalgesic ratio: 30 mg PO Morphine = 10 mg IV Morphine
    3. Calculate new dose using ratios: 180/30 x 10 = 60 mg IV Morphine/24
- B. **Change drug, keep the same route (e.g. po morphine to po hydromorphone)**

1. Example: Change 90 mg q 12 Extended Release Morphine to oral Hydromorphone.
  2. Calculate the 24 hour current dose:  $90 \text{ Q12} \times 2 = 180 \text{ mg PO Morphine/24 hrs}$
  3. Use the equianalgesic ratio:  $30 \text{ mg PO Morphine} = 7.5 \text{ mg PO Hydromorphone}$
  4. Calculate new dose using ratios:  $180/30 \times 7.5 = 45 \text{ mg oral Hydromorphone/24 hours}$ .
- C. Changing drug and route (e.g. oral morphine to IV hydromorphone)**
- Example: Change from 90 mg q12 Extended Release Morphine to IV Hydromorphone as a continuous infusion.
    1. Calculate the 24 hour current dose:  $90 \text{ Q12} \times 2 = 180 \text{ mg PO Morphine/24 hrs}$
    2. Use the equianalgesic ratio of PO to IV morphine:  $30 \text{ mg po Morphine} = 10 \text{ mg IV Morphine}$
    3. Calculate new dose using ratios:  $180/30 \times 10 = 60 \text{ mg IV Morphine/24 hours}$
    4. Use the equianalgesic ratio of IV Morphine to IV Hydromorphone:  $10 \text{ mg Morphine} = 1.5 \text{ mg Hydromorphone}$
    5. Calculate new dose using ratios:  $60/10 \times 1.5 = 9 \text{ mg IV Hydromorphone/24 hours}$

Reference: Regional Anesthesia and Pain Medicine: October 2018 - Volume 43 - Issue 7 - p 705–711

Supplemental Digital Content 2 <http://links.lww.com/AAP/A258>

**Appendix Table 2. List of ICD-9 codes for definitions of variables.**

<b>Variables</b>	<b>ICD-9 Codes</b>
<b>Respiratory failure</b>	518.5, 518.51, 518.52, 518.81, 518.82, 518.84
<b>Pulmonary edema</b>	514, 518.4, 428.0, 276.6, 276.69
<b>Tracheal reintubation</b>	96.04 (plus CPT 31500, CPT 94002)
<b>Pneumonia</b>	481, 482.0, 482.1, 482.30, 482.40, 482.41, 482.42, 482.82, 482.83, 482.89, 482.9, 486, 483.8, 484.6, 485, 507.0
<b>Substance abuse disorders</b>	291, 291.0, 291.1, 291.2, 291.3, 291.4, 291.5, 291.8, 291.81, 291.82, 291.9, 292, 292.0, 292.1, 292.11, 292.12, 292.2, 292.8, 292.81, 292.82, 292.83, 292.84, 292.85, 292.9, 303, 303.0, 303.9, 304, 304.0, 304.1, 304.2, 304.3, 304.4, 304.5, 304.6, 304.7, 304.8, 304.9, 305, 305.0, 305.1, 305.2, 305.3, 305.4, 305.5, 305.6, 305.7, 305.8, 305.9
<b>Psychiatric disorders</b>	
<b>Bipolar</b>	296.0, 296.1
<b>Depression</b>	296.2, 296.3, 300.4, 301.12, 309.0, 309.1, 311, 296.4, 296.5, 296.6, 296.7, 296.8, 296.9
<b>PTSD</b>	309.8, 308
<b>Schizophrenia</b>	295, 295.0, 295.1, 295.2, 295.3, 295.4, 295.5, 295.6, 295.7, 295.8, 295.9
<b>Pain</b>	721, 721.0, 721.1, 721.2, 721.3, 721.4, 721.5, 721.6, 721.7, 721.8, 721.9, 722, 722.0, 722.1, 722.2, 722.3, 722.4, 722.5, 722.6, 722.7, 722.8, 722.9, 723, 723.0, 723.1, 723.2, 723.3, 723.4, 723.5, 723.6, 723.7, 723.8, 723.9, 724, 724.0, 724.1, 724.2, 724.3, 724.4, 724.5, 724.6, 724.7, 724.8, 724.9, 847, 847.0, 847.1, 847.2, 847.3, 847.4, 847.9, 338, 338.0, 338.1, 338.2, 338.3, 338.4, 780.96
<b>Elixhauser comorbidity systems<sup>1</sup></b>	

