

Evaluation of Work Posture During Bed Bathing Procedures and Its Association with Musculoskeletal Complaints among Nursing Students

Ni Ketut Guru Prapti^{1,*}, Made Rini Damayanti¹

¹Nursing Department, Faculty of Medicine, Universitas Udayana, Bali, Indonesia

*corresponding authors: prapti.nkg@unud.ac.id

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Abstract

Aims: This study aimed to analyze the working posture of nursing students while bathing patients in bed and to identify the musculoskeletal complaints experienced by nursing students after the intervention.

Methods: This was an analytical observational study aimed at observing and analyzing the work posture of respondents while bathing patients in bed as well as identifying musculoskeletal complaints experienced by nursing students after the intervention. The Rapid Entire Body Assessment (REBA) instrument was used to determine whether the nursing students were working beyond safe limits, while the Nordic Body Map (NBM) was used to identify which parts of the body experienced discomfort. The study was conducted in the Nursing Skill Lab at one of the nursing education institutions in Bali, and involved 19 nursing students performing a case scenario related to fulfilling personal hygiene needs through bed bathing. A video of the activity was recorded and converted into images for analysis by measuring the angles of the various body parts. The scores for each body part were entered into the REBA worksheet to determine the final score.

Results: The results of the study showed that wiping the nearest hand, stomach, chest, and foot had a REBA score of 7, indicating a moderate risk. In contrast, wiping the furthest hand, back, and feet had REBA scores ranging from 9 to 10, indicating a high risk. The results of the NBM questionnaire revealed that the most commonly reported musculoskeletal disorders were disorders of the back (57.4%), waist (55.4%), and feet (42.3%).

Conclusion: Musculoskeletal complaints during education are a significant concern, as nursing programs must prepare students for a lifelong professional career that includes managing the physical demands of clinical practice. Therefore, modifying work procedures based on comprehensive ergonomic principles is essential, as is providing nursing students with a thorough understanding of proper ergonomic work postures.

Keywords: bathing, ergonomics, musculoskeletal complaints, personal hygiene

Introduction

Bathing with a patient in bed is a nursing action aimed at fulfilling the patient's basic needs. Meeting these basic needs is part of nurse competency standards and reflects a nurse's ability to provide professional nursing care (Putri & Kamil, 2019). This nursing action supports personal cleanliness and health to promote physical and psychological well-being (Nasirin & Wahyuningsih, 2020). Therefore, nurses must possess the knowledge and ability to meet basic human needs by monitoring and responding to the patient's ability to fulfill them (El-Soussi, 2017). However, many nursing students and practitioners still lack awareness of the proper body mechanics and ergonomic principles when performing these tasks, which can result in injury and decreased performance.

This topic is increasingly urgent, as improper techniques during basic care procedures, such as bed bathing, can lead to significant health risks for caregivers (Decormeille et al., 2021). While the primary focus is on meeting patients' needs, the physical toll on nurses and nursing students performing these tasks is often overlooked. Without proper guidance and awareness, these routine activities can result in harmful strains, particularly when carried out under time pressure or in less-than-ideal environments (Ashigbi et al. 2023). This study is therefore necessary highlights the ergonomic risks involved in bed bathing procedures and identifies effective strategies for preventing musculoskeletal disorders (MSDs) among nursing students. Addressing this issue early in nursing education is essential to ensure both the quality of patient care and long-term well-being of future healthcare professionals (Hwang et al., 2022). This study aimed to analyze the physical challenges faced by nursing students during bed bathing procedures and to promote safer and more ergonomic practices in nursing education and training.

The physical demands of patients on bed bathing present a significant occupational challenge in nursing practice. This procedure is typically performed manually in a standing posture and often requires assistance from at least two people. The bathing method depends on the patient's physical condition, level of dependency, and hygiene requirements (Goldenhart & Nagy, 2021). Bed bathing requires substantial physical energy and time, particularly when carried out for totally dependent patients whose asymmetrical, heavy, and uncoordinated body movements further increase physical strain on nurses. Additionally, limited room space often forces nurses into awkward and ergonomically poor positions (Larsen et al. 2022). Therefore, nurses are vulnerable to various work-related risk factors, including improper working postures. Musculoskeletal disorders (MSDs) are among the most common occupational health issues affecting healthcare workers (Abdollahi et al., 2020), and in nurses, these are frequently caused by repetitive movements, poor ergonomic postures, heavy lifting, bending, twisting, prolonged standing, and maintaining static positions (Ou et al., 2021).

