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At the heart of what we do is a commitment to cost-effectiveness. We strive to bridge the gap between quality patient care and financial efficiency. Our goal is to transform data into a powerful tool, one that enables healthcare stakeholders to make empowered, data-driven decisions. Health Analytics Connect isn't just about data analysis; we are about enabling transformation in healthcare through the power of data.

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## The Interplay of Musculoskeletal Disorders and Mental Health

### Analyzing Costs and Prevalence in Employer Populations

#### INTRODUCTION

Chronic conditions like diabetes, hypertension, musculoskeletal (MSK) disorders, and obesity are prevalent in the workforce, significantly impacting mental health, driving up healthcare costs, and posing challenges for employers and health plans. Among these, musculoskeletal (MSK) disorders and mental health conditions such as depression and anxiety are particularly burdensome. These conditions not only coexist frequently but also exacerbate each other, creating a compounded impact on healthcare costs and employee well-being.

According to the U.S. Bone and Joint Initiative, musculoskeletal disorders, including arthritis and back pain, affect almost 50% of all adults in the United States, making them one of the leading causes of disability and significantly contributing to healthcare costs. The National Institute of Mental Health (NIMH) reports that about one in five adults experience mental health conditions each year, with depression and anxiety among the most prevalent. These mental health issues often co-occur with chronic physical conditions like musculoskeletal disorders, compounding their impact on individuals' health and well-being.

The economic burden of MSK disorders is substantial, with estimates from the American Academy of Orthopaedic Surgeons (AAOS) indicating that these conditions account for over \$213 billion in direct and indirect costs annually in the U.S. Similarly, the National Institute of Mental Health (NIMH) reports that mental health conditions contribute to over \$300 billion in lost productivity each year, primarily due to absenteeism and reduced work performance.

Given their prevalence and associated costs, it is critical to closely examine these conditions. This Analytic Recipe<sup>SM</sup> by Health Analytics Connect (HAC) examines the costs and prevalence of MSK disorders and mental health conditions within employer populations.

By understanding the complex interplay between these conditions and their impact on healthcare expenditures, HAC provides strategies to help employers manage costs and improve employee health outcomes.

#### WHY MUSCULOSKELETAL CONDITIONS MATTER

Musculoskeletal (MSK) conditions, particularly osteoarthritis and spinal disorders, are significant drivers of healthcare costs in employer populations. The severity of these conditions is linked to higher costs, particularly for those also seeking care for depression. Importantly, data suggests that mental health support could mitigate some of these costs, making it a crucial consideration for employers.

#### INTERPLAY BETWEEN MUSCULOSKELETAL DISORDERS AND MENTAL HEALTH

Musculoskeletal (MSK) disorders are particularly burdensome among chronic conditions due to their high prevalence and significant impact on employees. MSK conditions, ranging from acute injuries to chronic ailments, often lead to increased healthcare utilization and costs. The overall expenses associated with MSK disorders include direct medical costs, such as physician visits, physical therapy, and medications, as well as indirect costs like lost productivity and disability claims. Understanding the prevalence and monetary impact of MSK disorders is essential for developing targeted interventions and managing costs.

Mental health conditions, such as depression and anxiety, significantly affect the management and outcomes of chronic illnesses, including MSK disorders. Employees with severe and complicated MSK conditions often exhibit higher rates of depression and anxiety. Addressing mental health issues plays a crucial role in managing and reducing the overall burden of MSK disorders in the workforce. Employees suffering from both chronic physical and mental health conditions often require comprehensive and coordinated care, driving up overall healthcare expenditures.

## HAC Findings: MSK and Mental Health Data Overview

- MSK Claims Impact:** 28% of the commercial population has an MSK diagnosis, but these claimants represent 54% of total healthcare costs, underscoring the financial burden of chronic MSK conditions.
- Age and Cost Disparity:** MSK claimants are on average three years older and incur costs twice as high as non-MSK claimants.
- Leading MSK Conditions:** Osteoarthritis is the costliest MSK condition, accounting for 24% of total charges despite being middle ranked in risk. Rheumatoid arthritis, though less common, carries the highest risk and a significant cost burden (10% of costs from 1.5% of episodes).