PTSD: post-traumatic stress syndrome, CPT: Current Procedural Terminology

1. The diagnosis coding of ICD-9-CM used in the Elixhauser comorbidity systems to identify comorbidities in hospital discharge records is available at the following link:

<https://www.hcup-us.ahrq.gov/toolssoftware/comorbidity/comorbidity.jsp#archives>

**Appendix Table 3. List of billing descriptions used in this study**

Variables	Description
Gabapentin	GABAPENTIN, NEURONTIN CAP 100MG GABAPENTIN, NEURONTIN CAP 300MG GABAPENTIN, NEURONTIN CAP 400MG GABAPENTIN, NEURONTIN TAB 600MG GABAPENTIN, NEURONTIN TAB 800MG GABAPENTIN, NEURONTIN SOL 250MG/5ML 5ML GABAPENTIN, NEURONTIN SOL 250MG/5ML 10ML GABAPENTIN, NEURONTIN SOL 250MG/5ML 30ML GABAPENTIN, NEURONTIN SOL 250MG/5ML 60ML GABAPENTIN, NEURONTIN SOL 250MG/5ML 120ML GABAPENTIN, NEURONTIN SOL 250MG/5ML 470ML GABAPENTIN MISC GABAPENTIN GABAPENTIN (NEURONTIN)
Pregabalin	PREGABALIN, LYRICA CAP 25MG PREGABALIN, LYRICA CAP 50MG PREGABALIN, LYRICA CAP 75MG PREGABALIN, LYRICA CAP 100MG PREGABALIN, LYRICA CAP 150MG PREGABALIN, LYRICA CAP 200MG PREGABALIN, LYRICA CAP 225MG PREGABALIN, LYRICA CAP 300MG PREGABALIN, LYRICA SOL 20MG/ML 5ML PREGABALIN MISC PREGABALIN
Oral NSAIDs	DIFLUNISAL, DOLOBID TAB 250MG DIFLUNISAL, DOLOBID TAB 500MG FENOPROFEN, NALFON CAP 200MG FENOPROFEN, NALFON CAP 300MG FENOPROFEN, NALFON TAB 600MG HYDROCOD/IBUPROF, VICOPROFEN TAB 7.5/200MG IBUPROFEN, MOTRIN TAB 300MG IBUPROFEN, MOTRIN TAB 400MG IBUPROFEN, MOTRIN TAB 600MG IBUPROFEN, MOTRIN TAB 800MG KETOROLAC, TORADOL TAB 10MG MEFENAMIC, PONSTEL CAP 250MG IBUPROFEN, MOTRIN DRPS 40MG/ML 15ML IBUPROFEN, ADVIL TAB 200MG IBUPROFEN, MOTRIN TAB 100MG

