**SUPPLEMENTARY APPENDIX**

*IDENTIFYING THE HEALTHCARE RECORD FROM WHICH INDICATIONS WERE CLASSIFIED*

In the first stage of the hierarchy, we classified individuals with their index opioid prescribed by a dentist (as indicated on the index prescription), then those with evidence of palliative care in the past year, then those with evidence of cancer in the past year. Thus evidence for the classification of clinical indication in this first stage of the hierarchy came from the index prescription or the healthcare records of the individual over the past year, rather than a single healthcare record.

In contrast for the second and third stages of the hierarchy, we used a single recent healthcare record to classify the clinical indication for which the individual was initiated on opioids. To identify this single healthcare record, we searched for inpatient hospital, same day surgery, emergency department, and physician office, long-term care, and home care visits. We looked 5 days back from the index date to identify a healthcare record to use.

If no records were identified, we also searched for physician visits with an undefined location and used that if available.

If an individual had multiple records identified, we used the most recent record with three exceptions:

* If the physician identifier on a healthcare record matched the dispensing record, we used this record regardless of whether it was most recent.
* If only two healthcare records were identified, one being a physician visit where the physician identifier did not match the dispensing record, we used the other healthcare record (i.e. non-physician visit record).
* If an individual had two healthcare records occurring on the same day (for which the aforementioned steps could not decipher which record to use), we used both and classified an individual’s indication according to whichever procedural or diagnostic code appeared first in our hierarchy.

**Figure A1. Hierarchical approach for classifying indications.**

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*Figure Summary: Cohort A represents the entire cohort of individuals that met inclusion/exclusion criteria. In step one, these individuals were classified into the three clinical indications (dentist-prescribed dental pain, cancer, or palliative care) based on the licensing college of the provider (i.e. being a dentist), or evidence of cancer or palliative care in the year preceding opioid initiation. All individuals not classified into these indications made up Cohort B. Individuals in Cohort B were allocated into procedure-specific diagnosis codes (e.g. Caesarean section) based on procedure codes in recent healthcare records (as described above). All individuals that could not be classified based on procedure codes made up Cohort C. Individuals in Cohort C were allocated based on diagnosis codes into either previously created procedure-specific diagnosis codes (e.g. physician-prescribed dental pain) or newly created diagnosis codes (e.g. fractures and major trauma). All individuals still not classified (i.e. no recent healthcare record found or record found with procedure and diagnosis codes that would not likely warrant an opioid prescription) were categorized as Unknown.*

**Table A1. Indication descriptions**.

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| **Indication** | **Description of inclusion criteria** |
| Dentist-prescribed dental pain | Individuals with prescriptions from dentists. |
| Physician-prescribed dental pain | Individuals with procedure or diagnostic codes relating to:* Teeth
* Gingiva
 |
| Palliative care | Individuals with palliative care in the 12 months prior to index prescription; evidenced by record of:* Hospital visit
* Clinic visit
* Physician billing record
 |
| Cancer | Individuals with cancer treatment or diagnosis in the 12 months prior to index prescription; evidenced by record of (any of the following):* Cancer diagnosis database
* Cancer clinic visit
* Physician billing record, OR

Individuals with procedure or diagnostic codes (in the 5 days prior to or on index prescription date) relating to:* Malignant neoplasms
 |
| Hernia repair | Individuals with procedure code related to hernia repair. |
| Knee, hip, and shoulder surgery | Individuals with procedure codes related to surgeries of the:* Knee (e.g. repair of the joint, ligament, or patella; device implantation; excisions of meniscus or joint)
* Hip (e.g. repair of the joint; fixation of the joint or pelvis, device implantation; reduction)
* Shoulder (e.g. repair of the joint or rotator cuff; fixation of the joint, clavicle, or scapula; excision)
 |
| Common excision | Individuals with procedure codes related to excisions of the:* Gallbladder
* Appendix
* Tonsils and uvula
* Nasal cartilage and sinuses
* Reproductive organs (e.g. uterus, ovary, fallopian tubes, prostate, testis)
 |
| Caesarean section | Individuals with Caesarean section as their procedure code. |
| Other surgery | Individuals with procedure codes related to:* Bypass, occlusions, dilations
* Repairs and excisions of the skin (including prepuce), gastrointestinal tract, veins, breast
* Fixations and reductions (of bones or joints other than the knee, hip, and shoulder)
* Device implantations (e.g. cochlear implant, central venous catheters), OR

