




## Hinge Health Medicare Cost and Utilization Study

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# 1. Executive Summary

Hinge Health's digital musculoskeletal (MSK) program was designed by physical therapists to manage chronic MSK pain through sensor-guided exercise therapy, education, and health coaching. Older adults age 65 and over engaged in the program more than younger adults and experienced similar improvements in pain as younger adults;<sup>1</sup> however, no studies have been conducted to date about the impact of the Hinge Health program on medical care use and medical claims spend among older adults with Medicare fee for service (FFS) coverage.

To address this gap, Hinge Health engaged Optum to estimate medical care use and medical claims spend for Hinge Health members versus a matched, control group of nonparticipants. This study focused on Medicare FFS beneficiaries who had not used medical care for their MSK needs in the past 12 months. It used Medicare FFS enrollment and claims data under Parts A and B obtained through the Centers for Medicare and Medicaid Services (CMS) Qualified Entity Program.

The control group's spend for MSK-specific medical services in the 12 months period after program start date was \$221.27 per member per month (PMPM) more (i.e., 6.2 times higher) than the Hinge Health group. This translates to a gross return on investment of 2.7 (i.e., \$2652 annualized savings divided by the \$995 Hinge Health program fee). The main drivers of savings were from decreased hospital inpatient and outpatient facility spend and spend for professional services from specialists. Most savings in this study came from reduction in use of services for osteoarthritis, spondylopathies/spondyloarthropathy, and joint pain.

In conclusion, Hinge Health may result in reduced MSK-specific medical care use and medical claims spend among Medicare FFS beneficiaries without recent medical care use for MSK needs.

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<sup>1</sup> Wang G, Bailey JF, Yang M and Krauss J (2021) Older Adult Use and Outcomes in a Digital Musculoskeletal (MSK) Program, by Generation. *Front. Digit. Health* 3:693170. doi:10.3389/fdgth.2021.693170

## 2. Background

Chronic MSK pain is a leading cause of disability and cost in the United States, especially among older adults. MSK disorders were the leading cause of years lived with disabilities (YLD) among older adults aged 70 and over (7554 YLD per 100,000 adults) in the United States in 2019.<sup>2</sup> One common MSK disorder, osteoarthritis, shows increasing incidence and prevalence with age.<sup>3</sup> With aging populations, the standardized annualized rate of change for spending on osteoarthritis was 5.7% between 1996 and 2016, reaching \$80 billion in 2016, with most of the expenditures going to inpatient care for adults age 65 years and over.<sup>4</sup>

Clinical guidelines recommend that patients pursue conservative care before using high cost MSK surgeries because exercise and education are effective for managing MSK pain and associated comorbidities.<sup>5 6 7 8 9 10 11</sup> Digital health approaches are among the newest methods

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<sup>2</sup> Global Burden of Disease Collaborative Network. Global Burden of Disease Study 2019 (GBD 2019) Results. Seattle, United States: Institute for Health Metrics and Evaluation (IHME), 2020. Available from <http://ghdx.healthdata.org/gbd-results-tool>

<sup>3</sup> Cui A, Li H, Wang D, Zhong J, Chen Y, Lu H. Global, regional prevalence, incidence and risk factors of knee osteoarthritis in population-based studies. *eClinicalMedicine*. 2020;29. doi:10.1016/j.eclinm.2020.100587

<sup>4</sup> Dieleman JL, Cao J, Chapin A, et al. US Health Care Spending by Payer and Health Condition, 1996-2016. *JAMA*. 2020;323(9):863-884. doi:10.1001/jama.2020.0734

<sup>5</sup> Katz JN, Arant KR, Loeser RF. Diagnosis and treatment of hip and knee osteoarthritis: A review. *JAMA*. 2021;325(6):568-578. doi:10.1001/jama.2020.22171

<sup>6</sup> Bannuru RR, Osani MC, Vaysbrot EE, et al. OARSI guidelines for the non-surgical management of knee, hip, and polyarticular osteoarthritis. *Osteoarthritis and Cartilage*. 2019;27(11):1578-1589. doi:10.1016/j.joca.2019.06.011

<sup>7</sup> Nicolson PJA, Bennell KL, Dobson FL, Ginckel AV, Holden MA, Hinman RS. Interventions to increase adherence to therapeutic exercise in older adults with low back pain and/or hip/knee osteoarthritis: a systematic review and meta-analysis. *Br J Sports Med*. 2017;51(10):791-799. doi:10.1136/bjsports-2016-096458

