ASSESSMENT OF MUSCULOSKELETAL DISORDERS AMONG NURSES AT PRIVATE HOSPITALS

VANITHA A/P CHANTHIRAN

FACULTY OF ENGINEERING
UNIVERSITY OF MALAYA
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RESEARCH REPORT SUBMITTED IN FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SAFETY, HEALTH AND ENVIRONMENT ENGINEERING

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[ASSESMENT OF MUSCULOSKELETAL DISORDERS AMONG NURSES AT PRIVATE HOSPITALS]

Abstract

Ergonomics is the study of making workplaces and work, tasks more compatible with the physical and mental capabilities of the people there. The goal of ergonomics is to decrease stress and prevent injuries and illnesses caused by muscle fatigue, poor posture, and repetitive job tasks. This research aims to assess the prevalence of musculoskeletal disorders (MSDs) among nurses at private hospitals. A descriptive cross-sectional design utilized for carrying out this study. The study addressed nurses within selected private hospitals (N=169). The tool used to collect data was a set of questionnaires including persistent of job risk factors, factors that affect the level of awareness and Nordic Musculoskeletal Questionnaire (NMQ). According to the study's findings, nurses are increasingly vulnerable to MSDs. Furthermore, there was a highly statistically significant positive link (p-value 0.05) between employment risk factors, factors influencing MSD awareness, and prevalence of MSDs among nurses working in private hospitals. The study recommended that the hospitals' organization as they devise strategies for reducing MSDs health risks in the workplace. It is important to make sure that the workplace (hospital) has an ergonomic work environment, educate, and communicate the risk factors of MSDs as well as to provide workshop on application of ergonomic principles at workplace. Combining interventions aimed at the organization and the individual to combat MSDs in the healthcare industry. Though the nurse should embed physical exercise in their daily tasks. Physical exercise is strong therapeutic modality to reduce musculoskeletal pain or discomfort and enhance the quality of life. Besides that, the nurses also should show their commitment towards the organization's every endeavor and attempt on reducing MSDs. Nurses should strongly prepare themselves room for improvements. MSDs in the healthcare industry may be prevented or minimized with

clear policies, strategies, and safety culture based on the management support, nurses' involvement, and rigorous change procedures. MSDs on the rise, and more study is needed to find ways to minimize their frequency, incidence, and long-term impact. Also, the future studies should be performed to investigate the relationship between MSDs and other variables such as demographic background, job performance and job satisfaction.

Keywords: Musculoskeletal Disorders (MSDs), job risk factors, factors affect level of awareness of MSDs.

[PENILAIAN GANGGUAN MUSKULOSKELETAL DALAM KALANGAN JURURAWAT DI HOSPITAL SWASTA]

ABSTRAK

Ergonomik adalah kajian menjadikan tempat kerja dan kerja, tugas lebih serasi dengan keupayaan fizikal dan mental pekerja. Matlamat ergonomik adalah untuk mengurangkan tekanan dan mencegahkan kecederaan dan penyakit yang disebabkan oleh keletihan otot, postur yang lemah, dan tugas kerja berulang. Penyelidikan ini bertujuan untuk menilai kelaziman gangguan muskuloskeletal (MSD) di kalangan jururawat di hospital swasta. Reka bentuk keratan rentas deskriptif yang digunakan untuk menjalankan kajian ini. Kajian ini ditujukan kepada jururawat di hospital swasta terpilih (N = 169). Alat yang digunakan untuk mengumpul data adalah satu set soal selidik termasuk faktor risiko pekerjaan yang berterusan, faktor yang mempengaruhi tahap kesedaran dan Soal Selidik Muskuloskeletal Nordic (NMQ). Hasil kajian menunjukkan bahawa jururawat berisiko dijangkiti MSD yang semakin meningkat. Selain itu, terdapat hubungan positif yang sangat signifikan secara statistik pada (nilai $p < 0.05$) antara faktor risiko pekerjaan, faktor-faktor yang mempengaruhi tahap kesedaran gangguan muskuloskeletal dan kelaziman gangguan muskuloskeletal dalam kalangan jururawat di hospital swasta. Kajian ini mengesyorkan bahawa organisasi hospital ketika mereka merancang strategi untuk mengurangkan risiko kesihatan gangguan muskuloskeletal di tempat kerja. Ia adalah penting untuk memastikan bahawa tempat kerja (hospital) mempunyai persekitaran kerja ergonomik, mendidik, dan menyampaikan faktor risiko MSD serta menyediakan bengkel mengenai penerapan prinsip ergonomik di tempat kerja. Menggabungkan intervensi yang bertujuan untuk organisasi dan individu untuk memerangi MSD dalam industri penjagaan kesihatan. Walaupun jururawat harus membenamkan latihan fizikal dalam tugas harian mereka. Latihan fizikal adalah modaliti terapeutik yang kuat untuk mengurangkan kesakitan atau ketidakselesaan

muskuloskeletal dan meningkatkan kualiti hidup. Selain itu, jururawat juga harus menunjukkan komitmen mereka terhadap setiap usaha organisasi dan usaha mengurangkan kadar penyakit otot. Jururawat harus mempersiapkan diri mereka dengan kuat untuk penambahbaikan. Gangguan muskuloskeletal dalam industri penjagaan kesihatan boleh dicegah atau diminimumkan dengan dasar, strategi, dan budaya keselamatan yang jelas berdasarkan sokongan pengurusan, penglibatan jururawat, dan prosedur perubahan yang ketat. Gangguan muskuloskeletal semakin meningkat, dan lebih banyak kajian diperlukan untuk mencari cara untuk meminimumkan kekerapan, kejadian, dan kesan jangka panjang mereka. Juga, kajian masa depan perlu dilakukan untuk menyiasat hubungan antara gangguan muskuloskeletal dan pembolehubah lain seperti latar belakang demografi, prestasi kerja dan kepuasan kerja.

Kata kunci: Gangguan muskuloskeletal (MSD), faktor risiko pekerjaan, faktor mempengaruhi tahap kesedaran gangguan muskuloskeletal.

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LIST OF SYMBOLS AND ABBREVIATIONS

DOSH	:	Department of Occupational Safety and Health
EMG	:	Electromyography
ENMG	:	Electroneuromyography
GDP	:	Gross Domestic Product
HRD	:	Human Resource Division
ILO	:	International Labour Organization
LBP	:	Low Back Pain
MLR	:	Multiple Linear Regression
MRI	:	Magnetic Resonance Imaging
MSDs	:	Musculoskeletal Disorders
NCV	:	Nerve Conduction Velocity
NMQ	:	Nordic Musculoskeletal Questionnaire
OSH	:	Occupational Safety and Health
OSHMP	:	Occupational Safety and Health Master Plan
RSI	:	Repetitive Strain Injury
SPSS	:	Statistical Package for Social Sciences
SOCSO	:	Society Security Organization
VDT	:	Visual Display Terminal
WHO	:	World Health Organization
WMSD	:	Work-related Musculoskeletal Disorder

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CHAPTER 1: INTRODUCTION

1.1 Introduction

Nursing is the highest-ranking career among all occupations vulnerable to developing musculoskeletal disorders (MSDs), with the highest MSD prevalence estimates (Martha et al., 2020). MSDs become more problematic, as per the World Health Organization (WHO), when nurses' regular work activities grow more stressful (Anap et al., 2013). Ergonomic studies have shown that the workplace has not changed in response to technology advancements (Akodu and Ashalejo, 2019). Developed countries, such as the United States, Sweden, the United Kingdom, and Japan, place a high value on human resource performance, which impacts national economic growth. Workers' safety and well-being have risen to the top of the priority list to guarantee that they work in a safe atmosphere that does not represent a danger. These hazards result in workers working in uncomfortably cramped conditions, contributing to the high preponderance of career-associated MSDs amongst the general population. According to the findings of research conducted on the Indian and Portuguese demographics, the nursing staff had a greater frequency of musculoskeletal disorders than the overall population (Serranheira, Sousa-Uva & Sousa-Uva, 2015).

Irrespective of whether they are working in a rich nation, including the United States or an emerging one such as Malaysia, nursing staff are in high demand worldwide. According to the analyzed healthcare study, the need for nurse positions in Malaysia surged at the same time as the country's population grew (Omar et al., 2018). According to the data, more than 70 percent of the medical centers do have not an adequate number of nurse personnel to meet their needs (HRD, 2018). This is since this occupation has the most physically strenuous fields, which require a lot of manual handling of patients and occasionally poor posture while doing tasks. Nursing practitioners comprise of around 33 percent of the hospital manpower, and they are peculiarly undefendable, representing 60

percent of all recorded work-related injuries (Tinubu et al., 2010). Nurses walk off the job at 12% each year, with 52 percent complaining of chronic lower back discomfort (Motacki & Motacki, 2009). Great demands limited decision-making power, high effort, and little pay are potential risk factors for prevalent mental illnesses among nurses. This shows that the psychosocial workplace significantly impacts mental health (Sorić et al., 2013).

The musculoskeletal disorder affects people in many types of jobs, with those in the healthcare domain being among the most prone to developing MSDs (Amin et al., 2016; Hou & Shiao, 2006; Reed et al., 2014). Body areas that MSDs most often afflict include the lower back, neck, and shoulders, to name a few (ILO, 2013). Because of their day-to-day job activities, most workers, including nurses, reported experiencing back discomfort, followed by neck and shoulder pain, according to the survey results (WHO, 2005).

