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Brief Overview about Musculoskeletal Disorders among Healthcare Providers

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Abstract: Background: Musculoskeletal Disorders (MSDs) have been identified as one of the most important and common health problems in occupational populations, with several socioeconomic implications. MSDs include a wide range of degenerative and inflammatory conditions affecting the joints, muscles, ligaments, tendons, bones, nerves, and blood system. All healthcare institutions are required to implement health, safety, and environmental policy that can ensure the worker safety. Identifying effective interventions can lead to sound guidelines and implementation.

Keywords: *Musculoskeletal Disorders, Healthcare Providers*

Introduction

MSDs have been identified as one of the most important and common health problems in occupational populations, with several socioeconomic implications [1]. MSDs include a wide range of degenerative and inflammatory conditions affecting the joints, muscles, ligaments, tendons, bones, nerves, and blood system [2]. MSDs are highly prevalent and affecting about a third of the worldwide population. MSDs are a major health problem with bad socioeconomic consequences including chronic disability, sick leave absence, reduced work productivity, reduced quality of life and increased insurance costs [3].

Direct socio-economic consequences of musculoskeletal diseases in healthcare providers include medical expenses, rehabilitation costs, and potential disability benefits. Indirect impacts involve productivity losses due to absenteeism, presenteeism (working while unwell), and the need for temporary staff or overtime payments to cover staffing gaps. Moreover, long-term effects may lead to career changes or early retirement, affecting both the individual's income and the healthcare system's workforce stability. Addressing these issues through preventive measures and supportive policies is essential for mitigating socio-economic repercussions [4].

USA estimated that the direct costs of MSDs are $20 billion per year, while total costs are estimated to be between $45-54 billion [5]. Indirect costs (lost productivity, product defects, etc.) of an MSD case can be up to five times the direct costs [6].

According to the National Institute for Occupational Safety and Health (NIOSH), WMSDs are a leading cause of morbidity and disability among workers in the United States [7].

The risk of developing WMSDs is high in HCPs due to the nature of their work that involves repetitive motions, awkward postures, and heavy lifting [8].

While it's challenging to provide precise percentages, the common musculoskeletal issues among healthcare providers can be generally ranked from most to least prevalent:

Low back pain: Approximately 40-50% experiences this issue due to lifting and standing [9].

Neck pain: Affects around 30-40%, often related to prolonged bending and computer work [10].

Shoulder issues: Occur in about 20-30%, linked to patient lifting and repetitive movements [11].

Wrist and hand problems: Affect around 15-25%, associated with instrument use and typing [12].

Knee pain: Approximately 10-20% experience discomfort from prolonged standing [13].

Hip discomfort: Reported by about 5-15%, resulting from extended periods of standing [14].

These percentages can vary based on factors such as individual work tasks, ergonomic practices, and workplace conditions.

All healthcare institutions are required to implement health, safety, and environmental policy that can ensure the worker safety. Identifying effective interventions can lead to sound guidelines and implementation [15].

Interventions for WMSDs can come in various forms of varying effectiveness, including assistive devices, exercises, training, as well as policies and procedures [16].

Most studies that evaluated assistive devices, educational, physical activity, or policy interventions on patient handling have been associated with some success in reducing healthcare workers' injuries [17].

Physical ergonomics specifically deals with the design and arrangement of physical aspects in the environment to optimize human well-being and performance. It focuses on the interaction between individuals and their physical workspaces, tools, equipment, and tasks. The goal of physical ergonomics is to prevent MSDs and enhance overall comfort and efficiency by ensuring that the physical aspects of the environment are well-suited to human capabilities and limitations [18].

In healthcare settings, physical ergonomics for providers involves designing work environments and tasks to minimize the risk of musculoskeletal injuries and optimize overall well-being [19]. Key considerations include:

Patient Handling: Implementing proper techniques for lifting, transferring, and repositioning patients to reduce the risk of back injuries. Very often, poor knowledge among healthcare workers on correct manual handling or the use of aids and procedures predisposes their musculoskeletal system to lifting trauma [15].