<sup>8</sup> Peterson NE, Osterloh KD, Graff MN. Exercises for older adults with knee and hip pain. *J Nurse Pract*. (2019) 15:263–67.e3. doi: 10.1016/j.nurpra.2018.12.029

<sup>9</sup> National Guideline Centre (UK). Evidence Review for Exercise for Chronic Primary Pain: Chronic Pain (Primary And Secondary) in Over 16s: Assessment of All Chronic Pain and Management of Chronic Primary Pain: Evidence Review E [Internet]. London: National Institute for Health and Care Excellence (2021). Available online at: <http://www.ncbi.nlm.nih.gov/books/NBK569982/>

<sup>10</sup> Bridle C, Spanjers K, Patel S, Atherton NM, Lamb SE. Effect of exercise on depression severity in older people: systematic review and meta-analysis of randomised controlled trials. *Br J Psychiatry J Ment Sci*. (2012) 201:180–5. doi: 10.1192/bjp.bp.111.095174

<sup>11</sup> Siddall B, Ram A, Jones MD, Booth J, Perriman D, Summers SJ. Short-term impact of combining pain neuroscience education with exercise for chronic musculoskeletal pain: a systematic review and meta-analysis. *Pain*. (2022). 163:e20–e30. doi:10.1097/j.pain.0000000000002308.

for delivering these conservative therapies and can significantly improve knee and low back pain and disability.<sup>12 13 14</sup>

Hinge Health is one such digital program with goals to help members manage chronic MSK pain through sensor-guided exercise therapy, education, and one-on-one health coaching for all members. Animations and videos demonstrate how to perform exercises (e.g., position, repetitions, duration). The program provides educational resources about pain neuroscience, movement, treatment options, coping, lifestyle changes, relaxation, social support, and habit creation. Individual health coaches encourage members to complete at least three playlists per week and to adhere to the program. Coaches work with members to set goals, identify challenges to performing exercises, and implement strategies to overcome challenges. Members may access these program components through a dedicated app on a personal device or tablet provided by Hinge Health. In addition, physical therapists and orthopedic surgeons are available for consultation.

Hinge Health has previously demonstrated high engagement and strong clinical outcomes among older adults. One study found that compared to younger adults, adults aged 65 and older had higher odds of completing Hinge Health's core 12-week program, completed 19 more exercise sessions, accessed 11 more articles, and sent 4 more messages to coaches. Younger and older adults had similar improvements in pain after the Hinge Health program.<sup>15</sup> That is, older adults used Hinge Health more than younger adults, but had similar pain outcomes.

Although older adults in Hinge Health's chronic program had notable engagement and clinical outcomes, it had been unclear the extent to which the Hinge Health program decreased older adult use of avoidable medical care services. To address this gap, this study's primary objective was to estimate medical care use and medical claims spend on MSK services for Hinge Health members versus a matched, control group of nonparticipants (herein, control group) over time. To achieve this objective, this study examined pre-post program change in MSK care use and spend by focusing on Medicare FFS beneficiaries who had no medical care for their MSK needs in the past 12 months. The study focused on participants with no prior MSK history to demonstrate that outcomes differed solely on Hinge Health participation and not therapies that the participant may have had before starting the program. The study's secondary objective was

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<sup>12</sup> Snowdon A. Digital Health: A Framework for Healthcare Transformation [Internet]. (2020). Available online at: <https://www.himss.org/news/himss-defines-digital-health-global-healthcare-industry> (accessed July 15, 2021).

<sup>13</sup> Xie S-H, Wang Q, Wang L-Q, Wang L, Song K-P, He C-Q. Effect of internet-based rehabilitation programs on improvement of pain and physical function in patients with knee osteoarthritis: systematic review and meta-analysis of randomized controlled trials. *J Med Internet Res.* (2021) 23:e21542. doi: 10.2196/21542

<sup>14</sup> Du S, Liu W, Cai S, Hu Y, Dong J. The efficacy of e-health in the self-management of chronic low back pain: a meta-analysis. *Int J Nurs Stud.* (2020) 106:103507. doi:10.1016/j.ijnurstu.2019.103507

<sup>15</sup> Wang G, Bailey JF, Yang M and Krauss J (2021) Older Adult Use and Outcomes in a Digital Musculoskeletal (MSK) Program, by Generation. *Front. Digit. Health* 3:693170. doi:10.3389/fgth.2021.693170

to explore drivers of health care savings produced by the Hinge Health chronic pain program. Study results provided evidence about whether and how Hinge Health prevented use of high-cost, avoidable medical care.