MSDs are a highly prevalent health concern encountered by employees across the globe, and they are a significant source of disability in the workplace all over the world (Schulte PA, 2020). The prevalence of MSDs in different workplace situations has been extensively researched, notably in the workplace (Marras et al., 2009), industry (Hembecker et al., 2017), and hospitals (Amin et al., 2016). Therefore, this study focuses on determine the prevalence of MSDs, factors of psychosocial and physical leading to MSDs prevalence and factors that affect the level of awareness and knowledge among nurses at private hospitals.

1.2 Problem Statement

The number of work-related cases occupational disease especially musculoskeletal disorders (MSDs) rising steadily compared to others (Borneo Post Online, 2016). Figure 1.1 shows reported musculoskeletal disorders cases from 2005 to 2014 by Society Security Organization (SOCSO) (DOSH, 2017).

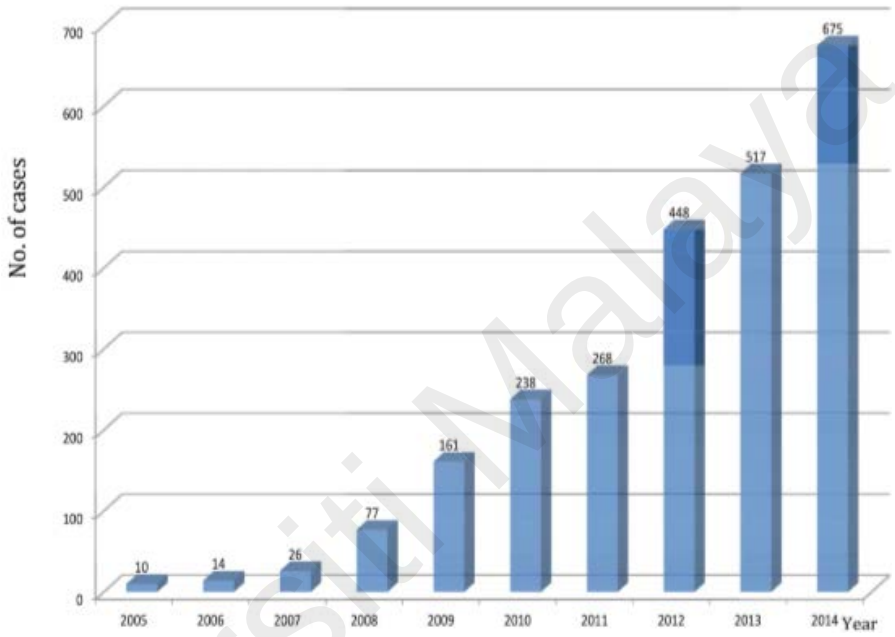


Figure 1.1: Reported musculoskeletal disorders cases from 2005-2014 by SOCSO (DOSH, 2017).

Although various industry found to be affected by MSDs, nursing profession one among them where they highly in risk. Nursing is an extremely physically and emotionally demanding career. These occupational responsibilities expose nurses to a significant risk of MSDs, including acute and chronic.

Study that recorded the prevalence rate among nurses at Malaysia was 73.1 % (Amin et al., 2016). It is highly possible and believable that the prevalence rate higher than the previous studies since increased demand for healthcare services due to the COVID 19 crisis. In 2021, there was a study concluded 94.9% of healthcare workers had musculoskeletal pain due to COVID 19 pandemic (Arca et al., 2021). Varieties of studies

has been conducted to discover the risk factors for MSDs and prevention and control techniques. Despite this, MSDs continue to be the most frequent cause of impairment among nurses around the globe.

1.3 Objectives

The objectives of the research are:

i. To assess the prevalence of the musculoskeletal disorders (MSDs) among nurses working in private hospitals.

ii. To analyze the job risk factors that may contribute to development of musculoskeletal disorders among nurses in private hospital.

iii. To determine the factors that affect the level of awareness of MSDs among the nurses in private hospitals.

1.4 Research Question

i. What is the prevalence of the MSDs among nurses at private hospitals?

ii. What is the job risk factors that may contribute to development of musculoskeletal disorders among nurses in private hospital?

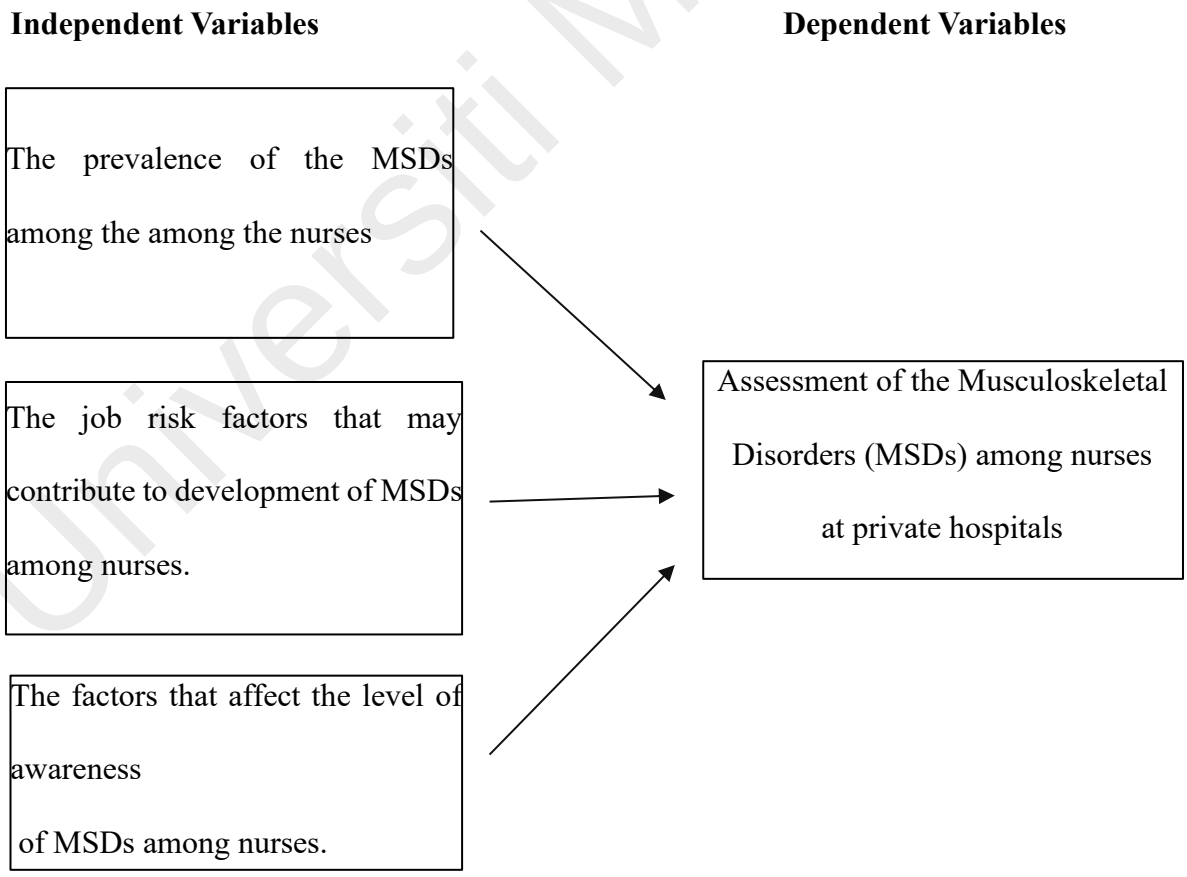
iii. Are there factors that affect the level of awareness of MSDs among the nurses?

iv. Do job risk factors and factors that affect the level of awareness of MSDs have relationship with prevalence of MSDs among nurses at private hospitals?

1.5 Scope of Research

The scope of this research is to will be based on the goals of the job risk factors, factors that affect the nurses' level of awareness and their relationships of these factors in leading to the prevalence of the MSDs among the nurses at private hospitals. Therefore, the study will be conducted within the chosen private hospital. Nurses who have been employed full-time and have working in the nursing profession for at least three years will be eligible to participate. Those that will not have a history of an MSDs before work will also include in the study. MSDs will be diagnosed based on the frequency and duration of discomfort, with symptoms lasting at least three days.

1.6 Conceptual Framework



CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

The nursing population makes up close to 33 percent of the hospital workforce, and nurses are peculiarly defenseless, accountable for 60 percent of all documented work-associated injuries in the hospital setting (Tinubu et al., 2010). According to estimates, 12 percent of nurses quit the field each year, and 52 percent report persistent lower back discomfort while on the job (Akodu & Ashalejo, 2019). According to a new study, the collection of advanced expectations and limited decision-making flexibility and high efforts, and insufficient compensation are all potential risk factors for ordinary mental illnesses among nursing professionals. This shows that the psycho-social occupation ecology is critical for keeping mental health in the workplace. Nursing practitioners handle the cleanliness of their patients, the care of their needs, and the administration of medicines to them. They are predisposed to buying MSDs because of these needs (Akodu & Ashalejo, 2019).

Workability described as a worker's ability to execute a task while considering the demands of the job, his or her health, and mental resources. Job ability is defined as the total of elements that enable workers in each circumstance to effectively handle their work responsibilities (Raithatha & Mishra, 2016). The factors of workability in work groups with primarily physical labour demands, such as building and construction workers (Akodu & Ashalejo, 2019), petrochemical sector employees (Akodu & Ashalejo, 2019), and hairdressers have been investigated in previous research. This research revealed that work capacity in such jobs impacted by a variety of variables such as health issues, lifestyle choices, individual traits, and work-related risk factors, amongst other things. (Pacheco, 2015; Akodu & Ashalejo, 2019; Akodu & Ashalejo, 2019).