These findings highlight the need for targeted strategies to manage the high costs associated with MSK conditions, particularly through early intervention and tailored care.

### HAC FINDINGS: Data Overview

This analysis utilizes healthcare claims data from a diverse set of employer-sponsored health plans. The dataset offers detailed insights into musculoskeletal (MSK) and mental health claims, enabling a comprehensive evaluation of costs, prevalence, and the interplay between these conditions.

In the commercial population aged 18 and over, 28% have an MSK diagnosis. As shown in Table 1 below, MSK claimants represent just over a quarter of the population and account for 54% of total claims cost, highlighting the substantial financial burden of managing chronic MSK conditions. The average age of claimants with MSK disorders is three years older than that of the average commercial population, and their average cost per claimant is twice as high as that of the average commercial claimant.

**Table 1: MSK Claimants: Overall Breakdown**

MSK Claimants: Overall Breakdown	Average Age	Percent of All Claimants	Percent of Allowed Expenses	Average Cost / Claimant Ratio
MSK Claimants	49	28%	54%	2.0
Non-MSK Claimants	44	72%	46%	0.7
All Commercial Claimants	46	100%	100%	1.0

### LEADING MUSCULOSKELETAL CONDITIONS BY COST

As shown Table 2 below, the MSK category is comprised of a diverse range of acute and chronic conditions. Using episodes of care as the unit of analysis Osteoarthritis leads the way, making up almost a quarter of the total allowed charges and over 12 percent of the episodes. Interestingly, this condition falls right in the middle when it comes to risk among all MSK episodes in the sample. The wide range of conditions within the MSK category is noteworthy. For instance, rheumatoid arthritis stands out because it accounts for over 10 percent of the costs but less than two percent of the episodes, with a relative risk more than twice the average for MSK disorders. This underscores the need for tailored health management strategies.

**Table 2: Leading Episode Summary Groups**

Leading Episode Summary Groups	Episode Type	Percent of Episodes	Percent of Allowed	Relative Risk
Osteoarthritis	Chronic	12.49%	24.27%	1.01
Spinal/Back Disorder, Low Back	Acute	12.21%	10.91%	0.91
Rheumatoid Arthritis	Chronic	1.48%	10.42%	2.22
Arthropathies/Joint Disorder NEC	Acute	27.77%	9.75%	0.90
Fracture/Dislocation - Upper Extremities	Acute	6.08%	7.59%	0.63
Spinal/Back Disorder, Ex Low	Acute	7.93%	5.28%	0.93
Injury - MSK, NEC	Acute	7.92%	3.53%	0.86
MSK Disorder, Autoimmune	Chronic	1.38%	3.25%	1.67
Fracture/Dislocation - Ankle/Foot	Acute	3.96%	3.15%	0.65
Bursitis	Acute	5.40%	3.13%	0.78
All Other MSK	Both	13.37%	18.72%	0.37

### FOCUS ON OSTEOARTHRITIS

Given the importance of Osteoarthritis to overall MSK costs, a more detailed investigation of this condition was undertaken. *Table 3*, shown on the following page, profiles Osteoarthritis episodes by disease stage. The disease stages are defined as follows: Stage 0 involves exposure or history, Stage 1 is disease presence without complications, Stage 2 includes local complications, Stage 3 has systemic complications or multiple sites involved, and Stage 4 results in death. A closer look at the progression of musculoskeletal (MSK) conditions by stage shows how costs and claimants are distributed.

The data in *Figure 1: Percent of Osteoarthritis by Disease Stage*, displayed on the following page, shows that a large majority of claimants (70%) are in the initial stages (0 & 1), yet these stages account for half (46%) of the total costs. In Stage 2 (local complications), both the percentage of claimants and associated costs decrease. In the advanced stages (3 & 4), only 5% of claimants remain, but they still account for 20% of the costs. Due to limited claims data, costs for Stage 3 (involving multiple sites or systemic complications) and Stage 4 (death) were combined. Cost per claimant increases markedly by stage; while Stage 1 claimants cost 65% of the overall average, those in Stages 3 & 4 are over four times the average.