Individuals with diagnosis codes related to:* Surgical prophylaxis or follow-up
 |
| Chronic back pain | Individuals with diagnostic codes related to:* Dorsalgia or lumbar strains
* Intervertebral disc disorders
* Spinal deformities (e.g. scoliosis, kyphosis, lordosis)
* Spondylopathies (e.g. ankylosing spondylitis)
 |
| Chronic joint and muscle pain | Individuals with diagnostic codes related to:* Joint pain and inflammation (arthralgia, arthritis)
* Muscle disorders (cramps, pain, masses, inflammation)
* Osteoporosis, connective tissue disorders, congenital bone malformations
 |
| Fracture and major trauma | Individuals with diagnostic codes related to:* Fractures
* Crushing injuries and traumatic amputations
 |
| Dislocations, sprains, strains | Individuals with diagnostic codes related to joint dislocations, ligament sprains, and muscle strains. |
| Burns, wounds, and superficial trauma | Individuals with diagnostic codes related to:* Burns (including corrosion and sunburns)
* Wounds (e.g. open wounds, lacerations)
* Abrasions and bruises
* Dermatological ulcers, dermatitis, psoriasis, etc.
* Nail disorders (e.g. ingrown nails)
* Non-specific superficial injury
 |
| Other trauma | Individuals with diagnostic codes related to:* Concussions and head injuries
* Foreign bodies
* Internal organ injuries
* Birth trauma
* Non-specific injuries
 |
| Nephrolithiasis/ cholecystitis | Individuals with diagnostic codes related to kidney or gallstones. |
| Headache and migraine | Individuals with diagnostic codes related to headache or migraine. |
| Infection | Individuals with diagnostic codes related to:* Viral disease (e.g. Herpes Zoster, infectious cysts)
* Bacterial disease (e.g. Cellulitis, infectious diarrhea, pneumonia)
* Parasitic disease
 |
| Eyes, ears, nose, and throat pain | Individuals with diagnostic codes related to:* Inflammation of nose and throat (e.g. nasopharyngitis, tonsillitis, sinusitis)
* Inflammation of ear and eye (e.g. otitis externa, otitis media, conjunctivitis, keratitis)
* Nasal disorders (e.g. polyps, deviated septum)
* Painful thyroid disorders (e.g. goiter)
 |
| Abdominal and pelvic pain | Individuals with diagnostic codes related to:* Unspecified abdominal and pelvic pain
* Hernias (not treated by surgical repair)
* Inflammations of internal organs (e.g. appendicitis, diverticulitis, gastritis, prostatitis, cervicitis)
* Nausea and vomit
* Menstruation
* Renal failure, obstructive uropathy, other urinary tract disorders
* Cysts and fissures (e.g. ovarian cysts, anal fissures)
 |
| Chest pain | Individuals with diagnostic codes related to:* Unspecified chest pain
* Heart conditions (e.g. heart failure, myocardial infarction, heart blocks)
* Breast pain or masses
* Lung conditions (e.g. bronchitis, pulmonary fibrosis, pulmonary embolism)
* Oesophageal conditions (e.g. esophagitis, ulcers)
 |
| Non-surgical deliveries | Individuals with procedure or diagnosis codes related to:* Labour/delivery (normal or with complications)
* Antepartum or postpartum
* Stillbirths or abortions
 |
| Other pain | Individuals with diagnostic codes related to:* Haemorrhoids
* Non-infectious skin disorders
* Benign neoplasms of non-specific origin (e.g. lipoma)
* Painful vascular disease (e.g. intermittent claudication, Raynaud’s disease, peripheral vascular disease)
* Unclassified pain
 |
| Unknown | Includes individuals with no record found in 5 days prior or on index prescription date, ORIndividuals with record but diagnosis code that would not normally warrant an opioid prescription including:* Anxiety, counselling
* Psychiatric disorder (e.g. dementia, delirium)
* Hypertension, obesity, diabetes, shortness of breath
* Haematological, chronic obstructive pulmonary disorder
* Family planning and infertility
* Laboratory testing
* Routine medical care (including immunizations)
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