2.2 Musculoskeletal Disorders (MSDs)

One of the fundamental purposes of the musculoskeletal system is to allow movement while also providing protection, stabilizing the body, and maintaining bodily homeostasis. Exhaustion, weariness, heavy weights, inadequate oxygen, and repeated activity may all cause muscular contractions to be reduced or eliminated (Hartvigsen et al., 2005). Accident risks may increase because of a lack of sleep. Acute muscular strain and strain-related disorders (MSDs) are defined as painfulness and redness in bodily tissues (e.g., muscles, tendons, and nerves), lessened motor function, or muscle/bone irritation that occurs because of repetitive motions and the continual application of force (Ou et al., 2021). MSDs are soft tissue irritation or deteriorating illnesses that affect the body's soft tissues, such as tendinitis, muscular stress, joint erosion, nerve compression, or tenosynovitis. MSDs are characterized by symptoms such as discomfort, soreness, swelling, and limitation of the posture angle. Moreover, acute trauma most MSDs, are characterized by diseases injuries that are the result of bad posture for using unergonomic tool as shown in Figure 1.2, repeated motions, incorrect force dissipation, and overburdening over an extended period (Ou et al., 2021).

Figure 2.1: Unergonomic designed chair for nurses (Ibrahim et al., 2019).

Nurses who work in the clinical setting for a lengthy time are exposed to occupational hazards for MSDs. The Occupational Hazards Survey, performed in the United States in 1984, found that the healthcare service sector placed fourth in the list of the estimated incidence of occupational injuries and illnesses in the workplace.

One in every ten incidents was known to be influenced by nursing staff members. In addition to accounting for two-fifths to one-half of healthcare workers, nursing practitioners are constantly exposed to work-related hazards and risks (such as needle-stick accidents, violent behavior, biochemical exposure, overwork pressure, and labor-related stress) when providing first-line diagnosis and treatment to hospital patients. Caregivers as a group are at high risk of acquiring MSDs owing to long-standing and frequent and continuous acts such as holding/carrying products, assisting with sick persons, updating wound dressing for patients, providing medicines, and turning patient in bed over there. (Lee et al., 2011; Chen et al., 2012; Tung et al., 2005).

According to literary works, threshold of the health care facility, volume of work, career satisfaction, work schedules, profession-related stress, workplace factors like climate and assistance, the physical weight of people, job term of worksite, sex, and exercising customs all impact the incidence of MSDs, which mainly occur in the shoulders, neck, or lower back (Chen et al., 2006; Ando et al., 2000; Alexopoulos et al., 2006). Even though MSDs are not lethal, the protracted course of the illness is likely to affect job standards and efficiency of life, and this may be a contributing reason to the regular changes in nursing practitioners' attendance for duties and responsibilities (Kim et al., 2012; Ou et al., 2021).

In the nursing profession, moving and transferring patients accounts for around 20% of the total time spent at work (Holman et al., 2010). After participating in a 2011 survey performed by the American Nurses Association, 62 percent of the nursing practitioners

surveyed expressed important ramifications about multiple sclerosis (MSDs), and 56 percent of the nursing professionals reported developing MSDs or experiencing exacerbated disease and disability as a direct consequence of their jobs (Ou et al., 2021). Only a few previous investigations in Taiwan have explored MSDs among nursing professionals. These studies were either demographically studies using diagnosis and treatment codes from the National Health Insurance Research Database as ascertained by Chung et al. (2013), or assessments using self-report survey questions without complementary objective analyses, as reported by Chung et al. (2013).

In comparison to other diseases, WMSDs have been shown to substantially impact people's lives (Punnett & Wegman, 2004), causing lost work hours or disengagement, creating increased restriction, and transitioning to some other profession (Tinubu et al., 2010). This may cause impairment (Amin et al., 2016) and a massive financial toll on the ordinary person, the organization, and society (Amin et al., 2016).

Multiple intrinsic and extrinsic variables have been identified in the genesis of multiple sclerosis (MSDs) (Punnett, & Wegman, 2004; Alexopoulos, Burdorf & Kalokerinou, 2006). In a recent study, Silverstein et al. (2019) identified reiterative motion, poor posture, and maximum force levels as the key risk factors that have been linked to muscular-skeletal disorders. On a regular basis, nurses must execute tasks that include lifting hefty weights and patient lifts as illustrated in Figure 2.2, working in uncomfortable positions, and transporting patients out of bed and off the floor. Nurses are at increased risk for both acute and cumulative MSDs because of these occupational responsibilities.

Figure 2.2: Lifting patients (Institute of Medicine, 2022).

Nurses, for example, have experienced a significant brain drain, as have most other healthcare workers in recent years at Nigeria. The nurses from Nigeria have travelled to Europe in quest of better living and working conditions. This has led to the issue of insufficient staffing, which has been linked to multiple sclerosis (MSD) among nursing personnel (Tinubu et al., 2010). A decrease in nurse personnel and other modification in the delivery of nursing care is likely to increase the prevalence of musculoskeletal diseases among nurses who are already at risk of developing them (Raithatha & Mishra, 2016).

In Uganda according to reports, Uganda now has a critical lack of nursing experts, with just six (6) nurses per 100,000 people, contrasted to 773 nurse practitioners per 100,000 people in the United States (Munabi et al., 2014). A scarcity of nurses' results in a more significant workload, which leads to increased levels of occupational stress among nurses. The stress associated with the workplace has been recognized as one of the primary triggers of occupational-related illnesses, particularly musculoskeletal disorders (MSDs) (Camerino et al., 2001). Nurses work in eight-hour shifts in most of the Ugandan

healthcare facility, both commercialized and government-supported. Hospital of Uganda has proposed a plan to convert from 8-hour core cycles to half-day working schedules for its nursing care employees in response to a scarcity of nursing personnel (Munabi et al., 2014).

In contrast to Uganda, where the concept was first spurned by the localized group of nurses, in more industrialized nations, the 12-hour hours were at the start positively welcomed as contrasted to the lesser 8- or 10-hour shifts, respectively (Munabi et al., 2014). When the 12-hour shift was introduced in these industrialized nations, it was first connected with greater time to spend with family as well as other non-health facility matters that were important to nurses. When performing the shorter and far regular shifts in their 35–40-hour work per week, it is claimed that they were unable to find the time to complete this task (Munabi et al., 2014). Most recent articles demonstrate that the overall quality of care of patients in wealthy nations with a 12-hour shift is declining, particularly in the United States (Stimpfel et al., 2013). The observed increased incidence of documentation mistakes (Warren & Tart, 2008) and the elevated likelihood of patients' exposure to negative events (Warren & Tart, 2008) provide support for this (Chen et al., 2011). Prolonged 12-hour shifts for nursing staff have been connected to the up-build of numerous types of stress, weariness, and changed body biochemistry in the workers (Munabi et al., 2014). Furthermore, research has already shown that nursing personnel who work these longer hours are more susceptible to acquiring occupational ailments, such as multiple sclerosis (MSD) (Munabi et al., 2014). Several studies have shown that the workplace atmosphere and the alternatives available to nurses in terms of how employees work play an essential role in minimizing the consequences of extended work shifts hours (Munabi et al., 2014; Yoder, 2010).

Nursing staff in low-resource nations seem to have little or no influence over their jobs, which adds to their stress levels even more. Given the significant nursing inadequate staffing in Uganda, it is necessary to evaluate the impact of the nurses' daily tasks on nursing professionals to establish a basis for further studies comparability and planning. Relevant documentation, as far as we are aware, is still absent. Furthermore, the diversity in administration of health facilities results in differences in workplace conditions amongst the several kinds of health facilities (private, not for monetary gain, and governmental) in Uganda, which are divided into three groups.

The combination of poor workplace conditions and a lack of an efficient work intervention program in highly developed nations has culminated in an extremely high proportion of work-related mental disorders MSD (Holder et al., 2009). Occupational activities such as high weightlifting, recurrent jobs, and uncomfortable working postures have been identified as risk factors for work - related MSDs, while demographic traits and psychological aspects have also been identified as important predictive factors. Vulnerability to risk factors for work-related MSDs is probable to happen during patient care tasks such as lifting patients, transporting patients, and performing manual treatment on patients. Each action necessitates the deployment of significant amounts of force, and that each operation may require the performance of each activity in potentially dangerous positions.

Patient proper management has been shown to relate to MSDs in nurses on a constant basis, with biomechanical investigations demonstrating very high associated loads. Professional musculoskeletal injuries in nursing practitioners are among the most common nonfatal work-related accidents (Hoskins, 2006). A series of research have demonstrated a link between particularly stressful positions and functional disruption or discomfort in many regions of the musculoskeletal system, highlighting the need of

improving body postures. Inaction on the part of the organization will not alleviate the situation until necessary precautions are taken to examine and lessen the problem. Employees' musculoskeletal systems may benefit from more appropriate working postures, which may enable for even more regulatory oversight of job productivity and a decrease in the frequency of job-associated injuries, among other benefits (Trinkoff et al., 2009).

2.2.1 Musculoskeletal Disorders (MSDs) Signs and Symptoms

When it comes to job-associated musculoskeletal disorders, the most often reported symptom is pain. Tinubu et al. (2010) report that joint stiffness, muscular tightness, redness, and edema of the afflicted regions might occur in certain instances. Some employees may also have "pins and needles" sensations, numbness, skin color changes, and a reduction in the amount of perspiration produced by their hands. The progression of occupational-related MSDs may occur in phases, ranging from moderate to severe. Pain and fatigue in the afflicted limb persist throughout the workday but vanish at nights and on leave days from the workplace.

