



Ergonomic Standard Compliance of Nurses in Tertiary Hospitals in Edo State, Nigeria

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Abstract. Healthcare professionals are responsible for many people's lives. In their daily routines, they care for a number of people and have a lasting impact on patients. Nursing can take a toll on the body and one way to mitigate long-term bodily damage is through an ergonomic friendly work environment. There are many work-related dangers that nurses face on a daily basis. Thus the study assessed the compliance of nurses towards the ergonomics standard in University of Benin Teaching Hospital UBTH, Nigeria. A descriptive survey research design was used in the study. The study population was all nurses in University of Benin Teaching Hospital and the sample size for the study was One hundred and fifty five (155) respondents selected across ten departments in the tertiary health center. The purposive sampling technique was used to select the participants in the study. After obtaining the informed consent from the subjects, compliance level was assessed by using ergonomic task analysis scale by observation method. The result of the study showed that the subjects had low compliance on the ergonomic standards of healthcare workers (nurses). Also various ergonomic-based risk factors are associated with their work process including awkward postures, high repetition and excessive work durations which are of great concern in this case. Several engineering and administrative-based controls were offered which would help to eliminate/reduce the presence of the ergonomic-based risk factors, improve their compliance to ergonomic standards and thus lower the potential of developing WMSDs among nurses.

Keywords: Ergonomics, Nurses, Safety and task analysis

1. Background of the study

Healthcare setting have been known to represent a high rates of work-related illnesses and injuries (Gropelli, & Corle, 2011). There are four main concerns which some other studies have narrowed down to be the plight of healthcare workers as regards the effects of their job on their body, namely musculoskeletal injuries; mainly low back pain (LBP), work place violence, shift working and high physical work load and job stress. In addition to individual and psychosocial variables such as age gender, physical status, smoking and workplace stress (da Costa & Vieira, 2010), the major ergonomic factors known to endanger nurses to develop LBP are; awkward postures, carrying and repositioning patients, prolonged standing and working without sufficient breaks. As studies have shown that to manage and prevent LBP among nurses, interventions must be work-related ergonomic strategies as well as exercises.

Ergonomics is the science of understanding the interaction of people and work systems. It is a multidisciplinary approach, underpinned by three sets of interrelated factors (Karwowski, 2012). Physical factors (anatomical, anthropometric, physiological systems) harness human capability issues relevant to efficient and effective workplace layout and working environment. Cognitive factors focus on mental process pertinent to handling information, interpretation, task analysis, human-machine interface, workload, alarm philosophies, and involve human senses (vision and hearing, touch, taste, smell). Organizational factors (sociotechnical systems, cooperation, and participation) are important for managing work responsibilities, work procedures and communication processes. There are established ergonomic principles that can be applied in the

design of nurse stations to encourage good performance, and ameliorate the high levels of musculoskeletal disorders and cumulative trauma disorders associated with nursing.

The two leading causes of work related ergonomic injuries among hospital workers are overexertion and bodily reaction (48%), including motions such as lifting, bending, or reaching, often related to patient handling, STFs (25%). Fatigue is another cause of ergonomic-related injuries and staff accidents in the Operation room OR. In particular, hand fatigue, due to the tedious, repetitive tasks involved in performing surgical procedures, can be exacerbated by the use of gloves that are thick, rigid, slippery, ill-fitting or uncomfortable. In the surgical practice setting, fatigue is primarily related to the work schedule and sleep, but the degree to which comfort has been incorporated into the design of the OR features and equipment may also be a factor.

According to the U.S. Bureau of Labor Statistics (BLS), in 2019 “private industry employers reported 2.8 million nonfatal workplace injuries and illnesses.” Medical personnel had an incidence rate (number of injuries and illnesses per 100 full-time workers) of 3.8, according to the BLS report. Healthcare institutions estimate \$20 billion in losses due to employee back injuries alone. As a result, the healthcare industry recognizes manual maneuvering as a risk for employees and patients.

Ergonomics helps reduce workplace injuries due to physical activity. When an employee’s workload is too demanding, this risk increases. The practice of ergonomics in nursing, as in other careers, decreases the impact work has on the body, preventing injuries before they occur.

Unknown physical stressors create workplace hazards. Many patients rely on healthcare workers for physically demanding mobility services. Each service a medical professional performs can potentially result in harm to the worker and patient, which increases healthcare costs due to worker absences, turnover, and shortages.

