Pilot Evaluation of Musculoskeletal Disorders Among Adult ICU Nurses Versus Neonatal ICU Nurses in the United States

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Objectives: *The purpose of this pilot descriptive survey was to evaluate occupation-related MSDs in nurses in the adult intensive care unit (ICU) compared to those in neonatal intensive care unit nurses (NICU).* ***Background:*** *Nursing research has focused on heavy patient handling however; there is a gap in the literature that examines musculoskeletal disorders (MSDs) among neonatal intensive care nurses.* ***Methods:*** *The survey utilized Standardized Nordic Musculoskeletal Questionnaire. This survey was disseminated to members of Academy of Neonatal Nursing and the American Association of Critical Care Nurses. It was a convenience sample but with low response rate. The inclusion criteria consisted of critical care nurses working or have worked full time.* ***Results:*** *A total of 38 responders completed the survey. General demographics among groups were similar. Risk factors for MSDs in each group were similar with the exception of a history of depression which was more common among NICU nurses, (p = .0052). Knee problems seem more common among adult ICU nurses, (p = .0002). Ankle/foot problems seem more common among NICU nurses, (p = .0202). Sixty-three percent of adult ICU nurses reported that MSDs were definitely related to work versus, 47.4% of NICU nurses.* ***Conclusion:*** *Both groups of nurses experienced MSDs, with adults experiencing lower extremity MSDs and NICU nurses experiencing upper extremity MSDs. These pilot results need to be interpreted with caution due to the small sample size. Depression, stress, and ethical dilemmas were more prevalent in the NICU nurses which may a contributing factor for MSDs Both groups expresses a need for additional staffing and a need for improving the quality of work/life issues.*

Keywords: occupational-related musculoskeletal disorders, ergonomics, neonatal ICU, adult ICU

INTRODUCTION

MSDs are prevalent among nurses. All levels of nursing are vulnerable to MSDs, especially those who perform direct patient handling. MSDs may be an occupational hazard due to heavy patient handling and awkward ergonomic demands (Occupational Safety & Health Association [OSHA], 2020). Ergonomics is defined as the recognition of physical and psychological hazards in the workplace to reduce human error, increase productivity, and enhance safety and comfort.

Among nurses in the United States, MSDs are not a unique health issue. Globally, MSDs are a common public health issue (Mock & Cherian, 2008). Nurses throughout the world are considered to be at risk for developing MSDs for similar reasons of those nurses in the United States (Lelis et al., 2012). Nursing is a physically demanding profession due to patients' extensive physical need requirements (BLS, 2017). Nurses may also lack the physical ability to meet the needs of their profession (Lelis et al., 2012). Past studies, both in the United States and other countries, focused on

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patient handling with adult patients (Waters et al., 2007). However, there is a gap in the literature identifying specific MSDs experienced by nurses in the neonatal intensive care unit (NICU) as well as identifying the ergonomic hazards.

In the NICU, the average weight of patients may be low, usually less than 5.5 pounds (2.49 kg), however the machinery and equipment in the unit can be heavy (Ellapen, T., & Narsigan, S. (2014)). Nurses may have to move and control the equipment while transporting the patient. Nurses in the NICU also work with smaller tubing and medical equipment due to the small size of patients. As a result, NICU nurses may stand in awkward positions for a prolonged period of time, as well as be in need for prolonged use of the hands and wrists In the adult intensive care unit (ICU), the weight for an adult patient averages 169 pounds (76.6 kg), with a range from 91 (41.2 kg) to 387 pounds (175.4 kg) (Lee et al., 2013). Mechanical ventilation is usually utilized which presents additional difficulty with patient handling due to sedation and paralytic agents. These patients are usually totally dependent and they may also be heavier than the nurse (Ellapen & Narsigan, 2014). Patients in the adult ICU may place a greater physical demand on the nursing staff than patients in the NICU. However, there may be differences in ergonomic demands in each unit.

The objectives of this descriptive survey were to compare and contrast the occupation-related MSDs among nurses working in an adult ICU versus nurses working in an NICU. In addition, this descriptive survey inquired about specific ergonomic similarities and differences that put each group of nurses at risk for developing MSDs. Our aim was to identify ergonomic hazards in the NICU.