Those indications appear during the first period and have no effect on the worker's ability to do his or her job. Aching and fatigue that begins early in the working time and continues through the evening are felt in the interim phase, which reduces the ability to do repeated tasks. Aching, weariness, and feebleness that persists at rest are noticed in the final phase, resulting in difficulty sleeping or doing light chores for an extended time. Tinubu and his colleagues (2010) found that not everyone passes through these phases in the same manner. In fact, it may as well be hard to determine whenever one phase finishes and the next one starts in some instances. The initial stage of pain is a warning to the muscles and tendons that they need to rest and recuperate from their injury. In the absence of treatment, an injury may become chronic and, in some cases, irreparable. Indications

should be recognized as shortly as affirmable, and management should be commenced as quickly as possible (Tanui, 2016).

2.2.2 Ways of Identifying MSDs

The examination of WMSDs involves the identification of potential occupational hazards. When evaluating someone, it is necessary, to begin with a discussion of their career history and provide a full explanation of all the procedures that occur throughout a regular workday. According to Varmazyar et al., (2009), the rate, vigour, length, and consistency of each job performed at work are all considered. When it comes to work-related MSDs, the diagnosis is established via the use of laboratory and electronic testing that detect nerve or muscle damage. An example of such a test is electron-euro-myography (ENMG), which combines two aspects: electromyography (EMG) and nerve conduction velocity (NCV). As an alternative to x-rays, magnetic resonance imaging (MRI) produces pictures of tendons, ligaments, and muscles that are more accurate and give better medical details (Trinkoff et al., 2002).

2.2.3 Management of MSDs

Work-related MSDs treatments include a variety of treatments, including limitation of mobility, application of heat or cold, exercise, medications, and surgical intervention as depicted in the photos in Figure 2.3. Prevention of the actions that are producing the injury is the initial step in treating occupational-associated MSDs. This strategy may eventually lead to therapy. Often, word limits are necessary, and in certain situations, a transfer to a new employment position might be explored. A splint may also limit mobility or immobilize the damaged joint when it is not possible to move it. The use of crutches in occupational settings, on the other hand, is prohibited.

Figure 2.3: Illustrations of how managing and remedy of MSDs (Pal Singh, 2018).

This situation necessitates utmost prudence. Stabilizing splints, when used improperly, may do more harm than they are worth. Splints are often used to manually stabilize a joint in situations when an excessive stress on the joint is foreseen and, among other things, limits the mobility of the injured joint. Splints should not be utilized as a structural component for a joint in the workplace since they might cause further injury. Instead, the task should be redesigned such that the high strain on the laborer's joint is not placed on it as the first consideration. To be effective, immobilizing an injured joint using splints must be accompanied with the discontinuation or modification of the occupational activity that caused the injury. Suppose the damaging task is allowed to proceed. In that case, the worker is susceptible to the danger of damage to other joints that must substitute for the one which is splinted, which might result in permanent disability (Tanui, 2016).

Heat supplied or ice to the affected area alleviates discomfort and may even speed up the healing process. Minor injuries should be treated with heat to lessen the discomfort. It is not suggested for wounds that have seen severe inflammation and edema. In contrast to the heat, ice decreases pain and swelling by increasing the flow of blood and decreasing

edema. Besides that, stretching is good since it improves circulation while simultaneously reducing muscular tension. Individuals who struggle with occupational-associated MSDs, on the other hand, should check with a physiotherapist before engaging in physical activity. If stretching or exercise regimens are not appropriately developed, they might worsen the current issue even more. The last option for managing occupational-associated MSDs is the administration of anti-inflammatory medications, which may help to decrease pain and inflammation. If all other treatments and techniques fail, the doctor may resort to more complex therapies or surgery (Trinkoff et al., 2009).

2.3 Impacts of MSDs

MSDs, according to Nur Azma et al. (2016), classified as non-communicable diseases and accurately characterized as illnesses or discomfort encountered by the employee on the repetitive strain injuries, peripheral nerve, and neurovascular systems because of long-term disclosure to workplace accidents (e.g., repetitive motion injuries). It is common for simple actions to be difficult and painful.

Workers' compensation claims for MSDs constituted 34% of all occupational diseases, with an incidence rate of 38 instances per 10,000 full-time employees in Malaysia (Nur Azma et al., 2016). MSDs amongst healthcare professionals, specifically among nursing personnel, has been a significant source of worry across the globe for decades. A figure of published information has reported a high yearly frequency of MSDs in at minimum one body area in the Asian populace (Anap, Iyer, and Rao, 2013) and Western populations (Alexopoulos, Burdorf & Kalokerinou, 2006; Foschen et al., 2006). Lower back pain (LBP) (29 percent - 64 percent of the population) (Munabi et al., 2014; Rahmah et al., 2008; Knight, 2002).

Besides that, to the person (Trinkoff et al., 2002; Widanarko et al., 2014), the effects of MSDs felt by the organization and society, either explicitly or implicitly (Buckle &

Devereux, 2002). These included missed working time, medical expenditures, earnings paid during absences, employees' compensation money, and the person's overall quality of life, among other things.

It estimated that indirect consequences accounted for around 75% of total spending. These included dependent benefits, the expense of extra personnel, psychological challenges in the workplace, downtime in the manufacturing process, workers' compensation claims, job changes and turnover (Nur Azma et al., 2016). These costs accounted for 4% of global Gross Domestic Product (GDP) and include the costs of injury, death, and disease via idleness, sickness management, disability, and survivor benefit, and are rarely recognized. (ILO, 2012). In 2010, the entire amount spent on acute disability benefits was RM 109 million. The total amount spent on persistent disability benefits was RM 306 million. The general amount spent on dependent payments was RM 205 million (ILO, 2013). And from the other hand, according to an Australian study, half from 955 nurses acknowledged earning time off owing to work-related illnesses or diseases, around 71 percent of them suffering from musculoskeletal disorders (MSDs) (Nur Azma et al., 2016). Furthermore, it was shown that MSDs were a common cause for nurses to leave their nursing careers, according to the study (Foschen et al., 2006). Individuals have experienced a reduction in their quality of life due to MSDs, which includes functional limits and medical reliance (Smith et al., 2005).

MSDs received less attention in Malaysia than other occupational illnesses, in contrast to the rest of the world. Nur Azma et al. (2016) found that MSDs caused just 4% of 1792 recorded workplace accidents in 2012, a figure that was much lower than that reported in other countries. The frequency of MSDs in Malaysia, especially among the nursing community, has been the subject of many studies; however, as far as the writers are aware, none has looked at the effect of MSDs on the persons who are afflicted.

MSDs have been well recognized as important sources of severe human misery and a large loss of productivity in enterprises. In addition, MSDs may cause pain, difficulties executing job duties, and even absence from work because of them. Others include poor work productivity, economic effect owing to decreased labour time, expensive medical costs, consequences on everyday life, and early retirement from the professional field (Smith et al., 2005; Leijon et al., 2009; Holder et al., 2009). The evaluation of the amount of exposure to the hazards of MSDs may serve as an acceptable foundation for developing and implementing interventional ergonomics programs in private-owned facilities. Professional nurses in selected and commercial health centres in Malaysia suffer from a broad variety of medical conditions that negatively influence their professional and personal lives.

2.4 Job Practice Controls

Sommers conducted a study on injury as a worldwide occurrence of interest in health sciences, which resulted in the publication of his findings (Foschen et al., 2006). Its goal was to build explanation for models to find the relationship between risk-taking and damage, among other things. The effectiveness of culturally appropriate treatments to mitigate and minimize harm investigated. According to the study's findings, nurse scientists can apply distinctive perspectives such as competence in mechanical handling and ergonomic ideas to improve awareness of injuries and their repercussions.

Waters and colleagues (2006) performed research on the assessment of a "appropriate practices" MSDs prevention strategy in convalescent hospital in the United States of America. Mechanical lifts and re-positioning assistance included in the "appropriate practices" MSDs prevention programme, as was a zero-lift policy and staff education on how to effectively use lifts. The intervention conducted at six care homes, and the findings revealed that the amount of handling injuries has significantly decreased., workers' compensation expenditures, and missed workday injuries because of the programme.

Dahl (2000) conducted a case study to investigate the effectiveness of work practice controls paired with workplace reconfigurations in reducing MSDs among visual display terminals (VDT) operators.

In addition to providing education and anatomical explanations for MSDs, low-cost workstation adjustments such as during the course of the experiment, lumbar rolls and seat cushions were used. When asked about the number of injuries recorded six (6) months following intervention, the firm reported a 50 percent reduction. A well-designed place of work lowers the amount of unneeded bending, twisting, and reaching. It is only via the application of ergonomic principles that proper designs may accomplished (Muggah, 2014; Tanui, 2016). There have been many studies that show how the importance of ergonomics in cost containment became apparent to the governments as well as entrepreneurs, specifically the costs paid due to absenteeism, retraining damaged personnel, medical bills, and health coverage (Farhang Dehghan et al., 2019; Buckle, 2005).

Ergonomics studies restricted to three primary areas, namely, workspace design, creation of work habits and postures that are safe, and development of handling and tool layout (Muggah, 2014). A computer ergonomics programme, developed in a university context and targeted specifically at computer users, as detailed by Tanui (2016) in detail. Professional behaviors and optimal working positions, as well as rest breaks, stretches, and strength training, were prescribed by the programme to reduce the risk of damage to employees. Prior to the programme, 30 percent of the employees complained of high degrees of pain at their jobs. Following the execution of the programme, 95 percent of these employees reported an increase in their personal comfort level.