	<p>IBUPROFEN, MOTRIN TAB CHW 50MG                  IBUPROFEN, PEDIAPROFEN SUSP 100MG/5ML 10ML                  IBUPROFEN, PEDIAPROFEN SUSP 100MG/5ML 120ML                  IBUPROFEN, PEDIAPROFEN SUSP 100MG/5ML 20ML                  IBUPROFEN, PEDIAPROFEN SUSP 100MG/5ML 30ML                  IBUPROFEN, PEDIAPROFEN SUSP 100MG/5ML 40ML                  IBUPROFEN, PEDIAPROFEN SUSP 100MG/5ML 5ML                  IBUPROFEN, PEDIAPROFEN SUSP 100MG/5ML 60ML</p>
Intravenous NSAIDs	<p>KETOROLAC, TORADOL INJ 15MG/ML 1ML                  KETOROLAC, TORADOL INJ 30MG/ML 1ML                  KETOROLAC, TORADOL INJ 30MG/ML 2ML                  IBUPROFEN, NEOPROFEN VL 10MG/ML 2ML</p>
Oral acetaminophen	<p>ACETAMIN/BUT, PHRENILIN TAB 325/50MG                  ACETAMIN/CAFF/BUT, FIORICET TAB 325/40/50MG                  ACETAMIN/CAFF/BUT, ESGIC + TAB 500/40/50MG                  ISOMETH/DICH/ACETAMIN, MIDRIN CAP 65/100/325MG                  ACETAMIN, TYLENOL ELX 650MG/20.3ML                  ACETAMIN/ASA/CAFF, EXCEDRIN TAB 250/250/65MG                  ACETAMIN/DIPHENHYD, EXCEDRIN PM TAB 500/38MG                  ACETAMIN/DIPHENHYD, TYLENOL PM TAB 500/25MG                  ACETAMIN/PHENYLTOX, PERCOGESIC TAB 325/30MG                  ACETAMIN, TYLENOL CAP 325MG                  ACETAMIN, TYLENOL CAP 500MG                  ACETAMIN, TYLENOL DRPS 100MG/ML 0.8ML                  ACETAMIN, TYLENOL DRPS 100MG/ML 15ML                  ACETAMIN, TYLENOL ELX 120MG/5ML 30ML                  ACETAMIN, TYLENOL ELX 130MG/5ML 12.5ML                  ACETAMIN, TYLENOL ELX 130MG/5ML 120ML                  ACETAMIN, TYLENOL ELX 130MG/5ML 25ML                  ACETAMIN, TYLENOL ELX 130MG/5ML 5ML                  ACETAMIN, TYLENOL ELX 160MG/5ML 10ML                  ACETAMIN, TYLENOL ELX 160MG/5ML 120ML                  ACETAMIN, TYLENOL ELX 160MG/5ML 240ML                  ACETAMIN, TYLENOL ELX 160MG/5ML 30ML                  ACETAMIN, TYLENOL ELX 160MG/5ML 5ML                  ACETAMIN, TYLENOL ELX 500MG/15ML 15ML                  ACETAMIN, TYLENOL ELX 500MG/15ML 240ML                  ACETAMIN, TYLENOL ELX 500MG/15ML 30ML                  ACETAMIN, TYLENOL TAB 325MG (EA)                  ACETAMIN, TYLENOL TAB 325MG (2)                  ACETAMIN, TYLENOL TAB 500MG                  ACETAMIN, TYLENOL TAB 650MG                  ACETAMIN, TYLENOL TAB CHW 160MG</p>

	ACETAMIN, TYLENOL TAB CHW 80MG
Intravenous acetaminophen	ACETAMINOPHEN, OFIRMEV VL 10MG/ML 100ML ACETAMINOPHEN, OFIRMEV INJ 10MG
COX2-inhibitors	CELECOXIB, CELEBREX CAP 100MG CELECOXIB, CELEBREX CAP 200MG ROFECOXIB, VIOXX TAB 12.5MG ROFECOXIB, VIOXX TAB 25MG ROFECOXIB, VIOXX SUSP 12.5MG/5ML 150ML ROFECOXIB, VIOXX SUSP 12.5MG/5ML 5ML ROFECOXIB, VIOXX SUSP 25MG/5ML 150ML ROFECOXIB, VIOXX SUSP 25MG/5ML 5ML ROFECOXIB, VIOXX TAB 50MG VALDECOXIB, BEXTRA TAB 10MG VALDECOXIB, BEXTRA TAB 20MG CELECOXIB, CELEBREX CAP 400MG CELECOXIB, CELEBREX CAP 50MG CELECOXIB MISC ROFECOXIB MISC VALDECOXIB MISC
Ketamine	KETAMINE, KETALAR VL 100MG/ML 1ML KETAMINE, KETALAR VL 100MG/ML 5ML KETAMINE, KETALAR VL 10MG/ML 1ML KETAMINE, KETALAR VL 10MG/ML 20ML KETAMINE, KETALAR VL 10MG/ML 25ML KETAMINE, KETALAR VL 10MG/ML 50ML KETAMINE, KETALAR VL 50MG/ML 10ML KETAMINE, KETALAR VL 50MG/ML 1ML KETAMINE MISC
Regional anesthesia	FENTANYL, SUBLIMAZE EPIDURAL 250ML HYDROMORPHONE, DILAUDID EPIDURAL 250ML MEPERIDINE, DEMEROL EPIDURAL 250ML BAG EPIDURAL CATHETER EPIDURAL DUPENS CATHETER EPIDURAL L/D ANES CATHETER EPIDURAL SPECIALTY KIT NEEDLE EPIDURAL MINI NEEDLE EPIDURAL NEEDLE EPIDURAL 20GX2.5 NEEDLE EPIDURAL MINI KIT SET EPIDURAL TRAY ANES EPIDURAL TRAY EPIDURAL CONTINUOUS PUMP EPIDURAL SETUP