The following questions were examined:

1. What are the demographic characteristics in NICU nurses compared to adult ICU nurses?
2. What are the personal risk factors that may contribute to the development of occupation-related MSDs in each group?
3. What are occupation-related MSDs among nurses that work in the adult ICU and nurses that work in the NICU?
4. What were the possible ergonomic explanations for the similarities and differences in occupational-related MSDs in adult ICU nurses versus NICU nurses?

METHODS

Design

The research design was an online survey that consisted of both quantitative and qualitative. In the quantitative portion of the survey, participants in each group were asked about demographics as well as personal risk factors. In the qualitative section, participants were asked about ergonomic demands.

Measurement

The survey utilized the Standardized Nordic Musculoskeletal Questionnaire (SNMQ) (Kuorinka et al., 1987). The questionnaire consists of 40 questions. This questionnaire focuses on occupational-related MSDs as well as work-related risk factors. It is a self-administered questionnaire and can be administered online (Pugh et al., 2015). Content and construct validity have been previously reported appropriate, and internal consistency with an acceptable Cronbach's alpha of 75 (Pugh et al., 2015).

Another set of questions inquired about the use of ergonomic assistance available in their respective unit. The qualitative section allowed the participants to provide an explanation of the ergonomic environment or the physical activities in their units that they believed contributed to their MSDs.

General demographics, as well as questions concerning occupation-related MSDs, pain levels, and personal risk factors were assessed. An assessment of ergonomic interventions as well

as a qualitative analysis of ergonomic designs that contribute to occupational-related MSDs was included.

Additionally, the survey also gathers information about age, gender, body mass index (BMI), past medical and surgical history, medications, and history of alcohol and smoking. These variables are known to contribute (or be related) to the development of occupational-related MSDs. The years of working in the NICU or adult ICU were also obtained. Participants were asked to quantify the pain level (0–10) that is related to MSDs. The final section of the survey inquired about the use of lifting equipment, lift team, patient transport, and if the beds or cribs were adjustable to height. These are commonly used lifting assistance devices used in each unit developed by the researcher. Participants answered with a "yes or no" response. Participants were able to provide qualitative responses to MSDs and pain levels, as well as any ergonomic issues that may have contributed to MSDs and pain levels. The participants may have dropped out at any time during the survey by not submitting it.

With regard to construct validity the numeric pain scale for MSDs highly correlates with the Visual Analogue Pain Scale with correlation range from 0.86 to 0.95. The test–retest reliability observed in both literate and illiterate rheumatologic patients is high (r = 0.96 and 0.95, respectively) (Downie et al., 1978; Ferraz et al., 1990). The MSDs reported by the participants were the dependent variable since the MSDs may be linked to the participant's individual work environment.

The independent (explanatory) variable was the work environment in which the nurse was assigned, the adult ICU or the NICU. The dependent (response) variables were the binary responses in the SNMQ and the Likert-type rating of pain (0 for no pain; 10 for extreme pain). Pain levels are the dependent variable and were measured by a Numeric Rating Scale (NRS) from 0 that indicates no pain to 10, indicating extreme pain.

Sample and Inclusion Criteria

Nurses were recruited from the Academy of Neonatal Nursing (ANN) and the American Association of Critical Care Nurses (AACN). Permission was granted by the research team in each professional organization. AACN has a membership of approximately 100,000 and ANN has approximately 6,000 members in each group. The survey was made available online, open to all members. The survey was made available to members of these organizations for a 60-day period from January 2019 to January 2020 and a convenience sample was obtained. The sample size was conducted with a 95% confident interval and a 5% margin of error revealed a recommended size of 125 in each group if 1,000 members response to establish adequate power to detect a statistical significances between the two groups.

The inclusion criteria were:

1. Working or had worked in either the adult ICU or the NICU.
2. Nurses working full time and on full duty were included.
3. Nurses need to be over 21.

The exclusion criteria were:

1. Licensed vocational nurses and nursing assistants that work in these units since the critical care areas employ mostly registered nurses.

Data Collection

The survey was disseminated via Qualtrics XM, version January, 2019, Provo, Utah, which is a service that creates surveys and questionnaires. All personal identifiers (e.g., names, social security numbers, employee or member's identification numbers) were anonymized. Only the primary researchers had access to the survey. Confidentiality was maintained. No other participants would have access to other participant's answers in the survey. Informed consent was on the first page of the MSD survey as well as an explanation of the questionnaire. Participation

was strictly on a volunteer basis. There were no health risks to the participants.