2.5 Approaches by Safety and Health Department in Malaysia

The primary objective of OSHMP 2020 is to instill a Preventive Culture in the work site. This strategy will continue the execution and acculturation of the notion of accountability and self-regulation established in the previous two strategies in order to develop a Safe and Healthy Work Culture among employers and employees (Department of Occupational Safety and Health, 2020). The Preventive Culture places a high value on consciousness, obligation, and dedication among employers and employees, respecting the rights of labourers with reference to occupational safety and health, reassurance of worker participation in OSH pursuits, improved OSH knowledge and expertise, and competent OSH management based on effective risk management. The goal objective is the restructuring of the American workplace into a safe and healthy atmosphere to safeguard the most asset - the employees (Department of Occupational Safety and Health, 2020).

2.6 Summary and Gap

A lot of scholastic research investigation have been conducted in the occupational safety and health especially in the MSDs though there is still a gap work-associated MSDs to concerning the nurses in the working in commercialized hospitals. Much of these studies performed in public/ governmental hospitals.

Nursing practitioners are frequently exposed to dangers and risks associated with their jobs. Acute muscle strain and strain-related diseases (MSDs) are characterized by pain, edema, and restriction of the posture angle. Professional musculoskeletal injuries are one of the most prevalent forms of nonfatal work-related accidents among nursing practitioners (Hoskins, 2006). Inaction on the side of the organization will not ameliorate the situation unless required safeguards taken to investigate and mitigate the issue. Limitation of movement, exercise, heat or cold application, medicine, and surgical

intervention are all examples of remedies for work-related MSDs. Without treatment, an injury may develop into chronic and, in some situations, irreversible.

CHAPTER 3: METHODOLOGY

3.1 Introduction

"This study used a descriptive cross-sectional research approach. This is due the study was a survey to gather fact information, and this is the most recommended research design", (Olutende et al., 2022).

Several methods are adapted to study musculoskeletal disorders, risk assessment, and risk control. A control measure is also recommended and implemented to observe the improvement in the infection of musculoskeletal. To achieve that, this study is conducted in actual private hospitals where the nurses work with the flow of methodology, which will be executed as preliminary work to acquire some input for the analysis.

Consultation is done to acquire information based on experience with musculoskeletal patients and colleague nurses, along with the change that has been achieved. Learning from past mistakes will help develop new safety measures that will be more comprehensive in preventing future disorders of muscles and bones.

The risk assessment will be done based on the disorder progression, and the frequent times they are identified in private hospitals. One of the primary goals of this research will be to develop health policy recommendations to reduce musculoskeletal illnesses among nurses in private hospitals. Preparation of musculoskeletal disorder control action plan is based on the proposed control measures according to the identified causes. The main objective of the control measure is to ensure musculoskeletal disorders are not prevalent in private hospitals or at least reduce the risk of acquiring to an acceptable level.

3.2 Survey Analysis

The survey is distributed to nursing staff working in private hospitals in order to gain their opinions on the causes of musculoskeletal illnesses based on their responses to the

survey form. The survey is designed to gather information about the nursing staff working in private hospitals. The survey is being performed, and the information gathered examined for the purpose of reliability of questionnaire.

In-depth discussions with experienced nurses provide valuable insight into the actual practice that is being carried out in private hospitals as well as questionnaire aspects, which varies between different private hospitals. The information gathered through this survey reviewed and improved the questionnaire based on the perspective of nurses whoever participated in pre-test.

The survey included questions about understanding the risk of the work with their own evaluation. It is essential practice to understand the procedure and have the ability to recognize the risk in the workplace before we conduct any task. It is expected based on the survey to obtain the variable trend that can explain the entire picture of the private hospitals' working conditions. Also, the questionnaires were developed according to the nurses' favors for them to answer straightforwardly.

3.3 Site Observation

According to the findings of this study, the method of private hospital observation is conducted in a more inspection-style manner to identify the causes of musculoskeletal problems, and the practice and compliance that is adapted.

3.4 Target Population

The study addressed nurses at private hospitals. The target population will be nurses from the selected private hospitals within the state. The nurses who agreed to participate chosen.

3.5 Sampling Design

Through the purposive sampling, the hospitals in which the research will be conducted were identified. Selected hospitals for the study accomplished using purposive sampling. The study employed the use of stratified sample, and nurses from each hospital stratum were selected at random for participation. Based on the total number of nurses at every hospital, a varying quantity selected to participate.

3.6 Sample Size

The size of sample determined through purposive sampling. The total population of nurses within the selected private hospitals were 258. However, due to the possible factors that affecting the research such as COVID-19 pandemic, overtime workload, working experiences and nurses who had a history of associated musculoskeletal problems before the study were excluded, as were pregnant nurses or postmenopausal at the time of data collection. The hospitals were chosen via convenience sampling and with the approval of the appropriate hospital management. Following approval from the necessary authorities, a briefing session was arranged to recruit new volunteers. The survey questionnaires were then presented to participants who volunteered to participate in the study at their separate workstations by the Nurse Manager. Table 3.1 shows population who match this research within the selected hospitals and the sample from.

Table 3.1: Population and sample selection from each hospital.

Hospitals	**Population**	**Sample**
Hospital A	107	73
Hospital B	86	61
Hospital C	65	35
TOTAL	258	**169**

3.7 Data Collection Tools

Every individual (nurse) given a self-administered questionnaire that collected after the completion. The questionnaires were divided into four sections. Section A included demographic details. Section B is the self-administered developed namely Nordic Musculoskeletal Questionnaire (NMQ) by (Kuorinka et al., 1987) and improved by (Crawford, 2007) used to evaluate the discomforts and troubles among nurses where its indicate the prevalence of MSDs among them. Result from previous study (Chairani, 2020) showed the self-administered NMQ has excellent reliability and declared valid. Section C is rating scale questions adopted from previous validated research paper (Tanui, 2015) where the respondents expected to rate how persistent the job risk factors happen at their workplace from options 'Seldom', 'Sometimes' and 'Often', that may contribute to development of musculoskeletal disorder (MSDs). Lastly, Section D is the open-ended questions about the factors that affect level of awareness of MSDs among the nurses in private hospitals. The Cronbach's alpha coefficient for the above-mentioned sections of questionnaires was 0.888.

3.8 Analysis of Data

The statistical data analyzed using IBM SPSS software and Excel. For qualitative factors, result presented as frequencies and percentages, and quantitative variables as deviation for means and standard deviation. The interrelationships of the variables assessed using MLR. The significance consideration was $p \leq 0.05$.

CHAPTER 4: RESULT & DISCUSSION

4.1 Results

The findings of the data analysis are presented in this chapter. Results relevant to demography and precise study objectives are included. The study selected 258 nurses after the exclusion criteria, with 169 being completed answering the questionnaires, yielding a 65.5 percent response rate. As seen in table 4.1, this was adequate for the research.

Table 4.1: Response Rate.

Questionnaires	Number	Percentage (%)
Completed	169	65.5
Non-responded	89	34.5
Total	**258**	**100**

4.1.1 Demographic Background

Table 4.2 shown the results of clear data on demographic background of the responders (N=169). Demographic details are the one of the factors that can be lead to musculoskeletal disorders (Hou et al., 2006). The overwhelming majority of the study population was females 128 (76%) and the other side male were 41 (24%) from 3 private hospitals. From 169 reponders, majority of the responders at the age of 25-35 years old which the frequency was 88 (52%); range age from 35-45 years old were 61 (36%) while above 45 years old were the third highest number of nurses with 17 (10%). The least number of nurses found to be less than 25 years old with 3 (2%).

The next demographic detail in the questionnaire was the level of education. The level of education categorized into three. Approximately, 54% of nurses held Diploma in nursing, while only 38% hold Bachelor degree in nursing and 8% other (the nurses with

an associate's degree in nursing or a higher education degree was among the others). However, the level of education doesn't indicate the adoption of safety working lifestyle at workplace (Abdul Rahman et al., 2015).

The data showed that 53% of the participants stated that they have worked for 3-6 years, 31% indicated that they have worked for 7-10 years, 7% indicated that they have worked for less than 3 years and 15 years and above correspondingly and 2% for 11-14 years. These results show that most nurses have worked for over 4 years, hence the demography was substantial for the research. Lastly, the data showed 106 (63%) nurses who were married and 63 (37%) were single.

Table 4.2: Total of respondents with demographic background (N= 169).

Item	**Frequency, n (%)**
Gender	
Male	41 (24)
Female	128 (76)
Age	
< 25 years old	3 (2)
25-35	88 (52)
35-45	61 (36)
> 45 years old	17 (10)
Education	
Diploma	91 (54)
Degree Bachelor	64 (38)
Other Education	14 (8)
Working experience as nurse	
< 3 years	12 (7)
> 3-6 years	90 (53)

> 7-10 years	52 (31)
> 11-14 years	3 (2)
> 15 years	12 (7)
Marital status	
Single	63 (37)
Married	106 (63)

4.1.2 Nordic Musculoskeletal Questionnaire (NMQ)

Result of prevalence of musculoskeletal disorders among nurses at private hospitals shown in table 4.3. For prevalence of musculoskeletal disorders, Nordic Musculoskeletal Questionnaire been applied to collect data. The questions about the symptoms at different parts of the body including lower back, shoulders, neck, upper back, wrists/hands, elbows, knees and ankles/feet hips/thighs, in four questions. For convenience's sake as was previously mentioned, there are two choices available to the workers, which are "Yes" and "No," and they can respond either one to demonstrate that they are having problems or discomfort in any part of their body. In addition, as was previously mentioned, there were four different question categories that were asked about each part of the body that will indicate the level of prevalence of MSDs among nurses at private hospitals.