Nursing students, as future healthcare professionals, are also at a high risk of musculoskeletal issues. Studies have shown varying prevalence rates of musculoskeletal pain among nursing students, with some reporting rates as high as 74.5% across different years (Singh et al., 2010). The lower back is the most commonly affected area, followed by the neck, shoulders, and upper back (Barr et al. 2021). Nursing education institutions play a vital role in preparing students with the required skills and competencies and making curriculum design, instructional content, and

teaching quality critical priorities. The learning process goes beyond knowledge transfer and is oriented toward helping nursing students master their practical skills and professional values. This process is crucial for developing the abilities necessary for professional performance, and is facilitated through social interactions and engagement with the nursing community (Abdollahi & Bagherzadi, 2024).

The working posture of nursing students during practical activities such as bathing or massage is a key concern in nursing skills training. Among the tasks most likely to cause musculoskeletal complaints are bathing, lifting, wound care, repositioning, and urine measurement (Hwang et al., 2023). A study by Džervé and Katiné found that 72.5% of nurses reported neck pain, 64.7% shoulder pain, and 62.7% upper back pain over the past year, indicating a high prevalence of these issues in the nursing profession (Džervé and Katiné, 2024). Non-ergonomic and static postures are major contributors to lower back pain (Bataller-Cervero et al., 2020) and accelerate the onset of musculoskeletal complaints (Abdollahi et al., 2020).

Improper ergonomic techniques during fundamental nursing tasks, such as bed bathing, pose serious and often overlooked health risks to nursing students and professionals, increasing the urgency to address musculoskeletal disorders early in training (Decormeille et al., 2021; Ashigbi et al., 2023; Hwang et al., 2022). Despite the physical demands of bed bathing and its role in meeting patients' needs, many nursing students lack sufficient awareness and application of ergonomic principles, resulting in a high prevalence of musculoskeletal complaints and performance-related risks (Abdollahi et al., 2010; Gül, 2014; Abdollahi et al., 2020; Ou et al., 2021). This study aimed to analyze the physical challenges experienced by nursing students during bed bathing procedures, and to promote safer, ergonomically sound practices within nursing education and clinical training.

Methods

Design

This study was an observational study.

Samples and settings

The study population consisted of nursing students at a nursing institution in Bali. A total of 19 samples were obtained using a simple random sampling technique and were included in this study. This sample size was determined based on the limited number of students enrolled in the clinical skills course during the data collection period as well as the feasibility of conducting in-depth observations and assessments. Although relatively small, a sample of 19 participants is considered adequate for preliminary or exploratory studies aimed at identifying patterns, evaluating procedures, or assessing ergonomic risks in a focused educational setting (Ullah et al., 2022) (Mani et al., 2016). Moreover, simple random sampling ensured that each eligible student had an equal chance of being selected, thereby reducing selection bias and enhancing the credibility of the findings.

Instrument

The research instrument used was the Rapid Entire Body Assessment (REBA), a method developed in the field of ergonomics that allows for quick and systematic assessment of working postures (Hignett and McAtamney, 2000). REBA was chosen by the authors because it is specifically designed to evaluate postural risks associated with health care and service tasks, including those that involve frequent bending, lifting, and awkward

body positions, which are common in nursing activities such as bathing patients in bed. This tool is widely recognized for its practicality in real-time assessments, ease of use without the need for complex equipment, and ability to highlight musculoskeletal risk levels that can inform preventive interventions in educational and clinical settings.

In addition, the Nordic Body Map (NBM) questionnaire was used to identify the location and intensity of musculoskeletal complaints. The NBM is a standardized and validated instrument designed to map discomfort or pain across various regions of the body, making it particularly suitable for ergonomic and occupational health studies. It provides a visual and quantitative means of recording musculoskeletal symptoms, which enhances both the accuracy and clarity of data collection. The tool has demonstrated strong validity with sensitivity values ranging from 66% to 92% and specificity values ranging from 71% to 88% (Thetkathuek et al., 2018). This instrument was selected because of its proven reliability, ease of use, and suitability in identifying patterns of musculoskeletal complaints among nursing students performing physically demanding tasks.

Data collection

This research received ethical approval and eligibility clearance from the Udayana University Research Ethics Commission Number:2023/UN 14.2 .2.VII.14/LT/2020. Data collection was conducted directly using tools such as a stopwatch and a video recorder. A stopwatch was used to measure the duration of specific physical activities or postures during bed bathing procedures, allowing for the precise timing of task performance and static postures. The video recorder, on the other hand, was used to capture participants' movements and postures throughout the procedure, providing visual data for later analysis using ergonomic assessment tools such as REBA. Data sources for this study included observational recordings and participant responses.