### 3. Methods

**Study Design** - This retrospective study calculated the changes in medical care use and cost for Hinge Health members before and after they started their HH program, and also compared these changes to those of a matched control group. This study used Medicare FFS enrollment and claims data under Parts A and B obtained via the CMS Qualified Entity Program.

**Hinge Health and Control Group** - Table 1 shows the inclusion and exclusion criteria for the Hinge Health and control groups.

**Table 1. Inclusion and exclusion criteria**

| Hinge Health group  | Control group  |
|---|--|
| <ul style="list-style-type: none"> <li>age 65 or older</li> </ul>   | <ul style="list-style-type: none"> <li>age 65 or older</li> </ul>  |
| <ul style="list-style-type: none"> <li>enrolled in Hinge Health for back, knee, shoulder, hip, or neck pain and completed one exercise session or accessed one educational article from April 2017 to October 2020</li> </ul> | <ul style="list-style-type: none"> <li>started physical therapy (herein, index event) for back, knee, shoulder, hip, or neck pain from April 2017 to October 2020</li> </ul> |
| <ul style="list-style-type: none"> <li>continuously enrolled in Medicare Part A and Part B plans for at least 12 months before and 9 month after starting Hinge Health</li> </ul>   | <ul style="list-style-type: none"> <li>continuously enrolled in Medicare Part A and Part B plans for at least 12 months before and 9 month after the index event</li> </ul>  |
| <ul style="list-style-type: none"> <li>had no MSK claims in the 12 months before starting Hinge Health</li> </ul>   | <ul style="list-style-type: none"> <li>had no MSK claims in the 12 months before the index event</li> </ul>  |
| <ul style="list-style-type: none"> <li>did not have more than \$150,000 in medical spend in the 12 months before starting Hinge Health</li> </ul>   | <ul style="list-style-type: none"> <li>did not have more than \$150,000 in medical spend in the 12 months before the index event</li> </ul>                                  |

**Matching.** Hinge Health members were matched to up to two control group members on: age category, gender, risk score category, medical coverage, pharmacy coverage, HMO status, Medicare Secondary Payer status, total cost of care category, cancer status, and date ranges of eligibility. We matched 87 Hinge Health members to 134 control members and further included the 246 unmatched Hinge Health members to the analysis.

**Outcomes** – The study included PMPM allowed amounts for all medical care services with MSK-specific primary diagnosis codes in the 12 month post period.

To examine drivers of savings, we examined allowed amounts and service use for the following MSK-specific service categories: hospital inpatient and outpatient (facility) services, professional

services by primary care providers and specialists, and other services (e.g., ambulance, durable medical equipment, home health, and prescription drugs paid under the Part B plan). To examine drivers of savings, we also examined MSK diagnostic categories, defined by ICD10 diagnostic codes grouped using the Agency for Healthcare Research and Quality Clinical Classifications Software system.

**Analysis** - The study calculated PMPM spend or annual service use for the Hinge Health and control groups in the 12 month post period. The difference in spend or service use between the two groups is the control group result minus the Hinge Health group result. The relative change between the two groups is the control group result divided by the Hinge Health group result.

Using the Wilcoxon Test for significance (two-sided), we tested the MSK specific costs (allowed PMPM) of the control and Hinge group for the 12 months post-program enrollment.

Additional details about the study method are shown in Appendix A.



## 4. Results

**Demographic Characteristics.** Table 1 shows the demographics characteristics of the Hinge Health members and the control group who started April 2017 – October 2020. Over 70% of the Hinge Health group was in the 65 to 74 years age group, 61.3% were female, and 68.5% had Hierarchical Condition Category (HCC) risk scores of <0.7. Almost 80% of the control group was in the 65 to 74 years age group, 82.4% were female, and 87.3% had HCC risk scores of <0.7.

**Table 1 – Demographic Characteristics**

| Demographic Characteristic | Control group (n=134) | Matched Hinge Health group (n=87) | Unmatched Hinge Health group (n=246) | All Hinge Health group (n=333) |
|----------------------------|-----------------------|-----------------------------------|--------------------------------------|--------------------------------|
| % age 65 to 74             | 79.9%                 | 79.3%                             | 67.1%                                | 70.3%                          |
| % age 75 or older          | 20.1%                 | 20.7%                             | 32.9%                                | 29.7%                          |
| % Female                   | 82.4%                 | 82.8%                             | 53.7%                                | 61.3%                          |
| % with HCC score (< 0.7)   | 87.3%                 | 85.1%                             | 62.6%                                | 68.5%                          |
| % with HCC score (>=0.7)   | 12.7%                 | 14.9%                             | 37.4%                                | 31.5%                          |

**Spend and service use, by service category.** The control group’s spend for all MSK-specific medical services in the post period was \$221.27 PMPM more (i.e., 6.2 times higher) than the Hinge Health group (Table 2).