Based on the result the first question answered by the participants who nurses are, they mostly had trouble during the last 12 months at the neck were 150 (88.8), shoulders 140 (82.8), lower back 133 (78.7), upper back 123 (72.8), wrists/ hands119 (70.4). Others are answered ‘No’ to the body of parts that mentioned previously. Although, the most workers did not feel discomfort at some areas of body parts as hips /thighs 150 (88.8), elbows 98 (58), knees 147 (87), ankles/feet 98 (58) respectively who answered with a ‘No’. It appears that most of the respondents in this section have experienced discomfort in the past year in their neck, shoulders, lower back, and upper back, but they have not experienced discomfort in their thighs, elbows, or ankles/feet.

Second question asked whether they took any preventive actions during the last 12 months from carrying out or avoid performing normal activities such as job, housework, and hobbies. Seems most of the nurses answered 'No', showed either it's their daily routine that can't avoid or the capacity of pressuring themselves to involve in activities even they felt discomfort at their body parts. On the other side, nurses still preventing themselves from carry out activities involved lower back due to their work as lifting patients or doing desk jobs as sitting for long hours. For lower back 124 out of 169 nurses answered 'Yes' with percentage of 73.4%. Besides that, 76.9% answered 'Yes and 23.1% answered 'No' for neck part. The responses from the participants showed that most of them avoided engaging in activities because they felt uncomfortable and were aware of the areas of their bodies where they experienced discomfort, in order to avoid making the situation even more severe.

Third question deals with the nurses being seen by any physician during the last 12 months due to discomforts condition of any part of the body. During the distribution of this questionnaire, the participants were asked if they had visited a doctor for their MSDs problems. They said that due to a lack of time and an overworked schedule, they had given up on seeing a doctor, undergoing therapy, or taking medication. The results support their statement. Highest number of workers answered 'Yes', means that they have been seen any physician during the last 12 months for their musculoskeletal discomforts. Especially for their neck 88.8%, wrists/ hands 82.8%, upper back71.6%, shoulders 78.7%. The frequency of other parts answered 'No' at average. That includes elbows with 66.9%, lower back 62.1%, hips/thighs 82.8%, knees 78.7% and ankles 88.8% respectively. Although, the highest frequency was at the neck 150 (88.8%) but also other parts of the body where they answered 'Yes' for this section such as wrists/hands, upper back, and shoulders should be considered as well since the frequency higher than 100. Discomfort at the mentioned parts before can conclude most nurses have a significant

challenge because they frequently bend when interacting with patients. The pain in their neck is getting worse, forcing them to see a doctor, undergo treatment, and take medicine.

The fourth question concerns nurses who had difficult handling bodily parts in the recent seven days. Most of the nurses answered 'Yes', indicating that they had a problem with one of the body parts in the previous seven days. The highest percentage of nurses responded with 'Yes' was neck 160 (94.7%), shoulders 146 (86.4%), lower back 134 (79.2%) and upper back 122 (72.2%). Others answered a 'No' when it come to the knees and wrists/hands 160 (94.7%), hips/thigh 122 (72.2%), ankles and feet 119 (70.4%). The last question demonstrates that nurses suffer from musculoskeletal discomforts I their neck, shoulders, lower back, and upper back. Other parts of the body cause less discomfort, but it can also be severe discomfort and lead to MSDs if it's not identified at early stage of pain.

From this NMQ data can conclude, the nurses are highly risk population where they become victim of MSDs. Its might be due to the current situation, COVID-19 crisis caused them bearing the pressure of workload (Arca et al., 2021).

Table 4.3: Musculoskeletal discomforts at body areas among nurses (N=169).

Area of Body	Have you at any time during the last 12 months had trouble (such as ache, pain, discomfort, numbness) in:		During the last 12 months have you been prevented from carrying out normal activities (e.g., job, housework, hobbies)		During the last 12 months have you seen a physician for this condition:		During the last 7 days have you had trouble in:	
	Yes	No	Yes	No	Yes	No	Yes	No
	Frequency, n (%)	Frequency, n (%)	Frequency, n (%)	Frequency, n (%)	Frequency, n (%)	Frequency, n (%)	Frequency, n (%)	Frequency, n (%)
Neck	150 (88.8)	19 (11.2)	130(76.9)	39 (23.1)	150 (88.8)	19 (11.2)	160(94.7)	9 (5.3)
Shoulders	140 (82.8)	29 (17.2)	130 (76.9)	39(23.1)	133 (78.7)	36 (21.3)	146 (86.4)	23(13.6)
Upper back	123 (72.8)	46 (27.2)	31 (18.3)	138 (81.7)	121 (71.6)	48 (28.4)	122 (72.2)	47 (27.8)
Elbows	71(42)	98 (58)	48(28.4)	121 (71.6)	56 (33.1)	113(66.9)	50(29.6)	119 (70.4)
Wrists/Hands	119 (70.4)	50 (29.6)	150 (88.8)	1 9(11.2)	140 (82.8)	29 (17.2)	9 (94.7)	160(5.3)
Lower back	133 (78.7)	36 (21.3)	124 (73.4)	45 (26.6)	64 (37.9)	105(62.1)	134 (79.2)	35 (20.8)
Hips/Thighs	19 (11.2)	150(88.8)	31(18.3)	138 (81.7)	29 (17.2)	140 (82.8)	47 (27.8)	122 (72.2)
Knees	22 (13)	147 (87)	141 (65.7)	27 (34.3)	36 (21.3)	133(78.7)	22 (5.3)	160 (94.7)
Ankles/Feet	71 (42)	98 (58)	31 (18.3)	138 (81.7)	19 (11.2)	150 (88.8)	50 (29.6)	119 (70.4)

4.1.3 Job risk factors that may contribute to development to MSDs

This is the second objective, tackled under section C of the questionnaires where different job risk factors were discussed. The risk factors and data collected shown in the table 4.4. There were 15 questions asked; the questions selected based on the previous researchers' findings and the pre-test conducted before distribution of the actual questionnaire for this research. Questionnaires were designed Likert scale format where the nurses answer one among "Seldom", "Sometimes" or "Often".

For most of the nurses performing the same task over and over is a job risk factors, majority of the corresponds at 53.3% as 'often' and 29.6% at 'sometimes'. Consequently, 17.1% of them answered at 'seldom'. This is due to the work such as lifting patients, highly lead to the Repetitive Strain Injury (RSI) (Martha et al., 2020). Secondly, there were 40 % of nurses stated 'seldom' at treating a large number of patients daily 30% of them stated 'sometimes' and 'often' respectively. Its due to the pandemic and high number of inpatients and outpatients (LoGiudice & Bartos, 2021) but not always there were treating large number of patients.

Thirdly, performing manual orthopedic procedures (join mobilizations, soft tissue mobilization) causes MSDs when 45 % believed that is happen 'often' while 21.9 % stated 'seldom'. Fourthly, most of the participants believed that insufficient rest pauses or breaks during the workday is a problem where 53.3 % answered 'often', 26.6% 'sometimes' and 20.1% 'seldom'. Based on the site observation found that, other than meal breaks the nurses are less likely take breaks in between their shifts. Fifthly, 100 of responders stated 'often' at working in difficult and overcrowded places, on contrary 34 of them also stated 'seldom'. Based on the site observation, the hospitals were filled with inpatients and outpatients which caused the nurses found difficulty working under overcrowded workplace. Despite their fears of contracting the disease, health care

personnel shown dedication and established purpose to conquer the challenges (Liu et al., 2020; Tan et al., 2020).

Working in the same positions for long period (sitting, kneeling, bending over, standing), 100 from 169 rated as 'often'. On contrary, 17.1% believed twisting or bending back incorrectly happen 'seldom' that can lead to MSDs. Besides that, working close to or beyond physical limitations 53.3% assured that happen 'seldom'. The following are other job risk factors that rated above 50 percentage of nurses as 'often' are persistently working while hurt or injured 56.2%, lifting or transferring dependent patients 56.8% and hoisting moving or carrying heavy equipment or materials (e.g., constant inert motion machineries) 52%. Nurses stated 'seldom' and 'sometimes' for job risk factors such as reaching or working away from body, working with diagnosed or disturbed patients, patients' unexpected quick movement or fall and assisting patients during gait activities 50 percentage more than 'often'.

Table 4.4: Percentage of how persistent the job risk factors happen by nurses.

Job Risk factors	Seldom n (%)	Sometimes n (%)	Often n (%)
Performing the same task over and over	29 (17.1)	50 (29.6)	90 (53.3)
Treating a large number of patients in a single day	69 (40)	50 (30)	50 (30)
Performing a manual orthopedic procedure (Joint mobilization, tissue mobilization)	37 (21.9)	56 (33.1)	76 (45)
Insufficient rest pauses or breaks during the workday	34 (20.1)	45 (26.6)	90 (53.3)
Working in difficult and overcrowded places	19 (11.2)	50 (29.6)	100 (59.2)
Working in the same position for long period (sitting, bend over, kneeling, standing)	29 (17.1)	40 (23.7)	100 (59.2)
Twisting or bending back incorrectly	35 (20.7)	32 (19)	102 (60.3)
Working close to or beyond physical limitations	90 (535)	50 (29.6)	29 (17.1)
Reaching or working away from body	119 (70.4)	30 (17.8)	20 (11.8)
Persistently working while hurt or injured	34 (20.1)	40 (23.7)	95 (56.2)
Lifting or transferring dependent patients	39 (23.1)	34 (20.1)	96 (56.8)
Working with diagnosed or disturbed patients	126 (75)	30 (18)	13 (7)
Hoisting moving or carrying heavy equipment or materials (e.g., constant inert motion machineries)	35 (21)	46 (27)	88 (52)
Patients' unexpected quick movement or fall	81 (48)	47 (28)	41 (24)
Assisting patients during gait activities	105 (62)	34 (20)	30 (18)

4.1.4 The factors that affect the level of awareness of MSDs among nurses at private hospitals

The question of factors that affect the level of awareness of MSDs among nurses at private hospitals was asked in an open-ended format to the responders. The responders responded based on their personal experience. There were a lot of answers responded by the nurses for this question. Based on the answers given, it categorized into six main factors since most of the answers similar to each other. Table 4.5 shows the six main factors affect the level of awareness of MSDs with frequency and percentage based on the nurses responded.