Workspace Design: Ensuring workstations are adjustable and accommodate various tasks, promoting comfortable body postures and reducing strain during prolonged periods of standing or sitting. Providing ergonomic chairs, adjustable desks, and adjustable computer monitors to optimize comfort and reduce strain [20].

Equipment Accessibility: Placing medical tools and equipment within easy reach to minimize awkward postures and unnecessary reaching. Moreover, Placing the most frequently used objects near and the least used farther away, avoiding trunk twists or spine to use those [21].

Training: Providing HCPs with training on proper ergonomic practices and techniques for specific tasks, emphasizing the importance of body mechanics [22].

Encourage Regular Breaks and Movement: Encourage HCPs to take regular breaks and incorporate movement into their work routine. Stretching exercises, brief walks, or simply changing positions can help prevent prolonged static postures and reduce the risk of musculoskeletal disorders [23].

Use of Assistive Devices: Introducing ergonomic tools and devices to aid in patient handling, such as mechanical lifts, to reduce the physical strain on healthcare providers [16].

By addressing these aspects, physical ergonomics aims to enhance the working conditions for healthcare providers, promoting both their comfort and the quality of patient care.

Cognitive ergonomics

Cognitive ergonomics focuses on optimizing the design of tasks, processes, and systems to enhance human cognitive abilities, such as perception, memory, attention, and decision-making. It aims to create environments that facilitate mental processes, reduce cognitive workload, and improve overall performance and well-being [24].

In various settings, including healthcare, cognitive ergonomics can involve designing user interfaces, workflows, and information systems to ensure they align with the cognitive capabilities and limitations of individuals. In healthcare, this approach can contribute to more effective communication, reduced mental fatigue, and enhanced decision-making for healthcare providers [25].

In healthcare, cognitive ergonomics for providers focuses on optimizing the cognitive aspects of their work to improve decision-making, communication, and overall performance [26].

Key considerations include:

Information Accessibility: Designing systems that provide easy access to relevant patient information, minimizing cognitive load during decision-making processes [27].

Workflow Efficiency: Streamlining workflows to reduce mental fatigue and enhance healthcare providers' ability to manage multiple tasks and responsibilities effectively [28].

Communication Systems: Implementing effective communication tools and practices to ensure clear and concise information exchange among healthcare team members [29].

Training and Education: Providing on-going training and education that aligns with the cognitive abilities of healthcare providers, facilitating continuous learning and adaptation to new information [30].

Technology Integration: Ensuring that technology used in healthcare, such as electronic health records, is user-friendly and supports rather than hinders cognitive processes [31].

By addressing cognitive ergonomics in healthcare settings, the goal is to enhance the overall cognitive well-being of providers, leading to improved patient care and outcomes.

Organizational ergonomics

Organizational ergonomics, also known as macro-ergonomics, focuses on optimizing the organizational structure, policies, and processes to improve overall effectiveness, well-being, and performance. In healthcare, organizational ergonomics considers how the broader system influences the work environment and its impact on healthcare providers [32].

By addressing organizational ergonomics, healthcare institutions can create a work environment that promotes the well-being of their staff and contributes to improved patient care.

In the context of healthcare providers, organizational ergonomics involves optimizing the broader structure and policies of healthcare institutions to support the well-being and performance of the workforce [33].

This includes considerations such as:

Staffing Levels: Ensuring appropriate staffing levels to prevent excessive workloads and reduce stress among healthcare providers.

Team Collaboration: Promoting effective teamwork and communication to enhance collaboration among healthcare professionals within the organization.

Training and Development: Providing continuous training and professional development opportunities to healthcare providers, aligning with organizational goals and industry advancements.

Flexible Scheduling: Offering flexible work schedules and considering shift patterns to accommodate the diverse needs and preferences of healthcare providers.

Work Environment: Designing healthcare facilities and workspaces to create a supportive and comfortable environment, considering factors such as lighting, noise levels, and overall ergonomics.

Policies and Procedures: Developing policies and procedures that prioritize the well-being of healthcare providers, including considerations for breaks, rest periods, and stress management.

By addressing organizational ergonomics, healthcare institutions can contribute to a positive work environment, reducing the risk of burnout and enhancing the overall performance and satisfaction of healthcare providers.