Table 2 also shows that compared to the Hinge Health group, the control group had \$191.85 PMPM higher spend for services in hospital inpatient and outpatient facilities and \$28.75 PMPM higher spend for professional services from specialists. That is, the control group’s spend was 10.8 times higher for hospital-based services and 3.0 times higher for specialist professional services versus the Hinge Health group.

The Hinge Health group’s total, hospital, professional specialist, and professional primary care provider PMPM were all significantly lower than the control group’s PMPM ( $p < 0.0001$ ).

**Table 2 – MSK-Specific PMPM Medical Care Spend in the Post Period for the Hinge Health Versus Control Group**

| Service Category                           | Hinge Health group (A) | Control group (B) | Difference (B-A) | Relative Change (B/A) |
|--|------------------------|-------------------|------------------|-----------------------|
| Total MSK Cost of Care                     | \$42.70                | \$263.97          | \$221.27         | 6.2                   |
| Hospital inpatient and outpatient services | \$19.50                | \$211.35          | \$191.85         | 10.8                  |
| Professional - specialist                  | \$14.36                | \$43.12           | \$28.75          | 3.0                   |
| Professional - primary care provider       | \$6.66                 | \$5.42            | \$(1.24)         | 0.8                   |
| Other                                      | \$2.18                 | \$4.08            | \$1.90           | 1.87                  |

Per 1,000 FFS beneficiaries, the control group had 3,100.5 more hospital inpatient admissions and outpatient visits, 376.7 more primary care provider visits, and 2555.9 more specialist visits versus the Hinge Health group (Table 3). That is, the control group had 13.5 times more hospital use, 1.8 times more professional visits to primary care providers, and 2.0 times more visits to specialists versus the Hinge Health group.

**Table 3 – MSK-Specific Service Use (per 1000 Beneficiaries) in the Post Period for the Hinge Health Versus Control Group**

| Service Category                                      | Hinge Health group (A) | Control group (B) | Difference (B-A) | Relative Change (B/A) |
|---|------------------------|-------------------|------------------|-----------------------|
| Hospital (inpatient admissions and outpatient visits) | 247.8                  | 3,348.3           | 3,100.5          | 13.5                  |
| Professional - specialist                             | 2,477.8                | 5,033.7           | 2,555.9          | 2.0                   |
| Professional - primary care provider                  | 454.8                  | 831.5             | 376.7            | 1.8                   |

**Spend, by diagnostic category.** Table 4 shows spend for MSK diagnostic categories in the Hinge Health group versus the control group. The three diagnostic categories with the largest differences in spend were osteoarthritis, spondylopathies, and musculoskeletal pain (not low back pain). Specifically, compared to the Hinge Health group, the control group had \$102.58 PMPM higher spend for osteoarthritis, \$37.23 PMPM higher spend for spondylopathies, and \$30.26 PMPM higher spend for MSK pain (not low back pain).

**Table 4 – PMPM Medical Care Spend in the Post Period for MSK-Specific Diagnostic Categories Among the Hinge Health Versus Control Group**

| Diagnostic Category    | Hinge Health group (A) | Control group (B) | Difference (B-A) | Relative Change (B/A) |
|------------------------|------------------------|-------------------|------------------|-----------------------|
| Total MSK Cost of Care | \$42.70                | \$263.97          | \$221.27         | 6.2                   |

|   |         |          |          |      |
|---|---------|----------|----------|------|
| Osteoarthritis                            | \$16.70 | \$119.28 | \$102.58 | 7.1  |
| Spondylopathies/spondyloarthropathy       | \$13.31 | \$50.54  | \$37.23  | 3.8  |
| MSK pain, not low back pain               | \$4.37  | \$34.63  | \$30.26  | 7.9  |
| Tendon and synovial disorders             | \$2.17  | \$19.22  | \$17.05  | 8.8  |
| Other specified connective tissue disease | \$0.81  | \$17.30  | \$16.50  | 21.4 |
| Low back pain                             | \$4.05  | \$12.95  | \$8.90   | 3.2  |
| Other specified joint disorders           | \$0.74  | \$6.24   | \$5.50   | 8.4  |
| Biomechanical lesions                     | \$0.52  | \$0.72   | \$0.21   | 1.4  |

## 5. Discussion

This retrospective control-matched study showed that the Hinge Health chronic pain program significantly reduced new MSK-specific medical care use and spend. Based on findings, we estimated a gross return on investment of 2.7 (i.e., \$2652 annualized savings divided by the \$995 Hinge Health program fee, Table 5).