Table 4.5: Factors that affect the level of awareness of MSDs among nurses.

Factors that affect the level of awareness of MSDs among nurses	Frequency (%)
Communication	58 (34%)
Personal Distress	20 (12%)
Professional Commitments	20 (12%)
Education Qualification	9 (5%)
Technological innovations	30 (18%)
Organizational commitments	32 (19%)

Based on the result shown in table 4.5, the highest number of nurses around 58 (34%) from 169 of total sample answered related to communication. Second highest number of nurses answered related to organizational commitments where 32 (19%). It's a regular complaint by the nurses where the organization or management does not provide proper resources such as readiness, training and perform risk management to create the awareness of the areas where the nurses lack of. There is not much different between the

next and previous factor. Technological innovations usage recorded 30 (18%). Nowadays the hospital data everything under the system. Innovation meant by nurses here is the system that upgrade frequently, and the operation of machineries make them spent more on desk jobs on learning. The technology usage such as computer usages become part of the nurses' life since hospitals are moving towards adopting data key in system technologically.

Next, personal distress and professional commitments recorded identical frequency and percentage where was 20 (12%). The 6Cs are six core nursing values (care, compassion, competence, communication, courage, and commitment) (Baillie, 2017). Although, commitments are core value for a nurse it's also become barrier for their level of awareness of MSDs due to the primary concern on patients on COVID-19 pandemic. The nurses' personal distress affects their mentally and physically of their profession.

Lastly, education qualification where 9 (5%) recorded. They believed nurses from different literacies, and some are competent in particular areas especially MSDs and others are not, it is affecting the level of awareness.

4.2 Discussions

Table 4.4 shows the mean of total musculoskeletal discomfort of areas of body. To make the discussion understandable the areas of body calculated as total neck, total shoulder, total upper back, total elbows, total wrist/hands, total lower back, total hips/thighs, total knees, and total ankles/feet.

Table 4.6: Mean and standard deviation scores of total areas of body.

Areas of total body	Mean (Std)
Total neck	6.45 (1.155)
Total shoulders	6.24 (1.025)
Total upper back	5.50 (1.247)
Total elbows	4.47 (.957)
Total wrist/ hands	5.08 (1.171)
Total lower back	6.76 (1.149)
Total hips/ thighs	5.21 (1.455)
Total knees	5.24 (1.403)
Total ankles/ feet	4.66 (1.169)

4.2.1 Relationship between job risk factors developing MSDs among nurse at private hospitals and MSDs

The table 4.7 shows Spearman analysis. After the normality test being conducted, the results shows that the data collected was not normal where the total the result of the normality test was less than $p > 0.05$. The reason for Spearman analysis being chosen was because the collected data that were used inferential analysis data to relate two variables. The result of correlation between job risk factors contributing to MSDs among nurses and

total body areas scores which presence of prevalence of MSDs shown in the following tables.

4.2.1.1 Job risk factors that have relationship with total body discomfort scores (MSDs)

The result of correlation between job risk factors contributing to MSDs and total body areas scores which presence of prevalence of MSDs shown in the following tables. On performing same task repeatedly, the p value shows (.010) (Table 4. 7). This clearly shows that repetitively executing a certain duty is a key source of MSDs in nurses. To lessen the incidence of this illness, preventative measures such as work rotation and taking breaks between shifts should be used. Nurses often execute their everyday tasks, such as injection procedures, weights, and body measurements, again and over, as found in this study. These are associated with MSDs, especially if performed in an awkward or poor posture. The most common sources of back discomfort among nurses were lifting patients in bed, moving patients out of bed, and raising patients off the floor. (Martha et al., 2020).

Besides that, regarding insufficient breaks during the nurses' shift hours, the result stated .002 where the is a significant relationship to MSDs ($p< 0.05$). This risk factor leads to the high incidence rate of MSDs among nurses; thus, hospital administrators must provide tea, lunch, and nap breaks throughout the night shift. Breaks also increase nurses' attention while doing procedures and lower the number of mistakes made during operations. Understaffing contributes to a high incidence rate of MSDs among nurses since most nurses have a huge task to handle and encounter numerous patients in a single long shift. (Tan et al., 2020).

Follow by that working in difficult or overcrowded places and working in the same position for longer period significance with MSDs as the result shows .020 and .007 p value respectively. Working in a difficult place and overcrowded places during pandemic make the nurses not only affect the muscles and bring musculoskeletal problems but also it mentally affects them. The high workload, along with their unfamiliarity with the condition and their working environment, caused nurses to experience stress, worry, anxiety, and despair, as well as burnout and sleeplessness (Han et al., 2020). On contrary, the p value of working in the same position for longer period was .007. Working in same position for long period such as when the nurses are engaged with desk job and doing something that providing patient care require effort and same position. In doing desk job especially during the computer usage for longer period might create Carpal Tunnel Syndrome (due to pressure of wrist at keyboard) (Mediouni et al., 2015) and eye strain (due to the brightness of display) (Sheppard & Wolffsohn, 2018). This is having a high significant relationship with MSDs. One of the factors that cause MSDs among nurse is being in same positing for longer period (Chen et al., 2012) as stated before in literature.

Bending or twisting the spine in awkward/poor postures was associated with MSDs in study participants (p =.021). Bending or twisting once back in improper posture correlates to a significant incidence rate of LBP in nurses, particularly while conducting extensive procedural tasks (WHO, 2007). Chen and his fellow authors (2012) demonstrated in their studies that the nurse population working in a slightly bent position for lengthy periods of time remained significant after adjusting for all other characteristics. Though the extent of the harm depends on the type of the task and its location in the body. Working when wounded or hurt had a significant connection with MSDS among research participants (p = .046). Because they are unable to operate correctly, they are vulnerable to MSDs. It was also suggested that musculoskeletal discomfort among hospital nurses may be linked to

specific responsibilities and things connected to work postures, control, and organization, as well as working while injured (Ando et al. 2000).

For, lifting or transferring patient and carrying heavy material or equipment, both have high impact on MSDs among nurses at private hospitals since the p value showed .006 and .025. The nurses' capability of carrying something heavier than them including patients and equipment should be encounter earlier and create preventive measures before the worst outcome. There is a proper instructions and trainings on how to lift a patient without hurting own self and carry equipment to follow. Without the knowledge of such things those job risk factors cause major musculoskeletal problems (Chung et al., 2013).

Table 4.7: Job risk factors have relationship with MSDs.

Job risk factors	**Total body areas scores (MSDs)**	
	p - value	**r - value**
Performing same task over and over	.010	-.061
Insufficient breaks	.002	.480
Working in a difficult or overcrowded places	.020	.376
Working in the same position for longer period	.007	.429
Twisting or bending back incorrectly	.021	.373
Working persistently while injured	.046	.325
Lifting or transferring patient	.006	.440
Carrying heavy material or equipment	.025	.363

4.2.1.2 Job risk factors have no relationship with total body score discomfort scores (MSDs)

The analysis showed that, .069 and .810 p value for MSDs are present while attending to many patients and using manual orthopedic techniques in a single day (Table 4.8). There was no significant relationship between treating an excessive number of patients and using manual orthopedic techniques and MSDs among study participants ($p<0.05$).

Firstly, treating excessive number of patients is a risk factor exposing nurse to MSDs. However, due to COVID-19 pandemic private hospitals having this issue, but it's unlikely to happen always. Based on the data shown in the previous section under result (Table 4.4) highest number of nurses its stated seldomly happen that treating excessing number of patients in a single day at private hospitals. It is the obligation of hospitals to guarantee that a suitable number of nurses are employed to service the growing number of patients. In contrast, the number of nurses working in these hospitals is typically quite low, forcing nurses to perform lengthy shifts due to COVID-19 pandemic (Ou et al., 2021) seeing many patients at the end of a single day based on the site observation. Also, the result shows performing orthopedic procedures has no significant to MSDs. However, manual orthopedic techniques typically require lengthy hours of bending and unnatural positions to complete, making them prone to triggering MSDs in nurses. Performing manual orthopedic procedures significant to working in the same position longer period (Table 4.7) since techniques require lengthy hours to be in uncomfortable position. Patients are frequently dependent and can provide minimal, if any, aid in moving themselves (Nelson, 2003) or may have limited capacity to grasp instructions and participate, predisposing nurses to WMSD. Those are consistent findings with previous research that found manual patient handling, transferring, or moving to be important predictors of musculoskeletal disorders and low back pain among nurses (Smith & Leggat, 2004; Yip, 2001).

According to the result there is no significant relationship between sudden movement or fall of a patient and MSDs of nurses. From the data collection, majority of the nurses (Table 4.4) stated it seldomly happen and doesn't cause problem for them. The nurses facing difficulty when the patients unexpectedly fall, just to bring them back the nurses be in static position. Add on, the differences between body weight of patients' cause sudden cramp in body parts of nurses during helping the patients.

Assisting patients during gait activities and working with diagnosed patients showed no significant relationship as the p value conclude .191 and .238 respectively. Nurses often play vital role in the rehabilitation process of patients suffering from serious injuries, such as assisting patients who have broken limbs to walk again. During this procedure, the nurse may injure or strain their body significantly, placing them at increased risk of developing MSDs. Also, most of the participants stated they have no problem in working with diagnosed patients or it causes them musculoskeletal related problems.