	<p>CATHETER EPIDURAL                  SET EPIDURAL CATH                  SET EPIDURAL PUMP                  MONITOR PUMP EPIDURAL                  INJ ANES EPIDURAL LUMBAR/CAUDAL CONTINUOUS                  INJ EPIDURAL LUMBAR/CAUDAL                  INJ EPIDURAL CERVICAL/THORACIC                  REMOVE INTRATHECAL/EPIDURAL CATHETER                  ER INJ ANES EPIDURAL CERVICAL/THORACIC SINGLE                  ER INJ ANES EPIDURAL LUMBAR/CAUDAL SINGLE                  ER INJ ANES EPIDURAL LUMBAR/CAUDAL CONTINUOUS                  ER INJ EPIDURAL LUMBAR/CAUDAL                  ER INJ EPIDURAL CERVICAL/THORACIC                  ER REMOVE INTRATHECAL/EPIDURAL CATHETER                  ANES EPIDURAL ADDL 30 MIN                  ANES EPIDURAL FLAT RATE                  ANES EPIDURAL 1ST 30 MIN                  ANES CRNA EPIDURAL FLAT RATE                  ANES EPIDURAL 1ST HR                  ANES EPIDURAL 1 HR                  ANES EPIDURAL 2 HR                  ANES EPIDURAL 2 HR 30 MIN                  ANES EPIDURAL 3 HR                  ANES EPIDURAL 3 HR 30 MIN                  ANES EPIDURAL 4 HR                  ANES EPIDURAL SETUP                  PF INJ ANES EPIDURAL LUMBAR/CAUDAL CONTINUOUS                  PF INJ EPIDURAL LUMBAR/CAUDAL                  PF INJ EPIDURAL CERVICAL/THORACIC                  PF REMOVE INTRATHECAL/EPIDURAL CATHETER</p>
Magnesium	<p>MAGNESIUM CHL VL 20% 50ML                  MAGNESIUM SULF VL 10% 20ML                  MAGNESIUM SULF VL 10% 50ML                  MAGNESIUM SULF VL 12.5% 20ML                  MAGNESIUM SULF VL 25% 50ML                  MAGNESIUM SULF INJ 50% 10ML                  MAGNESIUM SULF INJ 50% 5ML                  MAGNESIUM SULF VL 50% 10ML                  MAGNESIUM SULF VL 50% 20ML                  MAGNESIUM SULF VL 50% 2ML                  MAGNESIUM SULF VL 50% 30ML                  MAGNESIUM SULF VL 50% 50ML                  MAGNESIUM SULF VL 50% 5ML</p>