**Table 5 - Annualized Savings and Gross Return on Investment Estimates**

|  |         |
|--|---------|
| a. PMPM Difference - Savings Estimate                | \$221   |
| b. Annualized Difference - Savings Estimate (a * 12) | \$2,652 |
| c. Hinge Health Program Fees                         | \$995   |
| d. Gross Return on Investment (b/c)                  | 2.7     |

Savings were largely driven by prevented medical services in hospital facilities. Of the \$221 PMPM in savings for all MSK-services, 87% of the savings was from hospital inpatient and outpatient services (i.e., \$191.85) and 13% was from spend for professional services from specialists (i.e., \$28.75). Furthermore, we observed that hospital use per 1,000 FFS beneficiaries was 13.5 times higher for the control group versus the Hinge Health group.

In addition, savings were largely driven by certain diagnostic categories. Of the \$221 PMPM in savings, 46% of the savings was for osteoarthritis (i.e., \$102.58), 17% was for spondylopathies (i.e., \$37.23), and 14% was for MSK pain (not low back) (i.e., \$30.26). These findings are notable given the Centers for Disease Control and Prevention has projected that over one-quarter of the total adult population in the US will have doctor diagnosed arthritis by the year 2040.<sup>16</sup>

Most Hinge Health members started the chronic pain program in 2020 and were matched to control group members with physical therapy visits in the same timeframe. The study participants' 12 month post period was largely during the COVID-19 pandemic, which disrupted elective, in-person medical care. Cost and service use results were likely lower than non-pandemic periods for both groups, but we assumed that the pandemic influenced the magnitude of change similarly for both Hinge Health members and the control group.

The matching criteria were intended to identify a control group that was as similar as possible to the Hinge Health group on important member characteristics. Among Hinge Health members with matches, both groups were similar on age, gender, and risk score. Results for only the

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<sup>16</sup> Centers for Disease Control and Prevention. National arthritis prevalence estimates for US adults from the National Health Interview Survey (NHIS). Published October 12, 2021. Accessed April 13, 2022. [https://www.cdc.gov/arthritis/data\\_statistics/national-statistics.html](https://www.cdc.gov/arthritis/data_statistics/national-statistics.html)

matched Hinge Health and control group members are similar to overall findings reported above (Appendix B, \$2556 in savings). Matching is intended to improve the direct comparability of the Hinge Health group to the control group and result in more accurate estimates of the impact of the Hinge Health program on MSK-specific medical care use and spend; however, matching limits the overall sample size of the study. To increase sample size in this study, we included both matched and nonmatched Hinge Health members in analyses. Nonetheless, this study's sample size had limited credibility for use in an actuarial pricing context, but demonstrated statistical significance when comparing the Hinge Health and control group post-intervention.

When determining matches for the Hinge Health population that had no prior MSK history in the 12 months leading up to program start, we determined that starting physical therapy was equivalent to starting the Hinge Health program. We required that control matches started therapy in the same month as the Hinge Health member for the same condition as the Hinge Health member. We did not analyze the severity of the condition, but assumed that on average, severity of Hinge Health members was equal to the severity of control members.

Study results may be most generalizable to a specific segment of the Medicare FFS population. Hinge Health members in this study included those with both Parts A and B, supplemental employer-based insurance (which covered Hinge Health fees), and no recent medical care use for MSK pain. For example, findings may be most applicable to younger Medicare FFS beneficiaries. Almost 30% of Hinge Health members in this study versus 40% of the general Medicare FFS with both Parts A and B and employer-based health insurance were 75 years or older.<sup>17</sup>

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<sup>17</sup> Tarazi W, Welch WP, Nguyen N, et al. Medicare Beneficiary Enrollment Trends and Demographic Characteristics. Assistant Secretary for Planning and Evaluation, Office of Health Policy, Issue Brief. Published March 2, 2022. <https://aspe.hhs.gov/sites/default/files/documents/f81aafbba0b331c71c6e8bc66512e25d/medicare-beneficiary-enrollment-ib.pdf>

## 6. Conclusion

Among a subset of Medicare FFS beneficiaries who had not used medical care for their MSK needs in the past 12 months, the Hinge Health chronic pain program was shown to save \$2652 annually largely by reducing spend on hospital-based services and influencing osteoarthritis care.

