Supplementary Online Content

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eAppendix. Selection of Plans

eTable 1. Payers and Plans Examined

eTable 2. List of Non-Pharmacologic Treatments

eTable 3. Differential Incorporation of Utilization Management Strategies Across 45 Medicaid, Medicare Advantage and Commercial Plans for Select Covered Non-Pharmacologic Treatments

eReferences

This supplementary material has been provided by the authors to give readers additional information about their work.
Selection of Medicaid Plans
We selected 16 states based on varying demographics, such as large and small populations, wealth, level of urbanicity, and those with disproportionately high rates of injuries and deaths from prescription and non-prescription opioids, such as Ohio, West Virginia and Maine. Within tertiles of FMAP scores, we selected 4-6 states with varying population sizes and geographic regions, as defined by the United States Census Bureau. As a result, we selected 1 to 2 states from each of the 9 geographic regions. Using data from the Kaiser Family Foundation, we selected Medicaid formularies from the largest Managed Care Organization (MCO) in each state, with the exception of one state’s largest MCO, whose publicly available formulary listed analgesics in a unique fashion. We instead used the formulary from the second largest Medicaid MCO in this state.

Selection of Medicare Advantage Plans
Since their inception, the proportion of Medicare beneficiaries enrolled in Medicare Advantage (“Part C”) has steadily grown, relative to traditional (“fee-for-service”) Medicare. In 2017, Medicare Advantage enrollees numbered 19.0 million and accounted for 33% of all Medicare beneficiaries. To maximize representativeness, we selected the same 15 states as for the Medicaid plans, with the exception of Vermont, where we substituted Connecticut, due to Medicare enrollment data availability. Connecticut also has a relatively small population and is located in the same geographic region as Vermont. Our overall selection of states for Medicare Advantage also varied greatly in the number of their Medicare Advantage beneficiaries.

We referred to enrollment data from Medicare.gov to select Medicare Advantage Plan Types, such as health maintenance organization (HMO) or preferred provider organization (PPO) plans, with the largest or second largest enrollment in each state. Meanwhile, we ensured selection of plans from the largest 5 Medicare Advantage insurers, including Aetna, Anthem, Humana, Kaiser Foundation and United Healthcare, as well as a variety of smaller payers. We then selected plans with a variety of star ratings, which are offered for reference by medicare.gov. Star ratings are an evaluation of a plan’s overall quality and performance, determined by the Centers for Medicare and Medicaid Services, while taking member experience into consideration.

Selection of Commercial Plans
We selected 15 plans derived from a total of 7 states, in order to examine multiple plans within the same state. These 7 states were of different population sizes and geographic regions, selected from the list of states for the Medicaid plans. These states also varied in the magnitude by which they were affected by the opioid epidemic. We examined three commercial plans from each of 2 states, two commercial plans from each of 4 states, and one commercial plan from the last state.

Recent estimates suggest 74.9 million Americans are covered under private insurance. The majority (57%) of these are covered under what’s considered large group plans (greater than 51 employees). The remaining individuals are covered under either small group plans (19.6%) or the individual markets (23.3%). We focus our analysis on the small and large group markets, given that these markets have been the predominant provider of private health insurance. To identify plans of interest, we used the Kaiser Family Foundation data on individual states and the largest enrollments in both the large and small group health insurance markets. Of note, there is significant overlap of insurance carriers between the individual, small, and large group markets. For example, the top three carriers in California are the same across all three markets.
with slight differences in ordering. Additionally, within the same insurance carrier, formularies do not vary much outside of cost-sharing levels, such that a UnitedHealthcare formulary in one state will be similar, if not identical, to the UnitedHealthcare formulary in another state. Once a potential insurance plan was identified, we examined the insurance carrier website for access to the specific state-level formulary. Some plans restricted the plan-specific documents and level of information made publicly available; in these cases, we selected a different plan with large enrollment, but in the same state.
### eTABLE 1. PAYERS AND PLANS EXAMINED.