Variables

The control variables were age, gender, past medical and surgical history, smoking status, and alcohol misuse that may be risk factors for MSDs. Other variables (potentially related to both independent and dependent variables) included medications, the number of work-years, pain levels, and ergonomic interventions. All variables rely on self-reporting by the participants, and missing values were removed from the analysis.

Data Analysis

The mean and standard deviation were calculated for numeric variables and the proportion (and percentage) was calculated for categorical (binary) variables. These calculations were done by the independent variable (adult ICU or NICU). To compare the dichotomous variables between the two groups as well as adjusting for a small sample size of n = 19 in each group, a calculation that determine the effect size of the difference was utilized to detect if there was any statistical significance and include the medians. The nonparametric Mann–Whitney test was used for numeric data, and the Chi-square test was used for categorical data. To examine MSDs, the responses were either "yes" or "no" and were calculated by percentage in each group. All statistical analyses were performed in Statistical Package for Social Sciences (SPSS0, version 22 for Windows, IBM Corp, Armonk, New York), and R (version 3.6.1 for Windows, R Core Team, 2019).

RESULTS

Sample Characteristics

There were 19 participants in the adult ICU and 19 participants in the NICU for a total sample size of 38 who completed and submitted the survey. The survey was available to all members of the perspective professional organization. The response rate was less than 10% from each organization. All responses were recorded, with no missing data. Location data of the participants were 50% from the West Coastal regions of the United States, 15% of the participants were from the Midwest and 20% were from the East Coast of the United States and 15% from Canada and 5% from England.

The general demographics, past medical history, and current medications were compared in the two groups, and the results are summarized Table 1. The demographic information between the two groups was similar and no statistically significant differences were observed. What were the personal risk factors that may contribute to the development of occupational-related MSDs in each group?

Personal Risk Factors

Personal risk factors that may contribute to the development of MSDs in each group were similar with the exception of depression which was more prevalent among NICU nurses, and the difference was statistically significant (p = .0052) in Table 1. In particular, the likelihood of depression seems increasing with respect to years worked in the NICU, whereas this trend was not observed in the adult ICU.

Occupation-Related MSDs

The results related to the occupational-related MSDs are summarized in Table 2. In our sample, there was a trend for more wrists/hand problems among NICU nurses, but the difference was not statistically significant. Knee problems were more common among adult nurses (p = .0002). Ankle/foot problems seem more common among NICU nurses, and the difference was statistically significant (p = .0202). There was a trend for more adult ICU nurses (63.2%) reporting that their MSDs were definitely related to their work when compared to the NICU nurses (47.4%). Pain levels between the groups were similar with no statistically significant difference.

Perceived Ergonomics Challenges

A summary of ergonomic challenges is provided in Table 3. In the adult ICU, nurses associated their MSDs mostly with heavy patient handling, however, in the NICU, nurses associated their

TABLE 1. Comparing Respondents (*N* = 19 for Adult ICU and *N* = 19 for NICU)

Demographics	**Adult ICU**	**NICU**	***p* value**[a]
Working full time (%)	84.2	73.4	0.4261
Female (%)	84.4	94.7	0.2904
Age in years (median; mean ±*SD*)	46.0; 43.8 ± 11.1	51.0; 44.5 ± 14.1	0.7146
BMI (median; mean ±*SD*)	26.0; 27.6 ± 4.2	28.0; 28.5 ± 6.3	0.6802
Years working in unit (median; mean ±*SD*)	16.0; 14.3 ± 9.9	15.0; 16.4 ± 13.3	0.8265
Past medical history	**Adult ICU**	**NICU**	***p* value**[a]
HTN (%)	15.8	15.8	1.0000
Obesity (%)	15.8	26.3	0.4261
Osteoarthritis (%)	31.6	26.3	0.7206
Depression (%)	10.5	52.6	0.0052
Migraines (%)	15.8	5.3	0.2904
GERD (%)	5.3	10.5	0.5475
Osteoporosis (%)	0	0	NA
Parathyroid disorder (%)	0	0	NA
Thyroid disorder (%)	5.3	10.5	0.5475
Asthma (%)	5.3	0	0.3109
Smoking/alcohol misuse (%)	0	0	NA
Current medications	**Adult ICU**	**NICU**	***p* value**[a]
Narcotics (%)	0	5.3	0.3109
Nonsteroidal (%)	31.6	36.8	0.7324
SSRIs (%)	10.5	26.3	0.2093
HTN (%)	15.8	26.3	0.4261
Osteoporosis (%)	0	0	NA
Thyroid (%)	5.3	10.5	0.5475
Proton pump inhibitors (%)	5.3	5.3	1.0000
Migraines (%)	10.5	0	0.1462
Glucocorticoids (%)	5.3	0	0.3109

[a]The nonparametric Mann–Whitney test was used for numeric data, and the Chi-square test was used for categorical data. Note that it is a pilot study, so results should be interpreted with caution.