Posture

How an individual should sit, stand, or move can be described under the term of posture. Posture can be described as the attitude assumed by the human body and its segments [34].

A good working posture includes a neutral head, straight and low shoulders; their elevation above 90° is not indicated; arms are pretty close to the body; forearms are supported, but if this is not possible, the elbow should not exceed the 90-120° of flexion; ulnar or radial deviations and wrist flexion should be minimal, maintaining a neutral posture; the spine is always aligned and unnecessary torsion and bending should be avoided [35].

In such alignment, the least amount of stress/strain will be encountered by the musculoskeletal system. Any alterations to this alignment (faulty posture) will create MSDs [36].

Neck pain is a multifactorial disease; there are a number of risk factors which can contribute to its development, such as advanced age, lack of exercise, daily living activities, particularly in white-collar workers such as those using computers, doctors, perceived physical and psychic stress, and being female. Identifying risk factors can help in; diagnosis, treatment, and management of neck pain [37]. Common risk factors include:

Age and gender

Age and gender can both have an impact on the prevalence, severity, and causes of neck pain:

a) Age:

Neck pain tends to become more common as people age, with prevalence increasing significantly from middle age onward [38].

Degenerative changes in the spine, such as osteoarthritis, herniated discs, and spinal stenosis, become more prevalent with age and can contribute to neck pain [39].

Older adults may also experience age-related changes in muscle strength, flexibility, and posture. Moreover, the cervical disc becomes less hydrated and the facet joint gradually loses its protective cartilage, all of which can lead to an increased risk of developing neck pain [40].

Cervical degenerative disease is one of the most common diseases of the nervous system, and it has become a common health issue in the elderly population, with a neck pain incidence rate of 2.3 per 100 person-years. Cervical disc degenerations affect more than 80% of patients over 60 years without producing any symptoms [41].

b) Gender:

Studies have shown that women are more likely to report neck pain than men, although the reasons for this difference are not entirely clear [42].

Hormonal factors, such as estrogen levels, may play a role in the higher prevalence of neck pain among women, particularly during certain life stages, such as menopause [43].

Differences in occupational and leisure activities between men and women may also contribute to gender disparities in neck pain prevalence. For example, women may be more likely to engage in activities that strain the neck muscles, such as prolonged computer use or carrying heavy bags [44].

Overall, while both age and gender can influence the likelihood of experiencing neck pain, the specific mechanisms underlying these associations are multifactorial and may involve a combination of biological, social, and lifestyle factors [45].

Work-related factors

 Physical factors

Several factors have been suggested to play key roles in the development of work-related neck pain, including posture, working hours, psychological stress, repetitive neck movements, and prolonged static loads [46].

Furthermore, neck pain could be related to routine work, low ability to influence working conditions, low job satisfaction, high job demands, and low coworker support as independent risk factors for neck pain [47].

Analyses of the association between neck pain and work-related physical factors revealed that neck pain was significantly associated with holding the neck in a forward bent posture for a prolonged time, various short periods of movements with the neck, working in the same position for a prolonged time, sitting for a prolonged time, and computer use [48].

Holding the neck in a semi-flexed position for a long duration increases the risk of developing neck pain [49].

The neck and upper back muscles are required to provide stability to the moving arms, hands, and fingers, which in turn leads to muscle tension and repetitive strain [50].

Prolonged sitting posture affects the natural curvature of the spine, while also increasing the pressure on vertebral discs, ligaments, and muscles. A poorly designed working station has a direct impact on musculoskeletal injuries of the neck pain, as it overloads certain body parts [48].

The cervical spine supports the head and has the widest range of motion compared with the rest of the spine. This complex nature of the cervical region makes it susceptible to malalignment. A misaligned cervical spine has been shown to increase the pressure on adjacent segments of the intervertebral disc. The increasing pressure can cause the adjacent cervical spine motion segments to change rapidly, leading to degeneration and diseases in these segments.

Among HCPs, dentists, and surgeons have been shown to have a prevalence of neck pain above 50%. Office and computer workers had the highest incidence of neck disorders [51].