| State          | Medicaid              | Medicare Advantage     | Commercial Plan                  |
|----------------|-----------------------|------------------------|----------------------------------|
| Arkansas       | Arkansas Medicaid     | United Healthcare      | ---                              |
| California     | MediCal               | Kaiser Foundation      | Anthem Blue Cross Blue Shield    |
| Colorado       | Health First Colorado | Kaiser Foundation      | ---                              |
| Connecticut    | ---                   | Aetna                  | ---                              |
| Florida        | Florida Medicaid      | Humana                 | ---                              |
| Georgia        | Georgia Medicaid      | Humana                 | ---                              |
| Idaho          | Idaho Medicaid        | Anthem                 | ---                              |
| Maine          | MaineCare             | Martin’s Point         | Aetna                            |
|                |                       | Generations Advantage  | Anthem                           |
| Michigan       | Michigan Medicaid     | Anthem                 | ---                              |
| Missouri       | MO HealthNet          | Aetna                  | ---                              |
| New York       | New York Medicaid     | Healthfirst            | Aetna Empire Blue Cross          |
|                |                       |                        | Excellus BCBS                    |
| North Dakota   | North Dakota Medicaid | Medica                 | Blue Cross Blue Shield           |
|                |                       |                        | North Dakota Medica              |
| Ohio           | Ohio Medicaid         | MediGold               | Anthem Medical Mutual of Ohio     |
|                |                       |                        | United Healthcare                |
| Texas          | Texas Medicaid        | United Healthcare      | HCSC                             |
| Vermont        | Vermont Medicaid      | ---                    | United Healthcare                |
| West Virginia  | West Virginia Medicaid| Aetna                  | ---                              |
|                |                       |                        | Aetna Highmark                   |
**eTABLE 2. LIST OF NON-PHARMACOLOGIC TREATMENTS.**

| Medicaid                               | Medicare Advantage and Commercial                  |
|----------------------------------------|---------------------------------------------------|
| Acupuncture                            | Acupuncture                                       |
| Chiropractic care                      | Chiropractic care                                 |
| Occupational Therapy                   | Occupational Therapy                              |
| Physical Therapy                       | Physical Therapy                                  |
| Therapeutic massage                    | Therapeutic massage                               |
| Transcutaneous electrical nerve stimulation (TENS) |                             |
| Psychological interventions            |                                                   |
| Steroid injections                     |                                                   |
| Facet Injections                       |                                                   |
| Lumbar laminectomy                     |                                                   |
| Lumbar discectomy                      |                                                   |
**TABLE 3. DIFFERENTIAL INCORPORATION OF UTILIZATION MANAGEMENT STRATEGIES ACROSS 45 MEDICAID, MEDICARE ADVANTAGE AND COMMERCIAL PLANS FOR SELECT COVERED NON-PHARMACOLOGIC TREATMENTS**

| Physical Therapy | Chiropractic Care | Acupuncture |
|------------------|-------------------|-------------|
| **Condition requirements:** | **Condition requirements:** | **Condition requirements:** |
| - Medically determinable functional physical impairment, weakness, atrophy, and/or a decreased range of motion | - Musculoskeletal disorders | - Chronic pain (duration >3 months) |
| - Loss of function due to illness, injury, loss of a body part, or congenital abnormality | - Subluxation only | - Chronic pain (duration >3 months) as part of comprehensive pain management program |
| **Quantity Limits:** | - Mechanical/myofascial extremity pain or structural imbalance, distortion or subluxation in the human body | - Nausea |
| - 75 min/day | - 2 visits/month | - 6 visits/year |
| - 2 hours/day | - 6 visits/year | - 16 visits/year combined chiropractic care and acupuncture |
| - 15 visits/year | - 10 visits/year | - 20 visits/year |
| - 20 visits/year | - 12 visits/year | - 204 visits/year; 408 visits/year combined acupuncture, chiropractic and/or massage therapy services |
| - 25 visits/year | - 16 visits/year combined chiropractic care and acupuncture | | |
| - 30 visits/year | - 20 visits/year | **Provider requirements:** |
| - 30 visits/year combined physical and speech therapy | - 30 visits/year | - Licensed network acupuncturists |
| - 40 visits/year combined physical and occupational therapy | - 35 visits/year | **Other requirements:** |
| - 60 visits/year combined physical, occupational, and speech therapy | | - Step requirements- failure of physical therapy, NSAIDs, muscle relaxants, analgesics |
| **Provider requirements:** | **Quantity Limits:** | **Other requirements:** |
| - In-network provider | - 6 visits/year | |
| - Licensed provider | - 16 visits/year combined chiropractic care and acupuncture | |
| - Passed National Physical Therapy Examination (NPTE) | - 20 visits/year | |
| **Duration Limit per prescription:** | - 204 visits/year; 408 visits/year combined acupuncture, chiropractic and/or massage therapy services | |
| - 60 days | | |
| - 90 days | | |
| - 6 months | | |
| - 1 year | | |
| **Prescription requirements:** | **Other requirements:** | **Other requirements:** |
| - Written plan of care, including type of services, amount, frequency, duration and measurable goals | | |
| - Comprehensive evaluation to determine if PT is medically necessary | - Only manual manipulation is medically necessary | |
| **Other requirements:** | - Services must be expected to result in improvement in condition | |
| - Services must require unique knowledge, skills and judgment of a physical therapist | | |
| - Services must be expected to result in improvement in functioning within reasonable time | | |
| Expected improvement within 1 month of initiation |   |   |
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