The first stage involved identifying musculoskeletal complaints using the Nordic Body Map (NBM) Questionnaire. This self-administered instrument was distributed to participants under supervision to ensure accurate responses. The students were instructed to indicate any discomfort or pain felt in specific areas of the body during or after performing bed bathing tasks. This stage helped map the distribution and intensity of musculoskeletal complaints across different body regions. In the second stage, risk levels were assessed using the rapid whole-body assessment (REBA) method. Video recordings of nursing students performing bed bathing procedures were taken by the research team, ensuring that the camera angle provided a clear view of full-body movement. These recordings were later reviewed and analyzed by trained evaluators with a background in ergonomics and occupational health following the guidelines established by Hignett and McAtamney (2000), the developers of the REBA method.

The purpose of reviewing the video was to allow an accurate and objective assessment of working postures at critical moments of task performance. Snapshots of key postures were extracted from the recordings for detailed ergonomic analysis. Using the REBA worksheet, each posture was scored based on the position of the neck, trunk, legs, arms, and wrists, as well as additional factors, such as load handling, coupling, and activity type. The resulting REBA score indicates the level of risk associated with posture and indicates the need for intervention. REBA scores range from 1 to 15 and are grouped into five levels of action:

Score 1: Negligible risk – no action required

Score 2–3: Low risk – change may be needed

Score 4–7: Medium risk – further investigation and change soon

Score 8–10: High risk – investigate and implement change urgently

Score 11–15: Very high-risk – immediate action required (Hignett & McAtamney, 2000).

This structured assessment ensured that each student's posture during bed bathing could be evaluated reliably and systematically, providing evidence-based insights into the ergonomic risks faced by nursing students in practical settings. Subsequently, the upper extremities, particularly the arms and wrists, were assessed using a REBA scoring sheet. The lower extremities, specifically the legs, were also evaluated to identify postures that affect stability, such as bent knees or uneven weight distribution, which can contribute to musculoskeletal strain. The movement assessments were divided into several parts. A score of 1 was assigned to negligible-risk postures, whereas higher scores were assigned to postures involving more extreme movements that place greater strain on specific body segments. The final stage of the research involved drawing conclusions from the findings and offering constructive recommendations.

Results

Data analysis was conducted using collected data. In this study, the data to be analyzed included respondent characteristics, respondent REBA scores, and the most common musculoskeletal complaints felt by respondents after performing the intervention of bathing patients in bed.

This study included 19 nursing students at the academic stage of their education. The results showed that most respondents were 19 years old and female (Table 1). The nursing student stands with the body leaning forward at an angle greater than 60° while holding the patient's hand. The neck was tilted and bent at an angle greater than 20°, and both legs were in a straight position. On the basis of this posture, the REBA scores for the trunk, neck, and legs were 5, 3, and 2, respectively. The working posture involved leaning forward at a 45° angle, with the neck bent at 30° and twisting while reaching the lower hand. The legs were flexed at 60°. On the basis of this posture, the REBA scores for the trunk, neck, and legs were 3, 2, and 2, respectively (Figure 1).

The working posture involves a forward lean at an angle of 35°, with the torso twisted, the neck twisted, and the legs bent while bearing weight on the front leg. This position results in an unstable posture, yielding REBA scores of four for the trunk, two for the neck, and two for the legs. After determining the individual scores for each body part, the data were inputted into the REBA assessment worksheet to generate the final scores, as presented in Figures 2,3, and 4. Most Common Musculoskeletal Complaints presented in Figure 5.

Table 1. REBA score for the intervention of bathing patients in bed

Respondent	Age	Gender	REBA SCORE						
			Face and neck	Hands away	Hands close	Chest and abdomen	Back	Feet away	Feet close
1	21	M	7	12	11	10	12	12	11
2	21	F	3	9	6	7	9	11	4
3	21	F	4	8	7	8	9	11	8
4	21	F	2	10	9	10	11	9	6
5	19	F	3	11	7	7	8	8	7
6	19	M	5	8	6	5	8	9	5
7	19	F	3	11	5	7	6	11	8
8	19	M	3	8	7	8	7	10	4
9	20	F	5	12	5	7	7	10	5
10	20	M	4	8	4	8	8	11	7
11	20	F	2	9	5	10	7	9	6
12	21	F	1	10	5	6	6	12	6
13	19	F	3	9	6	7	6	12	10
14	19	M	2	12	4	7	8	11	7
15	19	F	1	7	7	6	7	10	7
16	19	F	5	12	5	5	11	8	8
17	20	F	2	9	9	6	12	9	6
18	20	F	3	12	8	6	11	9	7
19	20	F	2	11	10	7	10	10	5
	Relate		3.16	9.89	6.63	7.21	8.58	10.11	6.68