Posture is the position of your body while standing, sitting and performing your daily professional tasks. When the body is in proper alignment it becomes well-balanced with minimum stress and strain upon the supporting structures such as bones, ligaments and muscles. Posture can affect the functionality of the body. It can also affect breathing and arm and neck movements as well as how the jaws works and the way you chew. Posture do change over time, but

many limitations that people associate with aging are actually due to inactivity, therefore you can see an older person with an almost goose-necked stance, head forward and severely rounded shoulder, but many younger people exhibit these same bad postures, especially those who spend a lot of time at their desks peering at computer monitors. The complications of poor postures include but not limited to back pain, spinal dysfunction, joint degeneration, rounded shoulders and a pot belly

Good working postures are very important among nurses in order to abate workplace oriented musculoskeletal injuries. It provides an appropriate positioning for inner organs, while keeping the body upright which in turn gives the lungs the space they need to expand fully. It also helps to keep the abdominal muscles tight, which enables the muscles to provide support for the internal abdominal and pelvic organs.

Because nurses play a vital role in the health care sector and they almost always represent about 1/3rd of the healthcare work force (Almaghrabi & Alsharif, 2021) of UBTH, this study is therefore conducted to know if nurses in UBTH are ergonomically compliant in the course of their daily job. The ergonomic compliance emphasis for this study is on working postures which includes posture while sitting and documenting, standing, pushing trolleys, lifting and repositioning patients, feeding, emptying urine bags, dispensing drugs to patients and changing sheets.

1.1 Statement of the Study

In addition to safety risks, many jobs also present risks of disease, illness and other long-term health problems. Among the most common occupational diseases are various forms of pneumoconiosis, including silicosis and coal worker’s pneumoconiosis (black lung disease). Asthma is another respiratory illness that many workers are vulnerable to. Workers may also be vulnerable to skin diseases, including eczema, dermatitis, urticaria, sunburn, and skin cancer. Other occupational diseases of concern include carpal tunnel syndrome and lead poisoning.

Occupational hazards may include chemical agents and solvents, heavy metals such as lead and mercury, physical agents such as loud noise or vibration, and physical hazards such as electricity or dangerous machinery. Occupational health problems occur at work or because of the kind of work you do. These problems can include, Cuts, broken bones, sprains, and strains, Loss of limbs, Repetitive motion

disorders, Hearing problems caused by exposure to noise, Vision problems, Illness caused by breathing, touching, or swallowing unsafe substances, Illness caused by exposure to radiation, Exposure to germs in health care settings. Good job safety and prevention practices can reduce your risk of these problems. Try to stay fit, reduce stress, set up your work area properly, and use the right equipment and gear.

It is an undebatable fact that sitting, standing and carrying out your professional task with proper alignment would ensure that professional work is done more efficiently with less fatigue and strain on the body's ligaments and muscles. Therefore being aware of good posture and practicing good posture is the first step to breaking poor ergonomic habits and reducing stress and strain on the spine. The following postures were observed: postures while sitting and documenting, standing, pushing trolleys, lifting and repositioning patients, feeding, emptying urine bags, dispensing drugs to patients and changing sheets. Hence, this study was embarked upon to observe the ergonomic compliance of nurses in UBTH.

1.2 Research Questions

The following research question will guide the study:

- What is the compliance toward ergonomic risk reduction strategies among nurses?

2. Methodology

Research in simple terms means search for knowledge. In technical terms however, research is a serious exercise that involves a systematic and scientific search for pertinent information on a specific subject. It is an act of investigation to discover knowledge. The systematic processes involved in the search for knowledge is the methodology of research. This study adopted the non-experimental descriptive cross-sectional study. Quantitative cross-sectional studies are useful for evaluating adherence to ergonomics in health center among nurses (Adebowale et al, 2017). The study population was all nurses in University of Benin Teaching Hospital. There are 703 nurses in University of Benin Teaching Hospital, Benin City, Edo State. The sample size of 155 representing 22.05% of the study population was used. This is valid because Owie (2017) stated that for a small

population size, a higher percentage would be an adequate representative sample size. The purposive random sampling technique was employed in selecting the respondents into the study sample. In this, 7 units were randomly selected from a total of 11 units. Therefore, every nurse included in the sample was purposely selected. However, those that voluntarily refused to participate were excluded. The sample size of 155 nurses participated in the study.

The research instruments used for this study were structured observational checklist for the compliance of ergonomics. The checklist is divided into two sections; section A and B. Section A focused on demographic data of participants such as age, marital status, years of experience, ethnicity, religion, and the highest educational qualification. Section B contained items which elicited information on variable under study. The observation was made with the aid of an observational checklist with the researchers recording the nurses compliance of ergonomics in the health facility. The checklist was validated by three experts on ergonomics and physiotherapy. Content validity of the instrument was done by the three experts selected and their suggestions helped to ensure that the checklist measure what it ought to measure.