MSDs mainly with prolonged standing and having to bend forward over the incubator/crib for a prolonged period of time, repetitive movements associated with static activities, and a lack of nursing staff to assist with lifting/pulling/pushing of heavy equipment. Both groups reported a lack of nursing staff to assist with patient care.

Adult ICU nurses reported more support by patient transport teams, lift teams, and lift equipment, whereas NICU nurses did not have access to transport teams, lift teams, and lifting equipment (0% in the sample). Lift teams and lifting equipment may not be of benefit in the neonatal ICU. Both groups have adjustable beds/cribs 100%.

DISCUSSION

The main findings of this investigation revealed the general demographics among the two groups were very similar. Depression was more common in the NICU nurses. The evaluation of MSDs was based the SNMQ. Both groups of ICU nurses reported patient care activities that required prolonged standing with awkward positioning such

TABLE 2. Standardized Nordic Musculoskeletal Questionnaire (*N* = 19 for Adult ICU and *N* = 19 for NICU)

Area-Specific Questions	Q1: Had trouble/pain, aching, numbness, and/or tingling (past 12 months)		Q2:Prevented from carrying out normal activities (past 12 months)		Q3:Visited healthcare provider for this work-related trouble/pain (past 12 months)		Q4:Had trouble/pain (past 7 days)		Q11:Had surgery	
	Adult ICU	NICU	Adult ICU	NICU	Adult ICU	NICU	Adult ICU	NICU	Adult ICU	NICU
Neck (%)	52.6	68.4	21.1	10.5	5.3	15.8	36.8	26.3	0.0	0.0
Shoulders (%)	63.2	47.4	10.5	10.5	21.1	10.5	31.6	26.3	5.3	10.5
Upper back (%)	52.6	47.4	26.3	21.1	15.8	10.5	47.4	31.6	0.0	0.0
Elbows (%)	21.1	10.5	15.8	5.3	5.3	5.3	15.8*	0.0*	5.3	0.0
Wrists/hands (%)	21.1	42.1	5.3	15.8	0.0	10.5	10.5	15.8	5.3	0.0
Lower back (%)	52.6	78.9	36.8	31.6	36.8	31.6	63.2	73.7	5.3	5.3
Hips/thighs (%)	31.6	52.6	15.8	10.5	10.5	21.1	10.5*	36.8*	0.0	5.3
Knees (%)	52.6***	0.0***	10.5	0.0	26.3**	0.0**	21.1**	0.0**	10.5	5.3
Angles/feet (%)	21.1***	57.9***	5.3	10.5	10.5	15.8	10.5	15.8	10.5	10.5

Note. The nonparametric Mann–Whitney test was used for numeric data, and the Chi-square test was used for categorical data.
*$p < .1$. **$p < .05$. and ***$p < .01$ for comparing the two groups, adult ICU and NICU.

Other Questions		Adult ICU	NICU
Q5: Have you taken medications because of this job-related trouble/pain?	Nonsteroidal (%)	57.9	68.4
	Acetaminophen (%)	47.4	52.6
	Narcotics (%)	5.3	0
Q6: Have you ever had to change jobs either temporarily or permanently because of this job-related trouble/pain?	Yes (%)	26.3*	5.3*
Q7: Has your troubled site caused you to reduce your work activity?	Yes (%)	57.9	36.8
Q8: What is the total length of time that the troubled site prevented you from doing your normal work?	Number of days(median; mean ±*SD*)	31.0; 67.5 ± 110.9***	0.0; 20.8 ± 83.5
Q9: Has this troubled site caused you to reduce your leisure activity (past 12 months)?	Yes (%)	63.2	57.9
Q10: Do you think your troubled site is related to your job?	Definitely yes (%)	63.2	47.4
	Probably yes (%)	26.3	15.8
	Might or Might not (%)	5.3	26.3
	Probably not (%)	5.3	10.5
Q12: Your current pain levels associated with your troubled site (0 for no pain to 10 for worse pain)	Pain scale(median; mean ±*SD*)	3; 3.0 ± 1.9	3; 3.1 ± 1.6
Q13: Ergonomic assistance in your unit.	Patient transport (%)	47.4***	0.0
	Lift team (%)	78.9***	0.0
	Lift equipment (%)	78.9***	0.0
	Adjustable beds/cribs (%)	100.0	100.0

Note. The nonparametric Mann–Whitney test was used for numeric data, and the Chi-square test was used for categorical data.

