

DOI: 10.1503/cjs.007319

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## Appendix 1: Supplemental Tables

**Supplemental Table S1: ABJHI selection algorithm to identify elective knee arthroplasty in Alberta, Canada**

|                         |   |   |   |
|-------------------------|---|---|---|
| <b>Cohort Name</b>      | Elective Knee Arthroplasty                                |   |   |
| <b>Short/Other Name</b> | Knee  |   |   |
| <b>Description</b>      | All adult elective knee arthroplasty performed in Alberta |   |   |
|                         | <b>Description</b>  | <b>Technical Criteria</b>   | <b>Technical Detail</b>   |
| <b>Include</b>          | Elective admissions                                       | ADMITCAT=L  | L=elective  |
|                         | Knee arthroplasty performed                               | PROCCODE1-20 = 1VG53*,<br>1VA53*, 1VP53*<br><br><b>AND</b><br>PROCSTAT <> (A,R) | <b>ICD-10-CA Codes</b><br>1VG53=implantation, knee<br>1VP53=implantation, patella<br><b>PROCSTAT</b><br>A = abandoned<br>R = revision |
|                         | Age at admission 18 years or older                        | AGE_ADMIT >= 18   |   |
| <b>Exclude</b>          | Cement spacer   | 1VA53LASLN<br>1VA53LLSLN<br>1VG53LASLN<br><b>OR</b><br>PROCEXT=0                | <b>PROCEXT</b><br>0=cement spacer   |
|                         | Cases performed at Alberta Children’s Hospital            | INST=80015  |   |
|                         | Partial hip arthroplasty                                  | 1VA53***M*  |   |

Note  
Table created and provided by ABJHI

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**Supplemental Table S2: Anatomic therapeutic codes (ATC) used to extract opioid from PIN database**

| <b>ATC Code</b> | <b>Drug Class</b>  |
|-----------------|--|
| N02AA           | Natural opium alkaloids                                  |
| N02AA01         | Morphine   |
| N02AA02         | Opium  |
| N02AA03         | Hydromorphone  |
| N02AA04         | Nicomorphine   |
| N02AA05         | Oxycodone  |
| N02AA08         | Dihydrocodeine   |
| N02AA10         | Papaveretum  |
| N02AA51         | Morphine, combinations                                   |
| N02AA55         | Oxycodone, combinations                                  |
| N02AA58         | Dihydrocodeine, combinations                             |
| N02AA59         | Codeine, combinations excluding psycholeptics            |
| N02AA79         | Codeine, combinations with psycholeptics                 |
| N02AB           | Phenylpiperidine derivatives                             |
| N02AB01         | Ketobemidone   |
| N02AB02         | Pethidine  |
| N02AB03         | Fentanyl   |
| N02AB52         | Pethidine, combinations excluding psycholeptics          |
| N02AB72         | Pethidine, combinations with psycholeptics               |
| N02AC           | Diphenylpropylamine derivatives                          |
| N02AC01         | Dextromoramide   |
| N02AC03         | Piritramide  |
| N02AC04         | Dextropropoxyphene                                       |
| N02AC05         | Bzitraamide  |
| N02AC52         | Methadone, combinations excluding psycholeptics          |
| N02AC54         | Dextropropoxyphene, combinations excluding psycholeptics |
| N02AC74         | Dextropropoxyphene, combinations with psycholeptics      |
| N02AD           | Benzomorphan derivatives                                 |
| N02AD01         | Pentazocine  |
| N02AD02         | Phenazocine  |
| N02AE           | Oripavine derivatives                                    |
| N02AE01         | Buprenorphine  |
| N02AF           | Morphinan derivatives                                    |
| N02AF01         | Butorphanol  |
| N02AF02         | Nalbuphine   |
| N02AG           | Opioids in combination with antispasmodics               |
| N02AG01         | Morphine and antispasmodics                              |
| N02AG02         | Ketobemidone and antispasmodics                          |
| N02AG03         | Pethidine and antispasmodics                             |
| N02AG04         | Hydromorphone and antispasmodics                         |
| N02AX           | Other opioids  |
| N02AX01         | Tilidine   |
| N02AX02         | Tramadol   |
| N02AX03         | Dezocine   |
| N02AX05         | Meptazinol   |
| N02AX06         | Tapentadol   |
| N02AX52         | Tramadol, combinations                                   |
| N02AJ01         | dihydrocodeine and paracetamol                           |
| N02AJ02         | dihydrocodeine and acetylsalicylic acid                  |
| N02AJ03         | dihydrocodeine and other non-opioid analgesics           |
| N02AJ06         | codeine and paracetamol                                  |
| N02AJ07         | codeine and acetylsalicylic acid                         |

**Appendix 1** to Goplen CM, Kang SH, Randell JR, et al. Effect of preoperative long-term opioid therapy on patient outcomes after total knee arthroplasty: an analysis of multicentre population-based administrative data. *Can J Surg* 2021.