Dentistry is a demanding profession that requires stable posture and concentration throughout the session, unknowingly ignorance of ergonomic lead to cervical or neck injury and progress to disability [52].

Surgeons have the most responsible duty that they have to perform for hours. Ignorance of their body positioning during performing surgery for years results in generalized pain in the neck [53].

Psychological factors

Psychological causes, such as anxiety, poor social support, and depression, are among the most common causes of neck pain [40].

Factors such as stress, pain catastrophizing, depressive symptoms, low sleep quality, and alcohol consumption might play some role in changing the central pain processing within the spine, brainstem, or cortical levels, which can manifest as hyperalgesia, a condition in which individuals experience an enhanced sensitivity to pain [54].

Stressed people often tense up their muscles, including the muscles in the neck. This can lead to pain and stiffness in the neck and other areas of the body [55].

Stress can also affect how people process pain. This could be explained on the bases of a phenomenon known as remote hyperalgesia, which causes stressed people to become more sensitive to pain sensations [56].

A clear link has been demonstrated between psychological disorders and the onset and severity of neck pain; that could be attributed to cognitive, emotional, social, and behavioral domains [57].

Stress can also have detrimental effects on the treatment of neck pain. For example, if someone is coping with stress, they may be less likely to follow the doctor's instructions for treatment. They may also find it challenging to relax and may experience more pain due to muscle tension [58].

Psychogenic pain refers to pain that is perceived by the individual but has no identifiable physical cause. Instead, it originates from psychological factors, such as stress, anxiety, depression, or past trauma. Causes can include emotional distress, unresolved conflicts, or psychological disorders [59].

The theory of psychogenic pain revolves around the idea that psychological factors, such as emotions, thoughts, and behaviors, can influence the perception and experience of pain [60]. Here's an explanation:

Mind-Body Connection: Psychogenic pain suggests that there's a strong connection between the mind and the body. Emotional distress, such as stress or anxiety, can trigger physical sensations of pain even in the absence of any physical injury or damage [61].

Central Nervous System: The brain plays a significant role in processing pain signals. In cases of psychogenic pain, alterations in brain function may amplify or distort pain signals, leading to the perception of pain even without any obvious physical cause [62].

Psychosocial Factors: Psychogenic pain can be influenced by various psychosocial factors, including past experiences, beliefs about pain, coping mechanisms, and social support. For example, unresolved trauma or negative beliefs about pain can contribute to the development and persistence of psychogenic pain [63].
Pain Processing: The brain processes pain signals from the body and can modulate the intensity and perception of pain. Emotional states, such as fear or sadness, can affect this processing, either enhancing or reducing the experience of pain [64].
Somatic Symptoms: Psychogenic pain is often accompanied by other somatic symptoms, such as fatigue, headaches, or gastrointestinal disturbances. These symptoms may be manifestations of underlying psychological distress [65].
Overall, the theory of psychogenic pain highlights the complex interplay between psychological, neurological, and social factors in the experience of pain. Effective management typically involves addressing both the physical and psychological aspects of pain through approaches such as cognitive-behavioral therapy, relaxation techniques, and stress management strategies [66].
Neuromusculoskeletal Disorders; (other than autoimmune diseases)
Neck pain is one of the most common and obvious complaints of patients with neuromusculoskeletal disorders, such as cervical spondylosis, fibromyalgia, cervical radiculopathy, and whiplash-associated disorders (WADs) [67].
Most common neck MSDs among HCPs:
Some of the most common cervical disorders seen in healthcare settings include:
Cervical Strain or Sprain:
This occurs due to injury or overuse, leading to muscle or ligament damage in the neck. It's often seen in individuals who perform repetitive tasks or maintain poor posture [68].
Symptoms of a cervical strain include pain in the neck, limited range of motion, and stiffness or tightness in the neck, shoulders, or upper spine [69].
Cervical Spondylosis (CS):
Cervical spondylosis (CS), also known as neck arthritis, this condition involves degenerative changes in the cervical spine, including the development of bone spurs, disc degeneration, and narrowing of the spinal canal.
CS presents in three symptomatic forms; neck pain, cervical radiculopathy, and cervical myelopathy. Neck pain and cervical radiculopathy (nerve root involvement) can be acute, subacute, or chronic conditions resulting from different stages along the degenerative cascade [70].
Spondylosis resulting in foraminal encroachment causes 70% of cases of radiculopathy. Decreased disc height or degenerative changes of the uncovertebral joints anteriorly or zygopophyseal joints posteriorly are common contributors. Disc herniation is not seen as frequently in cervical radiculopathy compared with lumbar radiculopathy. Compression alone does not necessarily lead to radicular pain unless the dorsal root ganglion is affected [71].
Cervical myelopathy is less common in the spondylotic patient and occurs in elderly patients with symptoms such as neck, subscapular, or shoulder pain accompanied by a sensation of shock and numbness in the extremities. Cervical myelopathy associated with motor and reflex changes is indicative of more chronic disease and can eventually lead to spastic weakness and numbness in the extremities, loss of dexterity, spastic gait, loss of spinal function, and painful paresthesias. These chronic symptoms can eventually become permanent with a poor prognosis [72].
The majority of dental practitioners acquire the development of cervical spondylosis. Dentists exhibit common movements, such as forward and lateral flexions, which compromise the tissues around the neck and thus create imbalances and reduce neuromuscular efficiency over time [73].
Nurses are also at a higher risk of cervical spondylosis in comparison to the general population. Nursing tasks involving heavy physical labor and working with the neck in a bent or twisted position were the most common risk factors for neck pain among nurses [74].
Cervical Radiculopathy:

This condition involves compression or irritation of a nerve root in the cervical spine, leading to pain, weakness, and numbness that radiates into the shoulder, arm, or hand [75].

A cervical radiculopathy manifests as neck pain that radiates to the upper extremities and/or weakness and/or numbness. Radiculopathy is caused by the combined compression and inflammation of the spinal nerve. Symptoms related to radiculopathy tend to be unilateral. Bilateral symptoms are more consistent with arthritis of the cervical spine. Radiation of pain depends on the involved nerve root. The absence of radiating symptoms does not eliminate cervical radiculopathy as a potential diagnosis. Presenting pain may be isolated to the shoulder. Pain is not always the presenting complaint, because sensory or motor deficits may present without pain [76].

Cervical Disc Herniation (CDH):

This occurs when the soft inner core of a cervical disc protrudes through the outer layer, potentially compressing nearby nerves and causing pain, numbness, or weakness in the neck and upper extremities [77].

Cervical disc herniation most commonly occurs between C5-C6 and C6-C7 vertebral bodies. This, in turn, will cause axial neck pain and ipsilateral arm pain or paresthesias in the associated dermatomal distribution [78].

A thorough neurological examination is necessary to evaluate sensory disturbances, motor weakness, and deep tendon reflex abnormalities. Careful attention should also focus on any sign of spinal cord dysfunction. Provocative tests include the Spurling test, Hoffman test, and Lhermitte sign [79].

Most cases of acute spinal injury or herniation will resolve within the first four weeks, without any intervention. The use of imaging during this period is typically not recommended as management of these cases will usually not be altered. Imaging during this period is a recommendation when there is clinical suspicion of potentially serious pathology or in the presence of neurological compromise. Additionally, patients that fail to respond to conservative treatment after a period of 4 to 6 weeks warrant further evaluation [80].

Whiplash Injury:

Commonly resulting from rear-end car collisions, whiplash causes sudden hyperextension and flexion of the cervical spine, leading to soft tissue injury, muscle strain, and ligament sprain [81].

The clinical syndrome of whiplash-associated disorders (WADs) includes neck pain, neck stiffness, arm pain, and paresthesias, temporomandibular dysfunction, headache, dizziness, visual disturbances, memory and concentration problems, and psychological distress [82].

Cervical Myofascial Pain Syndrome (MPS):

This condition involves chronic pain and tenderness in the muscles and connective tissues of the neck, often due to muscle overuse, poor posture, or stress [83].