# Appendices

## Appendix A. Methods Details

### MSK Diagnosis codes included in the analysis to identify MSK-specific medical claims

G5700, G5701, G5702, M12011, M12012, M12019, M12051, M12052, M12059, M12061, M12062, M12069, M12111, M12112, M12119, M12151, M12152, M12159, M12161, M12162, M12169, M1218, M12211, M12212, M12219, M12251, M12252, M12259, M12261, M12262, M12269, M12311, M12312, M12319, M12351, M12352, M12359, M12361, M12362, M12369, M12411, M12412, M12419, M12451, M12452, M12459, M12461, M12462, M12469, M12511, M12512, M12519, M12551, M12552, M12559, M12561, M12562, M12569, M12811, M12812, M12819, M12851, M12852, M12859, M12861, M12862, M12869, M13111, M13112, M13119, M13151, M13152, M13159, M13161, M13162, M13169, M13811, M13812, M13819, M13851, M13852, M13859, M13861, M13862, M13869, M14611, M14612, M14619, M14651, M14652, M14659, M14661, M14662, M14669, M1468, M14811, M14812, M14819, M14851, M14852, M14859, M14861, M14862, M14869, M1488, M160, M1610, M1611, M1612, M162, M1630, M1631, M1632, M164, M1650, M1651, M1652, M166, M167, M169, M170, M1710, M1711, M1712, M172, M1730, M1731, M1732, M174, M175, M179, M19011, M19012, M19019, M19111, M19112, M19119, M19211, M19212, M19219, M21051, M21052, M21059, M21061, M21062, M21069, M21151, M21152, M21159, M21161, M21162, M21169, M21211, M21212, M21219, M21251, M21252, M21259, M21261, M21262, M21269, M2200, M2201, M2202, M2210, M2211, M2212, M222X1, M222X2, M222X9, M223X1, M223X2, M223X9, M2240, M2241, M2242, M228X1, M228X2, M228X9, M2290, M2291, M2292, M23001, M23002, M23003, M23004, M23005, M23006, M23007, M23009, M23011, M23012, M23019, M23021, M23022, M23029, M23031, M23032, M23039, M23041, M23042, M23049, M23051, M23052, M23059, M23061, M23062, M23069, M23200, M23201, M23202, M23203, M23204, M23205, M23206, M23207, M23209, M23211, M23212, M23219, M23221, M23222, M23229, M23231, M23232, M23239, M23241, M23242, M23249, M23251, M23252, M23259, M23261, M23262, M23269, M23300, M23301, M23302, M23303, M23304, M23305, M23306, M23307, M23309, M23311, M23312, M23319, M23321, M23322, M23329, M23331, M23332, M23339, M23341, M23342, M23349, 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### Service Category Definitions

- Inpatient – Medicare CLM\_TYPE\_CD = '60'
- Outpatient - Medicare CLM\_TYPE\_CD = '40'
- Professional - primary care provider – Medicare Part B CLM\_TYPE\_CD in ('81', '82) with provider specialty codes in ('01','08','11','16','50','89','97')
- Professional - specialist – Medicare Part B CLM\_TYPE\_CD in ('81', '82) with other provider specialty codes
- Other – Medicare Part B CLM\_TYPE\_CD in ('81', '82) with Optum defined service categories including Ambulance, Home Health, DME, and Part B Rx claims.

### Appendix B. Results for Only Matched Hinge Health and Control Group Members



**MSK-Specific PMPM Medical Care Spend in the Post Period for Matched Hinge Health Versus Matched Control Group**

| <b>Service Category</b>                    | <b>Hinge Health group (A)</b> | <b>Control group (B)</b> | <b>Difference (B-A)</b> | <b>Relative Change (B/A)</b> |
|--|-------------------------------|--------------------------|-------------------------|------------------------------|
| Total MSK Cost of Care                     | \$51.01                       | \$263.97                 | \$212.97                | 5.2                          |
| Hospital inpatient and outpatient services | \$31.76                       | \$211.35                 | \$179.59                | 6.7                          |
| Professional - specialist                  | \$17.04                       | \$43.12                  | \$26.08                 | 2.5                          |
| Professional - primary care provider       | \$2.08                        | \$5.42                   | \$3.34                  | 2.6                          |
| Other                                      | \$0.12                        | \$4.08                   | \$3.96                  | 33.9                         |