## Key Insights: Osteoarthritis by Disease Stage

- **Cost Distribution:** Early stages (Stage 0 & 1) account for 70% of osteoarthritis episodes but only 46% of total costs, suggesting cost-effective early management.
- **Cost Escalation:** Costs per claimant significantly increase in later stages, with a greater than 6x rise from Stage 0 & 1 to Stages 3 & 4.
- **Age and Progression:** Average age increases with disease severity, from 54.4 years in early stages to 58.1 years in advanced stages.
- **Mental Health Impact:** The prevalence of depression and anxiety rises with osteoarthritis progression, from 12% in early stages to 18% in advanced stages. However, the proportion of costs related to depression decreases, indicating potential underutilization of mental health services in more severe cases.

These findings highlight the importance of early intervention and integrated care models to manage both osteoarthritis and associated mental health conditions, reducing long-term costs and improving outcomes.

Table 3: Osteoarthritis by Disease Stage

Disease Stage	Percent of Osteoarthritis Costs	Percent of Osteoarthritis Episodes	Average Cost / Claimant Ratio	Average Age
Stage 0 & 1	46%	70%	0.65	54.4
Stage 2	34%	25%	1.36	55.9
Stage 3 & 4	20%	5%	4.27	58.1

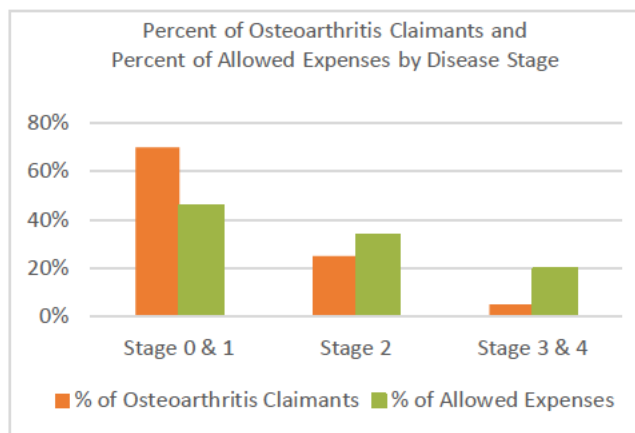


Figure 1: Percent of Osteoarthritis by Disease Stage

### THE RELATIONSHIP BETWEEN OSTEOARTHRITIS AND DEPRESSION & ANXIETY

The connection between osteoarthritis and mental health, particularly depression and anxiety, is significant in the working population. In our analysis, we focused on depression and anxiety as they are the most prevalent and impactful mental health issues within the working population, especially among individuals with musculoskeletal (MSK) disorders. These conditions are prioritized due to their considerable influence on overall health outcomes and healthcare costs.

- **Depression:** This condition often results in absenteeism, reduced productivity, and worsened health outcomes. It also leads to increased healthcare utilization among those with MSK conditions, as these individuals typically require more frequent medical visits and additional care.
- **Anxiety:** Anxiety can impair concentration and decision-making and intensify the perception of pain, making MSK conditions more challenging to manage. The interaction between MSK disorders and anxiety or depression creates a feedback loop where physical pain exacerbates mental health issues, and vice versa. This cycle leads to higher healthcare costs and more complex treatment needs.

By focusing on depression and anxiety, we recognize the need for integrated care models that address both mental and physical health. Early intervention in these mental health issues could mitigate their impact on MSK disorders, leading to better health outcomes and reduced costs.

Our findings reveal a clear pattern: for Osteoarthritis, members with more severe or complex manifestations of the condition have higher use of depression & anxiety services: only 12% of osteoarthritis claimants Stage 1 utilized depression services compared to 18% of those in Stages 3 and 4 (see Table 4 below). The percentage of costs anxiety and depression of overall cost for these patients The depression and anxiety percentage of overall costs for these patients lowered as disease stage became higher, indicating that depression-related expenses remained relatively flat regardless of disease stage.