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|         |   |
|---------|---|
| N02AJ08 | codeine and ibuprofen                   |
| N02AJ09 | codeine and other non-opioid analgesics |
| N02AJ13 | tramadol and paracetamol                |
| N02AJ14 | tramadol and dexketoprofen              |
| N02AJ17 | oxycodone and paracetamol               |
| N02AJ18 | oxycodone and acetylsalicylic acid      |
| N02AJ19 | oxycodone and ibuprofen                 |

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**Supplemental Table S3: Comparison of baseline patient characteristics for those included in final study cohort and those with missing data**

| <b>Variable</b>             | <b>Study Population (n = 1907)</b> | <b>Missing data (n = 9985)</b> | <b>p value</b> |
|-----------------------------|------------------------------------|--------------------------------|----------------|
| Age (SD)                    | 66.6 (8.7)                         | 67.1 (9.5)                     | 0.041          |
| <b>Sex, n (%)</b>           |                                    |                                |                |
| Female                      | 1234 (64.7)                        | 5965 (59.7)                    | 0.001          |
| Male                        | 673 (35.3)                         | 4020 (40.3)                    | 0.001          |
| <b>Comorbidities, n (%)</b> |                                    |                                |                |
| Depression                  | 301 (15.8)                         | 1671 (16.7)                    | 0.001          |
| Stroke                      | 28 (1.5)                           | 156 (1.6)                      | 0.001          |
| Pulmonary disease           | 168 (8.8)                          | 1123 (11.3)                    | 0.001          |
| Cardiac disease             | 456 (23.9)                         | 2750 (27.5)                    | 0.001          |
| Diabetes                    | 388 (20.4)                         | 2215 (22.2)                    | 0.001          |
| Renal disease               | 48 (2.5)                           | 325 (3.3)                      | 0.001          |
| Obesity disease             | 549 (28.8)                         | 2702 (27.1)                    | 0.001          |
| Hepatic disease             | 22 (1.2)                           | 145 (1.5)                      | 0.001          |

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**Supplemental Table S4: Comparison of WOMAC pain and function scores for those included in final study cohort and those with missing data**

| WOMAC Score | Time Point                | Study Cohort (n = 1907) |                      | Missing WOMAC data |                      | p value |
|-------------|---------------------------|-------------------------|----------------------|--------------------|----------------------|---------|
|             |                           | n                       | Mean [95% CI]        | n                  | Mean [95% CI]        |         |
| Pain        | Preoperative              | 1907                    | 45.85 [45.04, 46.65] | 5760               | 44.87 [44.40, 45.34] | 0.23    |
|             | 12-months postoperatively | 1907                    | 78.02 [77.02, 79.02] | 1109               | 77.77 [76.42, 79.11] | 0.86    |
| Function    | Preoperative              | 1907                    | 45.54 [44.76, 46.31] | 7114               | 44.87 [44.40, 45.34] | 0.44    |
|             | 12-months postoperatively | 1907                    | 76.78 [75.81, 77.75] | 1106               | 76.51 [75.25, 77.78] | 0.85    |

Notes

WOMAC = Western Ontario and McMaster Universities Osteoarthritis Index; n number of patients

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**Supplemental Table S5: Interaction model with adjusted parameter estimates for 12-months postoperative WOMAC function scores**

| <b>Variable</b>                     | <b>Estimate</b>      | <b>Standard Error</b> | <b>p-value</b> |
|-------------------------------------|----------------------|-----------------------|----------------|
| Age                                 | 0.007                | 0.055                 | 0.905          |
| Sex                                 | 0.638                | 0.983                 | 0.517          |
| Preoperative Pain Score             | 0.358                | 0.027                 | <.001          |
| Opioid Naive                        | <i>1 [Reference]</i> |                       |                |
| Intermittent Opioid User            | -3.522               | 1.193                 | 0.003          |
| Long-term Opioid User               | -5.706               | 2.261                 | 0.012          |
| Diabetes                            | 1.126                | 1.643                 | 0.493          |
| Depression                          | -2.442               | 1.153                 | 0.034          |
| Pulmonary disease                   | -3.117               | 1.644                 | 0.058          |
| Cardiac disease                     | -2.037               | 1.124                 | 0.070          |
| Depression*Intermittent Opioid User | -10.398              | 2.892                 | <.001          |
| Depression*Long-term Opioid User    | -9.183               | 4.243                 | 0.031          |

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**Supplemental Table S6: Interaction model with adjusted parameter estimates for 12-months postoperative WOMAC pain scores**

| <b>Variable</b>                     | <b>Estimate</b>      | <b>Standard Error</b> | <b>p-value</b> |
|-------------------------------------|----------------------|-----------------------|----------------|
| Age                                 | 0.096                | 0.058                 | 0.096          |
| Sex                                 | 0.044                | 1.032                 | 0.966          |
| Preoperative Pain Score             | 0.316                | 0.028                 | <.001          |
| Opioid Naive                        | <i>1 [Reference]</i> |                       |                |
| Intermittent Opioid User            | -2.869               | 1.253                 | 0.022          |
| Long-term Opioid User               | -5.972               | 2.368                 | 0.012          |
| Diabetes                            | -3.632               | 1.207                 | 0.003          |
| Depression                          | 0.695                | 1.721                 | 0.686          |
| Pulmonary disease                   | -3.467               | 1.722                 | 0.044          |
| Cardiac disease                     | -2.246               | 1.178                 | 0.057          |
| Liver Disease                       | -7.485               | 4.539                 | 0.099          |
| Depression*Intermittent Opioid User | -8.842               | 3.030                 | 0.004          |
| Depression*Long-term Opioid User    | -7.324               | 4.439                 | 0.099          |

Notes

WOMAC = Western Ontario and McMaster Universities Osteoarthritis Index; n number of patients