Next, reaching or working away from body and working beyond physical limitations showed the result of the p-value as .232 and .187 respectively. Statistically the data showed there is no significance between those two job risk factors and MSDs among nurses at private hospitals.

Table 4.8: Job risk factors have no relationship with MSDs.

Job risk factors	Total body areas scores (MSDs)	
	p - value	r – value
Treating excessive number of patients in one day	.069	-.298
Performing manual orthopedic procedures	.810	-.040
Patients' unexpected movement or fall	.061	.516
Assisting patients during gait activities	.191	.250
Working with diagnosed patients	.238	.196
Reaching or working away from body	.232	-.199
Working beyond physical limitations	.187	-.219

4.2.2 Relationship between factors that affect the level of awareness of MSDs among nurses at private hospitals and MSDs

Table 4.9 shows the Spearman analysis. The result shows the correlation between factors of level of awareness of MSDs among nurses at private hospitals whether statistically significant or not to MSDs. The data collected based nurses' own experiences that they feel factors that can be barriers to their level of awareness of MSDs.

From table 4.9, the first factor communication shows p-value .016 which relationship was statistically significant to MSDs. The data found nurses from three private hospitals who are not satisfied with the communication strategy related MSDs. Nursing is undergoing a phase of change in a global scenario to address the COVID 19 pandemic. Unexpectedly, there are changes in medical service routines, organizational structures,

and professional relationships (WHO, 2020a). At this moment, nurses are less in communication and participation regarding their own personal health crisis. Therefore, research is needed to address the communication perspective in health work, especially for teams working in constant stress situations such as emergency medical care. Specific recommendations have been made to accomplish this (WHO, 2020b), such as: (1) developing a crisis communication plan with the senior director or a deputy as the spokesperson, (2) The communication channel with hospital administration, hospital department, staff and relatives must be deliberate as described in communication plan, and (3) conducting daily briefing and debriefing sessions to inform staff of the epidemic status and policy changes.

The result showed p value of personal distress showed .048. The nurses' personal distress reasons include guilt for inefficient care, watching patients' suffering, difficulty from wearing personal protective equipment (PPE), work-related concerns, bad impact on family, and rejection by others make them less concentrate and commitment to their own health care (Rathnayake et al., 2021). The pandemic crisis affects them mentally and physically, therefore they at high risk of developing MSDs.

Regarding professional commitments of p-value showed .001 to MSDs. Professional commitments have relationship with MSDs, since the nurses devoted to the goals and values of their profession. Through the observation and answers given by nurses, can conclude that nurses are aware of musculoskeletal problems and disorders but their primary concern to the professional commitments and ready to contribute even in difficult situation. In Serife and his colleagues' recent study (2022) stated nurses had to work harder than other public employees and faced higher danger as they battled the pandemic, which persisted without abating and reached its peak in various periods. This circumstance has a detrimental impact on the nurses' quality of health.

On the contrary, table 4.9 shows education qualification more than significant value of $p<0.05$. The education qualification addressed as one of the factors that affect the level of awareness when there was 5% of data collected from total respondents. Nurses' perceptions on education qualification where different level of education indicate the knowledge variations. For instance, a nurse with diploma assumes to have low level of awareness and knowledge adoption of MSDs than nurse with higher education. However, the result shows there is no relationship between education qualification and MSDs.

Moreover, technological innovation has relationship with MSDs where the p-value showed .004. Researcher found technological innovations in healthcare industry needed in terms of embrace new modes of practice of nursing (Huston, 2013). Though every technological innovation has its own advantages and disadvantages. Authors identified, some innovations expose risks to the healthcare providers (Dixon-Woods et al., 2011). Organizations enhanced their infrastructure by implementing cutting-edge technology. Nowadays, details such as patients' information, related documents and medical data been key in system technologically. In circumstances, the nurses been spending a lot on learning the innovations that been upgraded timely by the hospital management. Nurses who spend longer period on computer works will be adopt awkward posture and expose to musculoskeletal related problems.

Besides, organizational commitment towards nurses' safety work culture showed has relationship with MSDs where the p-value (.025). A safe workplace environment (ergonomic) is a responsible of hospital management (Pickson et al., 2016). Safe workplace environment that should be provide by the organization including sitting arrangement is acceptable (pleasant chairs, excellent postural support, design match of handles, ladders, staircases, and handrails), and the lighting is adequate. According to the recent investigation found that the work schedule was the region with least ergonomic

appropriateness arrange by the management. Working night shifts, overtime or extra worktime, unequal distribution of work throughout the shift, and working at a predefined pace or time limit were all factors in this conclusion. Insufficient time management may contribute to the ergonomically low works satisfaction stated by three-fourths of the nurses surveyed. These observations are comparable to (Plessas & Bernardes Delgado, 2018). Based on the response received, nurses in private hospitals expect the organization provide educational trainings to create awareness of MSDs among staffs; less organizational commitment or carelessness towards nurse's barrier of level of awareness for developing MSDs among nurses at private hospitals.

Table 4.9: Factors that affect the level of awareness of MSDs with MSDs.

Factors that affect the level of awareness of MSDs among nurses	**Total body areas scores (MSDs)**	
	p - value	**r - value**
Communication	.016	.601
Personal Distress	.048	.361
Professional Commitments	.001	.085
Education Qualification	.079	.336
Technological innovations	.004	.451
Organizational commitments	.025	.515

CHAPTER 5: CONCLUSION & RECOMMENDATION

5.1 Conclusion

Assessment of musculoskeletal disorders (MSDs) were conducted based on the collected data from musculoskeletal discomforts questionnaires, at body parts, persistent of job risk factors and factors that affect the level of awareness of MSDs among nurses. The study demonstrated the prevalence of MSDs among nurses at private hospitals. From the result obtained and site observation reveals that nurses are at risk of MSDs which is on the increase. Findings and the site observation showed that nurses are highly engaged in tasks related to develop MSDs. This stud showed high prevalence of MSDs in nurses, with highest mean score (> 6.00) being for low back, neck and shoulders, whereas lowest mean score were elbows. Among 15 job risk factors, 9 were have greater likelihood than others where more than 50% of nurses responded. However, 8 job risk factors have significance ($p<.0.05$), whereas 7 were have no significance with MSDs developing. Add on, factors that affect the level of awareness of MSDs statistically significant ($p<0.05$) with MSDs development. The major limitation was, this research was carried out during the COVID-19 pandemic, due to that this has highly influence the study and the result showed there is a relationship between the prevalence of MSDs and other variables among nurses.

Due to COVID-19, not only the nurses' health at risk but also affect them mentally, physically, and emotionally. This study suggests that both management of the hospitals and nurses' commitments can make a significant difference. This study propose management to show high commitment on their nurses' safety and well-being. Management or the organization should provide adequate resources for education and application of ergonomic at hospitals, workshops on safety culture to adopt appropriate manual handling technique, reduce adverse working schedule, less overtime and job

rotation. Observation shows nurses are emotionally weak and exhausted due to COVID-19 pandemic. Pandemic causes nurses' various circumstances and workload pressures. Organization emphasizes on providing regular counselling and recovery sessions to assure the nurses have ability to adopt the environment and perform their job flawlessly. Based on the result, due to pandemic the hospitals were shortage on manpower, caused the nurses engaged in various repetitive tasks for longer period without breaks and exposed to musculoskeletal discomforts leading to musculoskeletal disorders (MSDs). This study proposes the organization to increase the manpower and divide tasks between nurses with frequent breaks and without workload pressuring.

Besides that, the nurses also should show their commitment towards the organization's every endeavor and attempt on reducing MSDs. Nurses should strongly prepare themselves room for improvements. According to safety principles, a person should be in less danger to save another from a danger. For example, a nurse should physically fit and educationally aware of their musculoskeletal risks before carrying or lift a patient. So that, both nurses and patients can be free or less exposed to the risks. This study proposes the nurses to open up and primed to communicate about the presence of risk factors of MSDs at their workplace to colleagues and organization. Although, the organization responsible for their staffs' health and well-being at the workplace, the nurses themselves responsible and react primarily towards every action of theirs' based on the knowledge and awareness they gained. As one of the preventive method, nurses embed physical exercise in daily tasks. Physical activity is a powerful therapy method for reducing musculoskeletal pain or discomfort and improving quality of life.

This study suggest control or preventive measures must be continuously analyzed and improved based on the risk management conducted by the organization. In a conclusion, cultivating a safe working environment is everyone's responsibility to minimize and work

towards zero MSDs cases that aggravating from the workplace through proper assessment and control measures so that both employer and employees adopt lesson learned from an incident. MSDs in the healthcare industry may be prevented or minimized with clear policies, strategies, and safety culture based on the management support, nurses' involvement, and rigorous change procedures.

5.2 Future Recommendation

MSDs are widespread among nurses, with the musculoskeletal pain at most of the body parts. Female gender, a history of musculoskeletal ailment, absenteeism, and anxiety were all considered. MSDs on the rise, and more study is needed to find ways to minimize their frequency, incidence, and long-term impact. Future study can be conducted in the following scope to analyze and assess the risk associated and develop MSDs to close the gap of the research as follows: -

1. More interactions with nurses.
2. Conduct site observation for more data collection.
3. Get more details that can cause the MSDs such as BMI value of respondents.

An addition limitation of the impersonal method was it did not allow for more in-depth investigations or inquiries at the hospital due to COVID-19 pandemic. Therefore, in future study, it would be wise to perform research not during the disease outbreak, that would influence the study majorly. Also, the future can be conducted to investigate the relationship between MSDs and other variables such as demographic background, job performance and job satisfaction.

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