Table 4: Claimants and Costs by Disease Stage

Stage	Percent of Claimants With Depression	Percent of Costs Associated with Depression
Stage 0 & 1	12%	1.6%
Stage 2	16%	1.0%
Stage 3 & 4	18%	0.3%

## Key Differences Between Osteoarthritis Claimants With and Without Depression Services:

- Higher Risk Scores:** Claimants using mental health services generally have higher Risk Scores, indicating greater health risks and anticipated higher healthcare utilization.
- Younger Demographics:** Those utilizing depression services are younger, with a lower average age than non-users.
- Gender Utilization Patterns:** Females use depression and anxiety services at twice the rate of males (18% vs. 9%). Despite lower utilization, males have higher Risk Scores and Average Costs.
- Increased Healthcare Utilization:** Higher use of mental health services is associated with more complex or severe osteoarthritis, as indicated in Disease Stage.

These insights emphasize that younger, higher-risk claimants with depression services require more comprehensive care strategies.

Key differences, as displayed in Table 5 below, between osteoarthritis claimants with and without depression services include:

- Risk Score:** Claimants who use mental health services typically have higher Risk Scores than those who do not. Risk Scores are calculated based on a combination of demographic and clinical factors, and they reflect the expected healthcare costs or resource use for an individual. Higher scores indicate greater health risks and anticipated higher healthcare utilization.
- Average Age:** Claimants utilizing depression services tend to be younger, with a slightly lower average age than non-depression claimants.
- Gender Differences:** Females utilize depression and anxiety services at twice the rate of males (18% for females vs. 9% for males). However, despite being less likely to use mental health services, males have higher Risk Scores and Average Costs compared to their female counterparts.
- Healthcare Utilization:** Claimants using mental health services typically show higher overall healthcare utilization (as indicated by the Average Cost Ratio), reflecting the complexity and severity of their conditions.

This indicates that higher use of depression services is associated with younger, higher-risk claimants with greater overall healthcare needs.

**Table 5: Comparative Analysis of Osteoarthritis Claimants with and without Depression Services**

Stage	AVERAGE AGE		AVERAGE RISK		AVERAGE COST RATIO	
	With Depression	Without Depression	With Depression	Without Depression	With Depression	Without Depression
Stage 0 & 1	51.3	55.3	1.94	1.43	0.9	0.6
Stage 2	52.4	57.2	3.24	2.65	1.7	1.3
Stage 3 & 4	55.7	59.1	10.43	8.42	5.2	3.9

### KEY INSIGHTS

From the data, several key insights emerge that can guide strategies for managing MSK conditions like Osteoarthritis and associated mental health issues like depression and anxiety.

- High Prevalence in Early Stages:** A substantial portion (70%) of osteoarthritis claimants is in the early disease stages (Stage 0-1). However, these stages account for only 46% of total allowed expenses, indicating that early-stage management is less costly. This presents an opportunity to implement interventions that could prevent progression to more costly stages.
- Sharp Cost Increase in Later Stages:** As osteoarthritis progresses to Stage 2 and beyond, the cost per claimant escalates significantly. Expenses double from Stage 0-1 to Stage 2, and in Stage 3 (combining previous Stages 3 and 4), costs more than quadruple. This highlights the monetary impact of late-stage osteoarthritis, making early and effective management crucial for controlling long-term costs.
- Rising Prevalence of Depression with Disease Progression:** The prevalence of depression and anxiety increases from 12% in Stage 0-1 to 18% in Stage 3. This trend underscores the need for integrated care strategies that address both physical and mental health, particularly as the disease advances. Effective mental health support can play a vital role in managing overall healthcare costs and improving member outcomes.
- Lower Proportion of Depression-Related Costs in Later Stages:** Despite the increased prevalence of depression and anxiety in later stages, the percentage of costs attributed to depression and anxiety decreases from 1.6% in Stage 0-1 to 0.3% in Stage 3. This suggests potential underutilization of mental health services as osteoarthritis becomes more severe, not because of a decrease in mental health spending, but since the rising costs of other healthcare services overshadow the consistent costs of mental health care. Enhancing support in this area could still benefit more claimants.
- The Case for Early Intervention:** The data highlights the importance of early intervention in managing both osteoarthritis and associated mental health conditions. By addressing these issues proactively, employers and health plans can prevent the escalation of costs and the worsening of member health outcomes, leading to more sustainable healthcare expenditures.
- Patient Engagement:** Osteoarthritis patients who seek out treatment for depression and anxiety are more likely to be female, younger, have higher risk scores and higher average costs. This suggests that there may be a fruitful way to engage these patients and direct them to high quality and efficient providers and networks.