*$p < .1$. **$p < .05$. ***$p < .01$ for comparing the two groups, adult ICU and NICU.

as squatting and bending. Another similarity in the two groups was the pushing and pulling of heavy equipment.

Nurses, in general, experience emotional distress and anxiety at work and these can be contributing factors to depression (Amin et al., 2018). Depression contributes to pain symptoms by causing a dysfunction in the hypothalamus-pituitary-adrenal axis that leads to lower concentrations of serotonin and noradrenalin (Amin et al., 2018). Neonatal ICU nurses are vulnerable to symptoms of depression due to ethical dilemmas uniquely associated with the care of a vulnerable neonate as well as the associated family responses and dynamics (Amin et al., 2018; Bursch et al., 2018). Stress is associated with all levels of nursing and may contribute to the symptoms of depression (Bursch et al., 2018) Heavy workloads, both physical as well as emotional, may also contribute to the musculoskeletal pain and fatigue (Amin et al., 2018). Stress contributes

TABLE 3. Summary of Ergonomic Challenges in the Units

Percentage	Reported Challenges
Adult ICU	
100	Heavy patient handling due to obese patient with time constraints.
5%	Failure of lifting equipment.
	Lift team not available during off shifts.
52	Understaffing for pulling/lifting of obese patients.
50	The transferring of obese patients.
50	The lack of staffing needs, assistance with lifting equipment.
50	Lack of assistant with bathing
NICU Nurse	
80	Unable to adjust crib or incubator to height.
75	Time-sensitive activities with no rest break.
75	Prolonged standing with static activities issues.
75	No patient transport available to assist with pushing/pulling/lifting of heavy equipment.
75	Unable to take schedule breaks, lack of staffing.
67	Prolonged bending forward over crib with prolonged standing in one Position.
54	Prolonged sitting with infant.
52	No ergonomic training, if training available focuses on heavy adult patients, no ergonomic training for repetitive movements, improper body mechanics specific to the neonatal ICU.
36	Repetitive movements involving upper extremities with no breaks.

to MSDs due to its negative impact on the limbic system, a part of the brain that is responsible for emotion. Stress activated the hypothalamic-pituitary-adrenal axis which increases cortisol levels and activates pain receptors (Generaal et al., 2014)

Both groups of nurses reported distress with heavy workloads with time constraints and tasks that require quick responses with minimal break time. A combination of increased physical workloads, time pressures, and emotional distress can be contributing factors to MSDs (Tsovili et al., 2012)

The results from the adult ICU nurse group were consistent with the literature that most risk factors reported for MSDs are associated with heavy patient handling and heavy equipment handling. Knee problems seem more common among adult nurses. Knee problems could be associated with prolonged standing, as the adult ICU nurses did report prolonged standing as an issue. The use of lift teams, lifting equipment, and transport teams were intended to decrease the physical demands of the adult ICU nurse as well as alleviate issues associated with poor staffing, however, adult ICU nurses still reported an increase in physical stress due to poor staffing (Waters et al., 2007)

Prolonged standing has been associated with ankle/foot problems (Speed et al., 2018). It is recommended to provide cushioning materials to make softer flooring may be considered, however, the use of a specific type of cushioning material is debatable (Waters et al., 2014). The use of floor mats and shoe inserts during prolonged standing compared to prolonged standing on hard surfaces may reduce symptoms of discomfort, muscle pain, and tiredness (Anokye et al., 2012).

Neonatal ICU nurses, on the other hand, reported MSDs from poor ergonomic designs such as static prolonged awkward standing when working over a crib or incubator. Based upon our results, wrists/hand problems may be more common among NICU nurses. One study investigated the prevalence of symptoms possibly related to carpal tunnel symptoms in NICU nurses (Tsovili et al., 2012). There was some evidence for a higher prevalence of symptoms potentially related to carpal tunnel syndrome in NICU nurses; however, further research work is needed to confirm these findings.

