Supplementary Online Content

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This supplementary material has been provided by the authors to give readers additional information about their work.
eTable 1. Total Knee Replacement Codes Used as Inclusion Criteria

| Total Knee Replacement Codes |
|-------------------------------|
| **CPT**                       |
| 27447                         |
| **ICD-10-PCS**                |
| 0SRC069, 0SRC06A, 0SRC06Z, 0SRC07Z, 0SRC0J9, 0SRC0JA, 0SRC0JZ, 0SRC0KZ, 0SRC0L9, 0SRC0LA, 0SRC0LZ, 0SRD069, 0SRD06A, 0SRD06Z, 0SRD07Z, 0SRD0J9, 0SRD0JA, 0SRD0JZ, 0SRD0KZ, 0SRD0L9, 0SRD0LA, 0SRD0LZ |
| **ICD-9-CM**                  |
| 81.54                         |
### eTable 2. CPT Codes for Active and Passive Physical Therapy Interventions

| CPT Codes | Physical Therapy                                      |
|-----------|-------------------------------------------------------|
| **Active**|                                                       |
| 97110     | THERAPEUTIC EXERCISES                                 |
| 97112     | NEUROMUSCULAR REEDUCATION                             |
| 97113     | AQUATIC THERAPY/EXERCISES                             |
| 97116     | GAIT TRAINING THERAPY                                 |
| 97530     | THERAPEUTIC ACTIVITIES                                |
| 97535     | SELF CARE MANAGEMENT TRAINING                        |
| **Passive**|                                                      |
| 97010     | HOT OR COLD PACKS THERAPY                             |
| 97012     | MECHANICAL TRACTION THERAPY                           |
| 97014     | ELECTRIC STIMULATION THERAPY                          |
| 97016     | VASOPNEUMATIC DEVICE THERAPY                          |
| 97018     | PARAFFIN BATH THERAPY                                 |
| 97022     | WHIRLPOOL THERAPY                                     |
| 97024     | DIATHERMY EG, MICROWAVE                              |
| 97026     | INFRARED THERAPY                                      |
| 97028     | ULTRAVIOLET THERAPY                                   |
| 97032     | ELECTRICAL STIMULATION                                |
| 97033     | ELECTRIC CURRENT THERAPY                              |
| 97034     | CONTRAST BATH THERAPY                                 |
| 97035     | ULTRASOUND THERAPY                                    |
| 97036     | HYDROTHERAPY                                          |
| 97124     | MASSAGE THERAPY                                       |
| 97140     | MANUAL THERAPY 1/> REGIONS                            |
| G0283     | ELECTRICAL STIMULATION, OTHER THAN WOUND CARE, AS PART OF A THERAPY PLAN OF CARE |
| **Evaluation** |                                                      |
| 97001     | PT EVALUATION                                         |
| 97161     | PHYSICAL THERAPY EVALUATION LOW COMPLEX 20 MINS       |
| 97162     | PHYSICAL THERAPY EVALUATION MODERATE COMPLEX 30 MINS  |
| 97163     | PHYSICAL THERAPY EVALUATION HIGH COMPLEX 45 MINS      |
**eTable 3. A List of Exposures and Outcome**

| Exposures       | Definition                                                                 |
|-----------------|-----------------------------------------------------------------------------|
| **Pre-TKR PT**  |                                                                             |
| Any PT          | One or more PT evaluation or treatment within 90 days before TKR           |
| **Post-TKR PT** |                                                                             |
| Any PT          | One or more PT evaluation or treatment within 90 days after TKR            |
| PT Dose         | Number of PT visits on unique dates within the first PT EOC initiated within 90 days post-TKR. Categorized as 1-5, 6-12, 13+ sessions. |
| PT Timing       | Number of days to initiation of PT within 90 days post-TKR. Categorized as <30 days, 31-60 days, 61-90 days. |
| PT Type         | Active PT was defined as >=50% of CPT codes in the first PT EOC being active PT interventions (see supplementary eTable 3 for CPT codes used to define active and passive PT) |

*Chronic opioid use was the outcome for all models, defined as >= 90 days worth of filled opioid prescriptions over the outcome assessment periods (see Figure 1 for the assessment period)*
**eTable 4. Included and Excluded Opioids**

| Included opioids: opioid prescriptions of oral/enteral formulations of the following: |
|----------------------------------------------------------------------------------|
| fentanyl, codeine, hydrocodone, oxycodone, meperidine, hydromorphone, morphine, methadone, oxymorphone, propoxyphene, levorphanol, levomethadyl, pentazocine, butorphanol, tapentadol, and tramadol. |

| Excluded opioids |
|------------------|
| Combinations of opioids with medications commonly used for cough, nasal congestion, and headache; excluded opioid combinations were those containing pseudoephedrine, guaifenesin, pheynylephrine, brompheniramine, pyrilamine, bulbital and caffeine. |
**eTable 5. Descriptive Data for Patients With One Opioid Prescription Within 12 Months Prior to the Index Date**