	<p>MAGNESIUM SULF IVPB 10GM  MAGNESIUM SULF IVPB 20GM  MAGNESIUM SULF IVPB 40GM  MAGNESIUM SULF IVPB 4GM  MAGNESIUM SULF IVPB 1GM  MAGNESIUM SULF IVPB 2GM  MAGNESIUM SULF IVPB 6GM  MAGNESIUM SULF IVPB 50GM  MAGNESIUM SULF VL 50% 1ML (500MG)  MAGNESIUM</p>
Lidocaine	<p>LIDOCAINE IVPB 0.2% 500ML (1GM)  LIDOCAINE IVPB 0.4% 250ML (1GM)  LIDOCAINE IVPB 0.4% 500ML (2GM)  LIDOCAINE IVPB 0.8% 250ML (2GM)  LIDOCAINE IVPB 0.8% 500ML (4GM)  LIDOCAINE, LIDODERM PATCH 5%  LIDOCAINE MISC</p>
Dexmedetomidine	<p>DEXMEDETOMIDINE, PRECEDEX VL 100MCG/ML 2ML  DEXMEDETOMIDINE, PRECEDEX INJ 200MCG/50ML  DEXMEDETOMIDINE, PRECEDEX INJ 400MCG/100ML  DEXMEDETOMIDINE, PRECEDEX INJ 80MCG/20ML  DEXMEDETOMIDINE MISC</p>
Steroid	<p>METHYLPRED ACE, DEPOMEDROL VL 20MG/ML 10ML  METHYLPRED ACE, DEPOMEDROL VL 20MG/ML 1ML  METHYLPRED ACE, DEPOMEDROL VL 20MG/ML 5ML  METHYLPRED ACE, DEPOMEDROL VL 40MG/ML 10ML  METHYLPRED ACE, DEPOMEDROL VL 40MG/ML 1ML  METHYLPRED ACE, DEPOMEDROL VL 40MG/ML 5ML  METHYLPRED ACE, DEPOMEDROL VL 80MG/ML 1ML  METHYLPRED ACE, DEPOMEDROL VL 80MG/ML 5ML  METHYLPRED NA, SOLUMEDROL VL 125MG  METHYLPRED NA, SOLUMEDROL VL 1GM  METHYLPRED NA, SOLUMEDROL VL 2GM  METHYLPRED NA, SOLUMEDROL VL 40MG  METHYLPRED NA, SOLUMEDROL VL 500MG  METHYLPRED, MEDROL TAB 4MG DOSEPAK  METHYLPRED, MEDROL TAB 16MG  METHYLPRED, MEDROL TAB 24MG  METHYLPRED, MEDROL TAB 2MG  METHYLPRED, MEDROL TAB 32MG  METHYLPRED, MEDROL TAB 4MG  METHYLPRED, MEDROL TAB 8MG  METHYLPRED ACE MISC</p>

	<p>METHYLPRED MISC METHYLPRED NA MISC</p> <hr/> <p>PREDNISON, DELTASONE TAB DOSEPAK 5MG (21) PREDNISON SOL 5MG/5ML 10ML PREDNISON SOL 5MG/5ML 30ML PREDNISON SOL 5MG/5ML 5ML PREDNISON SOL 5MG/5ML 60ML PREDNISON, DELTASONE TAB 10MG PREDNISON, DELTASONE TAB 1MG PREDNISON, DELTASONE TAB 2.5MG PREDNISON, DELTASONE TAB 20MG PREDNISON, DELTASONE TAB 50MG PREDNISON, DELTASONE TAB 5MG PREDNISON SOL 5MG/5ML 15ML PREDNISON, DELTASONE TAB DOSEPAK 10MG (21) PREDNISON MISC</p> <hr/> <p>HYDROCORT AC, HYDROCORTONE VL 25MG/ML 10ML HYDROCORT AC, HYDROCORTONE VL 25MG/ML 5ML HYDROCORT AC, HYDROCORTONE VL 50MG/ML 10ML HYDROCORT AC, HYDROCORTONE VL 50MG/ML 5ML HYDROCORT, CORTEF SUSP 10MG/5ML 120ML HYDROCORT, CORTEF SUSP 10MG/5ML 30ML HYDROCORT NA PHOS, HYDROCORTONE VL 50MG/ML 10ML HYDROCORT NA PHOS, HYDROCORTONE VL 50MG/ML 2ML HYDROCORT NA SUC, SOLUCORTEF VL 1GM 8ML HYDROCORT NA SUC, SOLUCORTEF VL 100MG 2ML HYDROCORT NA SUC, SOLUCORTEF VL 250MG 2ML HYDROCORT NA SUC, SOLUCORTEF VL 500MG 4ML HYDROCORT, CORTEF SUSP 10MG/5ML 60ML HYDROCORT, CORTEF TAB 10MG HYDROCORT, CORTEF TAB 20MG HYDROCORT AC MISC HYDROCORT NA PHOS MISC HYDROCORT NA SUC MISC</p>
Naloxone	<p>NALOXONE, NARCAN AMP 0.02MG/ML 2ML NALOXONE, NARCAN INJ 0.2MG NALOXONE, NARCAN INJ 0.4MG NALOXONE, NARCAN VL 0.4MG/ML 10ML NALOXONE, NARCAN VL 0.4MG/ML 1ML NALOXONE, NARCAN VL 0.4MG/ML 2ML NALOXONE, NARCAN VL 0.4MG/ML 5ML NALOXONE, NARCAN VL 1MG/ML 10ML NALOXONE, NARCAN VL 1MG/ML 1ML NALOXONE, NARCAN VL 1MG/ML 2ML NALOXONE MISC</p>