Wrist/hand injuries may be associated with repetitive movements (Harih & Dolsak, 2013). Ergonomic changes in the NICU may include equipment to fit the hand, easier to grip, especially for those nurses with early osteoarthritis in their hands, as well as decreasing the amount of hand/grip force required (Baker et al., 2018). Equipment that requires prolonged heavy gripping may also lead to pain and muscle ischemia (Baker et al., 2018). Providing rest breaks to decrease muscle stiffness and ischemia is recommended (Baker et al., 2018)

NICU nurses also reported poor staffing levels that lead to no rest breaks as a risk factor. Some nursing tasks require repetitive movements. Repetitive movements without adequate break times may result in MSDs that may cause muscular pain and fatigue. Neonatal ICU nurses also reported static/prolonged standing may contribute to the development of MSDs. Prolonged standing in a static position as well as prolonged sitting may contribute to musculoskeletal pain (Karakolis et al., 2016). Ankle/foot problems seem more common among neonatal nurses, and the difference was statistically significant.

NICU nurses reported an increased amount of static activities lead to MSDs (Sogaard & Sjogaard, 2017). Physical activity promotes the delivery of nutrients and oxygen to muscles as well as decreases the amount of lactate acid that contributes to muscle pain and fatigue. Static muscle activity leads to muscle atrophy as well as the breakdown of muscle tissue that creates a leaky sarcolemma that releases chemicals that irritate nociceptive nerve endings (Sogaard & Sjogaard, 2017). A potential personal risk factors such as gender and osteoarthritis may also play a role as well (Rogers et al., 2013). The personal risk factor for MSDs was the prevalence of depression in the NICU nurse group. Pain is often a symptom of depressive disorder (Korniloff et al., 2017). The assistance of ancillary staff that can assist with patient care and transport would relieve prolonged and static activities.

Encouraging the nursing staff to engage in physical activity outside of work, not only improves general health, but psychosocial health as well (Malmberg-Ceder et al., 2017). Neuromuscular exercises may be effective in reducing pain and improving lumbar movement control, abdominal strength, and physical functioning. An example of neuromuscular exercises are Pilates that involves mind–body exercises that targets core stability, strength, flexibility, posture, breathing, and muscle control (Taulaniemi et al., 2019). By improving the quality of life at work, there may also be a decrease in musculoskeletal pain (Ng et al., 2019)

In the critical care areas, an ergonomic evaluation of the environment, tasks, and the individual personal risk factors should be conducted. It is important to have input from individual nurses, since each nurse has different risk factors for MSDs and may need the individual training. Environment design to decrease the pain and fatigue associated with prolonged standing with static activities in awkward position should be implemented. Nursing management may consider alternative ergonomic designs for cribs/incubators.

LIMITATIONS

The main limitation of this pilot survey was the small number of participants with little statistical power to demonstrate statistically significant results. A larger sample size is needed to further investigate MSDs differences, especially

focusing on personal risk factors of depression in NICU nurses as well as upper extremity MSDs. Future studies should evaluate specific workers' compensation files evaluating the specific MSDs in both groups of nurses. This survey did not address issues of psychosocial issues nor did it assess physical fitness levels and physical activity levels outside of work. This study inquired about pain levels in each group, however, did not address if pain levels interfere with their ability to perform their nursing tasks. This survey also did not address reasons that some of the participants were no longer working in their units.

CONCLUSION

This is a pilot survey that compared and contrasted MSDs between adult ICU nurses and NICU nurses. Traditionally, ergonomic programs focused on heavy patient handling, however a gap in the literature examined the MSDs among NICU nurses which involved a much smaller patient size. Both group of nurses experienced MSDs, with adults experiencing lower extremity MSDs and NICU nurses experiencing upper extremity MSDs. Depression, stress, and ethical dilemmas were more prevalent in the NICU nurses which may a contributing factor for MSDs Both groups expresses a need for additional staffing and a need for improving the quality of work/life issues.

The results of this survey indicate that a proper ergonomic program analyzes the job description and the nursing tasks for NICU nurses. Another aspect of task analysis is the duration, frequency, and complexity of the task. The physical working environment as well as the nurse's physical, emotional, and mental capacities are included.

Nursing management may consider interventions that reduce the need for repetitive movements, and reduce the physical burden of work as well as lessen the time pressures experienced by nurses as well as staffing needs. Promotion of social support among staff may also lessen the symptoms of depression (Bernal et al., 2015).

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