Symptoms of MPS include deep aching pain in a muscle, persistent pain that doesn't go away or worsens, the presence of a tender knot (also known as a trigger point) within a muscle, sleep disturbances due to pain, a general feeling of being unwell, known as malaise, tiredness, or fatigue [84].

7. Cervical spinal canal stenosis:

Cervical spinal canal stenosis is characterized by narrowing of the spinal canal in the cervical spine. The symptoms include suboccipital neck, shoulder, and arm pain; various degrees of lower motor-neuron deficits [85].

These disorders may vary in severity and presentation, and healthcare providers play a crucial role in accurately diagnosing and managing them to improve patients' outcomes and quality of life.

Diagnosis of LBP and Neck Pain

The history and physical examination play a key role in ruling out some of the more serious causes for LBP and neck pain that require physician intervention. Differentiating among various painful conditions involving the back or the neck is less critical, especially if the symptoms resolve with time and conservative treatment. History and physical examination are often enough to diagnose cervical radiculopathy [86].

The most common diagnostic imaging studies for neck and back pain include:

1- X-ray

Standard radiographs are an appropriate initial imaging study for LBP and neck pain in the absence of "red flag" symptoms. However, the degenerative changes seen on imaging are often poorly correlated with the presence of neck pain [87].

X-rays of the spine may be performed to diagnose the causes of LBP or neck pain, such as fractures, spondylosis, spondylolisthesis, degeneration of the disks, tumors, abnormalities in the curvature of the spine like kyphosis or scoliosis, or congenital abnormalities [88].

In spondylosis, common radiographic findings include osteophyte formation, disc space narrowing, end-site sclerosis, degenerative changes in uncovertebral and facet joints, and calcified/ossified soft tissue. AP, lateral, and oblique views of the spine are sufficient to assess foraminal stenosis, sagittal alignment, size of the spinal canal, and the presence of any degenerative or spondylotic changes [89].

These can be further supplemented with lateral flexion and extension views to assess for the presence of spinal instability [90].

For patients with suspected cervical radiculopathy. Loss of the normal cervical lordosis, osteophyte formation, and foraminal narrowing responsible for symptoms can be observed [91].

2- Magnetic Resonance Imaging (MRI)

MRI is the imaging modality of choice to assess neural structures and soft tissues. It allows correct visualization of the entire spines without subjecting the patient to radiation [92].

MRI is recommended for patients with suspected infection, overt neurologic compromise, or progressive neurologic symptoms; it may be appropriate for patients with moderate to severe LBP and neck pain that lasts longer than six weeks and does not resolve with standard treatment [93].

Sagittal and axial sections can help quantify the degree of compression of the nerves and medulla, as well as reveal involved pathological changes (e.g., herniation, bone spurs, enlarged flava ligaments, or facet arthropathy). A hyperintense bone marrow signal on T2-weighted images may be representative of edema, inflammation, ischemia, myelomalacia, or gliosis [94].

Despite the high sensitivity of MRI studies to spondylotic changes, they should not be part of the routine diagnostic examination unless otherwise indicated, given the high prevalence of degenerative signs on MRI in asymptomatic individuals [95].

MRI is the preferred imaging modality and the most sensitive study to visualize a herniated disc, as it has the most significant ability to demonstrate soft-tissue structures and the nerve as it exits the foramen [79].

3- Computed tomography (CT)

Computed tomography may be useful in trauma cases, when bony disruption is suspected, or when MRI is contraindicated [96].

4- Electromyography and nerve conduction studies

Electromyography and nerve conduction studies are not recommended for patients with LBP or neck pain unless they also have numbness, weakness, or pain in the arms or legs. There is insufficient evidence for electro-diagnostic testing, even in cases of suspected radiculopathy. Electromyography may be useful when peripheral neuropathy of the upper or lower extremity is a suspected alternative diagnosis [97].

5- Laboratory studies

Laboratory studies are not essential for evaluating musculoskeletal back or neck pain, unless other causes of back or neck pain are suspected (e.g., rheumatologic disorder, infection, malignancy), in which case a complete blood count, erythrocyte sedimentation rate, and C-reactive protein might be an appropriate panel to send as a screening laboratory tool [98].

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