Patient controlled analgesia	FENTANYL, SUBLIMAZE PCA 0.05MG/ML 30ML FENTANYL, SUBLIMAZE PCA 0.05MG/ML 60ML FENTANYL, SUBLIMAZE PCA 0.05MG/ML 100ML HYDROMORPHONE, DILAUDID PCA 0.2MG/ML 30ML HYDROMORPHONE, DILAUDID PCA 0.2MG/ML 60ML MEPERIDINE, DEMEROL PCA 10MG/ML 30ML MEPERIDINE, DEMEROL PCA 10MG/ML 50ML MEPERIDINE, DEMEROL PCA 10MG/ML 60ML MORPHINE PCA 1MG/ML 100ML MORPHINE PCA 1MG/ML 30ML MORPHINE PCA 1MG/ML 50ML MORPHINE PCA 1MG/ML 60ML MORPHINE PCA 5MG/ML 30ML MORPHINE PCA BAG 250ML
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**Appendix Table 4. Baseline comorbidities and pain-related conditions of patients receiving gabapentin on the day of surgery categorized by doses.**

	None n = 764,291	1–350 mg n= 37,613	351–700 mg n= 31,638	701–1050 mg n= 8,352	>1050 mg n= 16,412
CHF, n (%)	16,273 (2.1)	1,161 (3.1)	880 (2.8)	267 (3.2)	521 (3.2)
Valvular disease, n (%)	23,388 (3.1)	1,356 (3.6)	891 (2.8)	253 (3.0)	423 (2.6)
Pulmonary circulation disorder, n (%)	4,844 (0.6)	298 (0.8)	271 (0.9)	96 (1.1)	137 (0.8)
Hypertension, n (%)	491,802 (64.4)	25,581 (68.0)	21,072 (66.6)	5,599 (67)	10,675 (65.0)
Peripheral vascular disease, n (%)	15,654 (2.0)	1,046 (2.8)	765 (2.4)	239 (2.9)	372 (2.3)
Paralysis, n (%)	858 (0.1)	51 (0.1)	46 (0.1)	21 (0.3)	23 (0.1)
Other neurological disorders, n (%)	26,137 (3.4)	2,033 (5.4)	1,668 (5.3)	625 (7.5)	1,115 (6.8)
COPD, n (%)	109,037 (14.3)	6,553 (17.4)	5,472 (17.3)	1,646 (19.7)	3,193 (19.5)
Diabetes, complicated, n (%)	132,515 (17.3)	7,714 (20.5)	6,302 (19.9)	1,627 (19.5)	3,485 (21.2)
Diabetes, uncomplicated, n (%)	8,559 (1.1)	1,246 (3.3)	949 (3.0)	392 (4.7)	639 (3.9)
Hypothyroidism, n (%)	115,304 (15.1)	6,688 (17.8)	5,095 (16.1)	1,434 (17.2)	2,698 (16.4)
Renal failure, n (%)	30,207 (4.0)	2,233 (5.9)	1,577 (5)	493 (5.9)	726 (4.4)
Liver disease, n (%)	6,675 (0.9)	443 (1.2)	337 (1.1)	153 (1.8)	232 (1.4)
Peptic ulcer disease, n (%)	122 (0.0)	7 (0.0)	5 (0.0)	3 (0.0)	4 (0.0)
Acquired immune deficiency syndrome, n (%)	308 (0.0)	22 (0.1)	15 (0.0)	3 (0.0)	11 (0.1)
Lymphoma, n (%)	1,936 (0.3)	126 (0.3)	77 (0.2)	29 (0.3)	53 (0.3)
Metastatic cancer, n (%)	672 (0.1)	50 (0.1)	20 (0.1)	8 (0.1)	16 (0.1)
Solid tumor without metastasis, n (%)	3,032 (0.4)	156 (0.4)	115 (0.4)	26 (0.3)	59 (0.4)
Rheumatoid arthritis, n (%)	29,734 (3.9)	1,975 (5.3)	1,530 (4.8)	436 (5.2)	961 (5.9)
Coagulopathy, n (%)	9,249 (1.2)	533 (1.4)	391 (1.2)	106 (1.3)	198 (1.2)
Obesity, n (%)	151,095 (19.8)	8,900 (23.7)	7,401 (23.4)	2,101 (25.2)	4,012 (24.4)
Weight loss, n (%)	1,846 (0.2)	89 (0.2)	72 (0.2)	12 (0.1)	34 (0.2)
Fluid/electrolyte disorders, n (%)	17,830 (2.3)	1,004 (2.7)	768 (2.4)	219 (2.6)	407 (2.5)
Blood loss anemia, n (%)	2,760 (0.4)	122 (0.3)	96 (0.3)	33 (0.4)	44 (0.3)
Deficiency anemia, n (%)	43,225 (5.7)	2,268 (6)	1,726 (5.5)	485 (5.8)	890 (5.4)
Alcohol abuse, n (%)	8,422 (1.1)	484 (1.3)	389 (1.2)	115 (1.4)	212 (1.3)
Psychoses, n (%)	12,062 (1.6)	863 (2.3)	844 (2.7)	380 (4.5)	657 (4.0)
Depression, n (%)	95,142 (12.4)	6,304 (16.8)	5,122 (16.2)	1,570 (18.8)	3,162 (19.3)
Any substance abuse, n (%)	65,116 (8.5)	3,061 (8.1)	3,051 (9.6)	997 (11.9)	2,008 (12.2)
Pain conditions, n (%)	41,604 (5.4)	3,394 (9.0)	2,663 (8.4)	879 (10.5)	1,683 (10.3)
Steroid, n (%)	40,132 (5.3)	1,776 (4.7)	1,428 (4.5)	428 (5.1)	914 (5.6)