The data for the study was collected by the researchers with the assistance of three research assistants. Permission was gotten from the ethical committee of UBTH before embarking on the study. The participants gave their informed consent a week to the commencement of data collection in order to minimize study bias. The participants were unaware they were being observed randomly every one hour for a daily time period of 4hours and a total study period of 2weeks. The researchers sent the research assistants unknown to the participants to garner the required data. The participants were observed if they complied to the various ergonomics safety precautions with the use of the checklist. The checklists that was duly filled was uploaded to a main database, which was accessible only to the researchers. The data was downloaded in MS Excel format when the requested sample size is reached. After that, it was exported to SPSS version 20, in which a final check of consistency was performed as a pre-analysis. The rating and evaluation statistics was used to determine their adherence.

3. Result

Table 1: Compliance to avoiding awkward or static posture

s/n	Ergonomics	Ergonomic Compliance	Non compliance
AWKWARD or STATIC POSTURES			
1	Avoid twisting or bending body to the side	48(32.0%)	102(68.0%)
2	Avoid holding arms at or above shoulders	15(10.0%)	135(90.0%)
3	Avoid bending or twisting neck	69(46.0%)	81(54.0%)
4	Avoid leaning over or kneeling	108(72.0%)	42(28.0%)
5	Avoid reaching low or high to begin a lift	126(84.0%)	24(16.0%)
6	Avoid working in one position for long periods	21(14.0%)	129(86.0%)

The table above shows the ergonomic compliance (avoiding awkward posture) of nurses in their workplace. It can be seen that in terms of awkward and static posture, majority of the nurses did not comply to avoid twisting or bending body to the side (68%), avoid holding arms at or above shoulders (90%), avoid bending or twisting neck (54%), avoid working in one position for long periods (86%). However, they comply in avoiding leaning over or kneeling (72%) reaching low or high to begin a lift (84%). Hence they have low compliance to avoiding majority of the awkward postures.

Table 2: Compliance to avoiding repetition

	REPETITION	Ergonomic Compliance	Non compliance
1	Avoid frequent forceful or awkward motions	39(26.0%)	111(74.0%)

For the repetition category, 74% of the subjects did not comply avoiding frequent forceful or awkward motions.

Table 3: Compliance to force

	FORCE	Ergonomic Compliance	Non compliance
1	Avoid lifting more than 6 lbs with one hand	36(24.0%)	114(76.0%)
2	Avoid frequently lifting (more than 12 times per shift)	18 (12.0%)	132 (88.0%)
3	Avoid lack of ability to grasp the patient securely (no handles)	75(50.0%)	75(50.0%)
4	Avoid totally dependent, unpredictable, or combative patient	36 (24.0%)	114(76.0%)

In same vein most of the subject did not also comply to avoid lifting more than 6 lbs with one hand (76%), avoid frequently lifting (more than 12 times per shift) (88%), avoid lack of ability to grasp the patient securely (no handles) (50%) and avoid totally dependent, unpredictable, or combative patient (76%).

Table 4: Compliance to avoiding extreme temperatures

	EXTREME TEMPERATURES	Ergonomic Compliance	Non compliance
1	Avoid working with excessive exposure to cold or heat	57 (38.0%)	93 (62.0%)

Also, for the extreme temperatures aspect, 62% did not comply on avoiding working with excessive exposure to cold or heat.

Table 5: Compliance to avoiding work stress

	WORK STRESS – mental demand or physical fatigue	Ergonomic Compliance	Non compliance
1	Avoid time pressures	54(36.0%)	96 (64.0%)
2	Avoid excessive overtime	21 (14.0%)	129 (86.0%)
3	Enough rest breaks	60 (40.0%)	90(60.0%)

Also for the extreme temperatures aspect, 62% did not comply on avoiding working with excessive exposure to cold or heat. The subjects did not also comply in avoiding time pressures (64%), avoid excessive overtime (86%) and have enough rest breaks (60%).

Table 6: Compliance to avoiding contact stress

	CONTACT STRESS	Ergonomic Compliance	Non compliance
1	Avoid Sustained pressure to a body part against a surface or edge	33(22.0%)	117(78.0%)

In terms of contact stress the respondent did not comply in avoiding sustained pressure to a body part against a surface or edge (78%). Thus it can be deduced that majority of the subjects do not comply with the various standard ergonomics of hospital setting by nurses.

4. Discussion of findings

This study was conducted to assess the ergonomic compliance of nurses in UBTH. It was discovered that majority of the participants in the study do not comply with the various ergonomic standard at the workplace. It was seen that in terms of awkward and static posture, majority of the nurses did not comply to avoid twisting or bending body to the side, avoid holding arms at or above shoulders, avoid bending or twisting neck, avoid working in one position for long periods. This non-compliance could be related to their nature of job. For instance, the researchers observed that the nurses could spend a lot of hours attending to a patient especially those in critical conditions, twisting or bending to ensure the various medical equipment are inserted properly on the patients.