## Questions Raised for Further Research

The findings from this analysis raise several important questions for further research:

- What specific interventions can effectively address the interplay between MSK disorders and mental health conditions?
- How can employers implement targeted programs to manage the costs associated with these conditions?
- What roles do workplace wellness programs play in mitigating the impact of MSK and mental health conditions on employees?
- How can integrated care models be optimized to provide comprehensive and coordinated care for employees with both MSK and mental health issues?

### KEY STRATEGIES FOR EMPLOYERS

Employers play a crucial role in supporting the mental health of their workforce by taking proactive steps to increase awareness and utilization of available services, expanding the range of support offered, and regularly evaluating the effectiveness of these programs. By integrating mental health into broader wellness initiatives and focusing on preventative care, employers can foster a healthier, more resilient workforce.

1. **Increase Awareness and Utilization**
  - Employers should focus on educating employees about the availability and benefits of mental health services. This could involve regular communications, workshops, and integrating mental health discussions into broader wellness programs. The goal is to ensure that employees understand the importance of mental health and feel encouraged to seek help when needed.
2. **Expand the Range of Services**
  - To cater to diverse needs, employers might consider expanding the scope of mental health services offered. This could include offering virtual therapy sessions, stress management programs, and resources for managing anxiety and depression. By broadening the range of services, employers can provide more comprehensive support, which could prevent more severe health issues down the line.
3. **Regularly Evaluate and Optimize Services**
  - Continuous evaluation of mental health programs is critical to ensure they are meeting the needs of employees. Employers should gather feedback, analyze utilization data, and adjust as needed to improve the effectiveness of these services. This could involve incorporating innovative technologies, refining the delivery of services, or adjusting the types of support offered based on employee feedback and emerging trends in mental health care.
4. **Integrate Mental Health with Other Wellness Initiatives**
  - Mental health should not be viewed in isolation but rather as an integral part of overall wellness. Employers can achieve this by integrating mental health resources with other wellness initiatives, such as physical fitness programs, nutritional counseling, and stress management workshops. This comprehensive approach addresses the full spectrum of employee health, leading to better outcomes and a healthier workforce.
5. **Focus on Preventative Care**
  - Preventative mental health care can reduce the need for more intensive services later. Employers should consider offering resources that help employees manage stress, build resilience, and maintain a positive work-life balance. This might include mindfulness training, resilience-building workshops, and providing access to self-help resources that promote mental well-being.

### CONCLUSION

The interplay between musculoskeletal (MSK) disorders and mental health conditions presents a significant challenge for employer-sponsored health plans. The substantial costs and high prevalence of these conditions necessitate a comprehensive approach to managing healthcare expenditures and improving employee health outcomes. To address these challenges, employers should consider implementing targeted strategies that integrate both physical and mental health care. Early intervention in MSK conditions, coupled with robust mental health support, can prevent the escalation of costs, and improve overall employee well-being.

Health Analytics Connect (HAC) offers a powerful solution through its Analytic Recipes<sup>SM</sup>. These data-driven frameworks enable employers and health plans to analyze and understand the complex interactions between various health conditions, including MSK disorders and mental health issues. By leveraging HAC's Analytic Recipes, employers can gain actionable insights into their healthcare data, identify key cost drivers, and develop evidence-based strategies that effectively manage these conditions. Additionally, health plans can incorporate these Analytic Recipes into their account reporting packages, providing more comprehensive and insightful reporting to their clients.

Employers and health plans are encouraged to integrate HAC's Analytic Recipes into their existing health strategies. By doing so, they can proactively address the dual burden of MSK and mental health conditions, optimize healthcare outcomes, and achieve more sustainable healthcare costs. Taking these proactive steps will not only enhance employee health but also contribute to long-term financial stability and success for the organization.

### Sources

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