|                      | Patients, No. (%)          |
|----------------------|-----------------------------|
| One Opioid (15,169)  |                             |
| **Age (years), mean (SD)** | 65.5 (9.0)                  |
| Female               | 8,924 (58.8%)               |
| Obesity              | 3,395 (22.4%)               |
| **Race**             |                             |
| Asian                | 190 (1.3%)                  |
| Black                | 1,437 (9.5%)                |
| Hispanic             | 743 (4.9%)                  |
| White                | 12,363 (81.5%)              |
| Missing              | 436 (2.9%)                  |
| **US Region**        |                             |
| Midwest              | 5,305 (35.0%)               |
| Northeast/Missing    | 1,294 (8.5%)                |
| South                | 6,208 (40.9%)               |
| West                 | 2,362 (15.6%)               |
| **Insurance Type**   |                             |
| Commercial           | 10,444 (68.9%)              |
| Medicare Advantage   | 4,725 (31.1%)               |
| **Pre-TKR Opioid Prescriptions^, median (IQR)** | 1 (1-1)                    |
| NSAID use            | 9,451 (62.3%)               |
| Fibromyalgia         | 1,285 (8.5%)                |
| Low Back Pain        | 5,608 (37.0%)               |
| Neck Pain            | 2,990 (19.7%)               |
| Shoulder Pain        | 1,385 (9.1%)                |
| Elixhauser physical comorbidities, mean (SD) | 2.7 (2.1)                  |

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| Disorder                          | Count (Percentage) |
|----------------------------------|--------------------|
| ADHD                             | 73 (0.5%)          |
| Depression                       | 2,269 (15.0%)      |
| Bipolar Disorder/Schizophrenia Disorder/PTSD | 179 (1.2%)        |
| Substance Use Disorder           | 42 (0.3%)          |
| Alcohol Use Disorder             | 117 (0.8%)         |
| Anxiety                          | 897 (5.9%)         |
| Dementia                         | 41 (0.3%)          |

^Pre-TKR Opioid Prescriptions: filled opioid prescriptions within 12 months prior to TKR

NSAID: Nonsteroidal anti-inflammatory drugs (including celecoxib, diclofenac, diflunisal, fenoprofen, flurbiprofen, ibuprofen, indomethacin, ketoprofen, ketorolac, meloxicam, naproxen, nabumetone, oxaprozin, phenylbutazone, rofecoxib, salsalate, sulindac, tolmetin, and valdecoxib)

ADHD: attention deficit hyperactivity disorder

PTSD: post-traumatic stress disorder
**eTable 6.** Association of Dose, Timing, and Type of Post-TKR PT With Long-Term Opioid Use After TKR Among Patients with One Opioid Prescription Within 12 Months Prior to the Index Date

|                                      | One Opioid Prescription |                                      | Adjusted OR (95% CI) |
|--------------------------------------|-------------------------|--------------------------------------|----------------------|
|                                      | Patients, No. (%)a | Long-term Opioid Use, No. (%) |                         |
| Any pre-TKR PT                       | Yes                     | 2128                                | 65 (3.1%)            | 0.75 (0.58, 0.98) |
|                                      | No                      | 12082                               | 484 (4.0%)           | 0.65 (0.48, 0.89) |
| Any post-TKR PT                      | Yes                     | 11136                               | 404 (3.6%)           | 0.82 (0.67, 1.00) |
|                                      | No                      | 3074                                | 145 (4.7%)           | 1.0                |
| Post-TKR PT Dose (# sessions)        | 13+                     | 5019                                | 198 (3.9%)           | 1.00 (0.78, 1.28) |
|                                      | 6-12                    | 2863                                | 75 (2.6%)            | 0.65 (0.48, 0.89) |
|                                      | 1-5                     | 2479                                | 100 (4.0%)           | REF                |
| Post-TKR PT Timing (days)            | 61-90                   | 277                                 | 19 (6.9%)            | 1.92 (1.17, 3.17) |
|                                      | 31-60                   | 2099                                | 82 (3.9%)            | 1.13 (0.87, 1.46) |
|                                      | 0-30                    | 7985                                | 272 (3.4%)           | REF                |
| Post-TKR PT Type                     | Active                   | 8116                                | 297 (3.7%)           | 1.13 (0.87, 1.47) |
|                                      | Passive                 | 2245                                | 76 (3.4%)            | REF                |

*Of the 15,169 individuals with one opioid prescription within 12 months prior to the index date, 14,210 had data available over 15-months following TKR for any pre- and post-TKR PT analyses (i.e., 90 day period to exclude any opioid use in the immediate postoperative period and subsequent 12-months of outcome assessment period), and 10,361 received post-TKR PT and had data available over the 12-month outcome assessment period after the end of the episode of care for post-TKR PT dose, timing and type analyses.