Also, they did not comply avoiding frequent forceful or awkward motions. This was observed mainly at the accident and emergency department (A&E) and in other wards when patients require emergency attention. Furthermore, most of the subject did not also comply to avoid lifting more than 6 lbs with one hand, avoid frequently lifting (more than 12 times per shift), avoid lack of ability to grasp the patient securely (no handles) and avoid totally dependent, unpredictable, or combative patient. Also for the extreme temperatures aspect, majority of the nurses did not comply on avoiding working with excessive exposure to cold or hot conditions. The subjects did not also comply in avoiding time pressures, avoid excessive overtime and have enough rest breaks. They did not also in avoiding sustained pressure to a body part against a surface or edge. Thus it can be deduced that majority of the subjects do not comply with the various standard ergonomics of hospital setting by nurses. All these activities are seen as risk factors to workplace injuries. This is corroborated by da Costa and Vieira (2010) who stated that the major ergonomic factors known to endanger nurses to develop LBP are; awkward postures, carrying and repositioning patients, prolonged standing and working without sufficient breaks. As studies have shown that to manage and prevent LBP among nurses, interventions must be work-related ergonomic strategies as well as exercises. In same vein, Waters (2010) stated that healthcare workers who handle and

move patients as part of their jobs suffer a disproportionately high number of work-related musculoskeletal disorders (MSDs). The majority of reported work-related MSDs are back pain cases that result in significant numbers of lost work days. It is likely that these lost workdays have a substantial impact on the quality and cost of health care. Patient care ergonomics can reduce the risk of work-related MSDs by helping safety experts design the work so it can be safely performed by most workers. It has been concluded that task organization was mainly responsible for developing the reported musculoskeletal disorders among these nurses (Kuřagowska, 2008).

5. Conclusion

Based on the findings of the study, several conclusions can be drawn:

Lack of ergonomic compliance: The study reveals that a majority of the nurses in UBTH (University of Benin Teaching Hospital) do not comply with the various ergonomic standards in their workplace. This implies that they do not adhere to recommended practices to ensure their physical well-being while performing their duties.

Non-compliance with posture guidelines: The nurses were found to exhibit non-compliance with ergonomic guidelines related to posture. They frequently engaged in activities that involved twisting or bending their bodies, holding their arms at or above their shoulders, bending or twisting their necks, and working in one position for extended periods. These activities are considered awkward and static postures, which can increase the risk of musculoskeletal injuries.

Non-compliance with forceful or awkward motions: The study observed that the nurses did not comply with guidelines that recommend avoiding frequent forceful or awkward motions. This non-compliance was particularly evident in the Accident and Emergency Department and when attending to patients requiring emergency attention. Engaging in such motions can lead to strains, sprains, and other work-related injuries.

Non-compliance with lifting guidelines: The nurses did not comply with guidelines for safe lifting practices. They lifted more weight than recommended with one hand, lifted patients frequently throughout their shifts, lacked the ability to securely grasp patients (due to the absence of handles), and dealt with patients who were totally

dependent, unpredictable, or combative. These practices increase the risk of back injuries and musculoskeletal strains.

Non-compliance with temperature guidelines: Majority of the nurses did not comply with recommendations to avoid excessive exposure to cold or hot conditions while working. This can potentially lead to discomfort, decreased performance, and potential health issues.

Non-compliance with time management guidelines: The study found that the nurses did not comply with guidelines related to time pressures, excessive overtime, and adequate rest breaks. Failing to manage time effectively and not taking enough breaks can contribute to increased stress levels, fatigue, and decreased job performance.

Overall, the study concludes that the majority of nurses in UBTH do not comply with the various standard ergonomics in the hospital setting. These non-compliant behaviors pose a significant risk of workplace injuries for the nurses, emphasizing the need for interventions and strategies to improve ergonomic compliance and reduce the risk of musculoskeletal disorders and other work-related injuries.

6. Recommendation

The Nurses should be provided freedom of mobility around the wards which would allow easier access to the desired point. This approach will not only promote the neutral body posture, but also allows operators to complete the task in a timely and convenient manner.

They should avoid activities that require excessive work durations, especially while standing, and allow the work to be performed in standing as well as seated positions. Activities with excessive standing durations possess a potential to stress the lower back and can cause localized-muscle fatigue, especially in the gastrocnemius muscle, which is located in the back part of the lower leg.

Management of health centers should conduct periodic job/workstation inspections to identify areas where ergonomic based risk factors may develop or are already present. Identified risk factors should be analyzed and eliminated before they contribute to the occurrence of undesirable consequences.

Enhance job rotation in which workers are able to perform different tasks that do not require the same

motions or use of body parts. With this approach, muscles and other body components can rest and heal while performing another job.

Ensure top management support and nurse involvement. Clarify to nurses how and why about standards and immediately praise compliance and address non-compliance. Moreover, encourage nurses' cooperation, especially during the decision-making process, because nurses are close to the patient and the work environment and can provide valuable information

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