CHF: congestive heart failure, COPD: chronic obstructive pulmonary disease.

**Appendix Table 5. Baseline comorbidities and pain-related conditions of patients receiving pregabalin on the day of surgery categorized by doses.**

	None n = 771,053	1–110 mg n= 47,398	111–250 mg n= 36,161	>250 mg n= 3,694
CHF, n (%)	17,459 (2.3)	929 (2.0)	632 (1.7)	82 (2.2)
Valvular disease, n (%)	23,766 (3.1)	1,330 (2.8)	1,127 (3.1)	88 (2.4)
Pulmonary circulation disorder, n (%)	5,178 (0.7)	248 (0.5)	204 (0.6)	16 (0.4)
Hypertension, n (%)	499,803 (64.8)	29,910 (63.1)	22,725 (62.9)	2,291 (62.0)
Peripheral vascular disease, n (%)	16,467 (2.1)	836 (1.8)	679 (1.9)	94 (2.5)
Paralysis, n (%)	895 (0.1)	62 (0.1)	38 (0.1)	4 (0.1)
Other neurological disorders, n (%)	28,368 (3.7)	1,711 (3.6)	1,304 (3.6)	195 (5.3)
COPD, n (%)	112,773 (14.6)	7,090 (15.0)	5,298 (14.7)	740 (20.0)
Diabetes, complicated, n (%)	136,483 (17.7)	8,209 (17.3)	6,205 (17.2)	746 (20.2)
Diabetes, uncomplicated, n (%)	10,489 (1.4)	748 (1.6)	452 (1.3)	96 (2.6)
Hypothyroidism, n (%)	118,031 (15.3)	7,077 (14.9)	5,502 (15.2)	609 (16.5)
Renal failure, n (%)	32,006 (4.2)	1,907 (4.0)	1,194 (3.3)	129 (3.5)
Liver disease, n (%)	6,956 (0.9)	485 (1.0)	358 (1.0)	41 (1.1)
Peptic ulcer disease, n (%)	127 (0.0)	5 (0.0)	7 (0.0)	2 (0.1)
Acquired immune deficiency syndrome, n (%)	320 (0.0)	19 (0.0)	13 (0.0)	7 (0.2)
Lymphoma, n (%)	2,017 (0.3)	105 (0.2)	89 (0.2)	10 (0.3)
Metastatic cancer, n (%)	700 (0.1)	39 (0.1)	26 (0.1)	1 (0.0)
Solid tumor without metastasis, n (%)	3,099 (0.4)	147 (0.3)	129 (0.4)	13 (0.4)
Rheumatoid arthritis, n (%)	30,859 (4.0)	2,122 (4.5)	1,452 (4)	203 (5.5)
Coagulopathy, n (%)	9,411 (1.2)	523 (1.1)	506 (1.4)	37 (1.0)
Obesity, n (%)	153,807 (19.9)	9,962 (21.0)	8,770 (24.3)	970 (26.3)
Weight loss, n (%)	1,886 (0.2)	108 (0.2)	50 (0.1)	9 (0.2)
Fluid/electrolyte disorders, n (%)	18,340 (2.4)	1002 (2.1)	816 (2.3)	70 (1.9)
Blood loss anemia, n (%)	2,780 (0.4)	166 (0.4)	96 (0.3)	13 (0.4)
Deficiency anemia, n (%)	43,885 (5.7)	2,446 (5.2)	2091 (5.8)	172 (4.7)
Alcohol abuse, n (%)	8,586 (1.1)	530 (1.1)	428 (1.2)	78 (2.1)
Psychoses, n (%)	13,473 (1.7)	679 (1.4)	552 (1.5)	102 (2.8)
Depression, n (%)	98,628 (12.8)	6,762 (14.3)	5,152 (14.2)	758 (20.5)
Any substance abuse, n (%)	66,403 (8.6)	4,039 (8.5)	3,360 (9.3)	431 (11.7)
Pain conditions, n (%)	44,618 (5.8)	3,028 (6.4)	2,189 (6.1)	388 (10.5)
Steroid, n (%)	39,920 (5.2)	2,613 (5.5)	1,791 (5.0)	354 (9.6)

CHF: congestive heart failure, COPD: chronic obstructive pulmonary disease.

**Appendix Table 6. Propensity score analysis using stabilized inverse probability treatment weighting and robust variance estimators showing the association of gabapentin and pregabalin with outcomes.**

Gabapentin	1–350 mg	351–700 mg	701–1050 mg	>1050 mg
Primary outcome				
Composite of PPCs, OR (95% CI)	1.09 (1.01, 1.18)	1.37 (1.23, 1.53)	1.20 (1.07, 1.34)	1.46 (1.20, 1.78)
Secondary outcomes				
ICU admission, OR (95% CI)	1.16 (0.86, 1.57)	1.11 (0.98, 1.26)	1.52 (1.13, 2.03)	1.37 (1.11, 1.68)
LOS, days (95% CI)	0.0 (-0.1, 0.0)	0.0 (-0.1, 0.1)	0.0 (0.0, 0.1)	0.1 (0.0, 0.2)
PMEs on the day of surgery, mg (95% CI)	5.0 (3.4, 6.7)	0.5 (-1.0, 2.0)	0.9 (-1.6, 3.4)	4.6 (0.6, 8.6)
Average daily PMEs after the day of surgery, mg/day (95% CI)	0.9 (0.3, 1.5)	0.8 (0.2, 1.4)	3.1 (1.9, 4.4)	1.7 (0.8, 2.6)
Pregabalin	1–110 mg	111–250 mg	>250 mg	
Primary outcomes				
Composite of PPCs, OR (95% CI)	1.26 (1.10, 1.45)	1.09 (0.93, 1.29)	1.34 (1.10, 1.65)	
Secondary outcomes				
ICU admission, OR (95% CI)	1.30 (0.88, 1.91)	1.82 (1.47, 2.27)	1.1 (0.69, 1.75)	
LOS, days (95% CI)	0.0 (-0.1, 0.0)	-0.1 (-0.2, 0.1)	0.1 (-0.2, 0.4)	
PMEs on the day of surgery, mg (95% CI)	-3.9 (-5.6, -2.2)	-4.2 (-7.2, -1.2)	2.2 (-5.8, 10.2)	
Average daily PMEs after the day of surgery, mg/day (95% CI)	0.9 (0.2, 1.5)	1.2 (0.3, 2.1)	4.2 (2.0, 6.3)	

PPCs were defined as a composite of respiratory failure, pneumonia, re-intubation, pulmonary edema, noninvasive ventilation, or invasive mechanical ventilation. Average daily opioid consumption after the day of surgery was opioid consumption after the day of surgery divided by LOS after the day of surgery. Opioid doses were converted to PMEs using dose conversion formulae (Appendix Table 1).

Abbreviations: LOS: length of stay, PMEs: parental morphine equivalents, PPC: postoperative pulmonary complications, ICU: intensive care unit.