Reba Scores

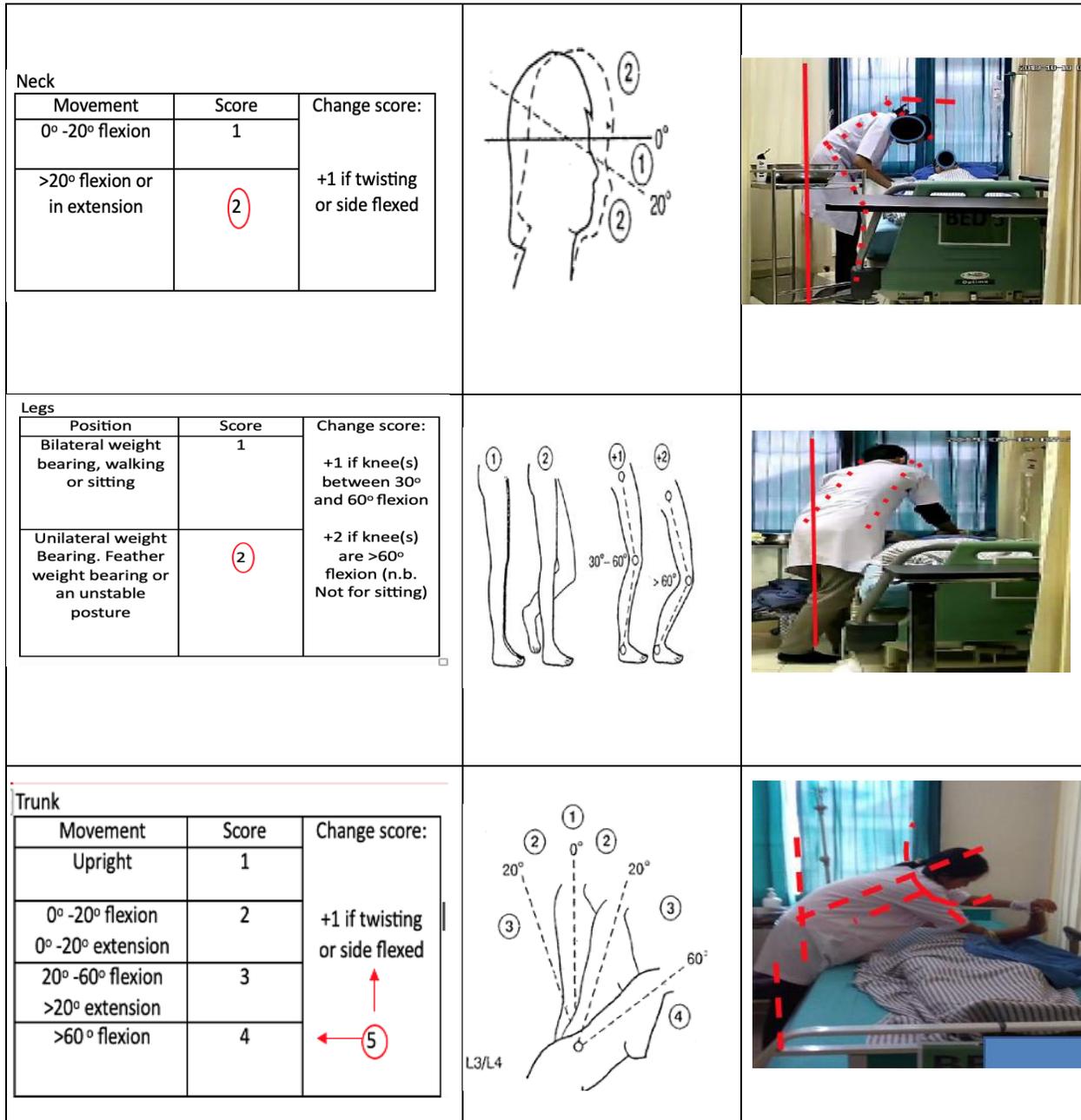
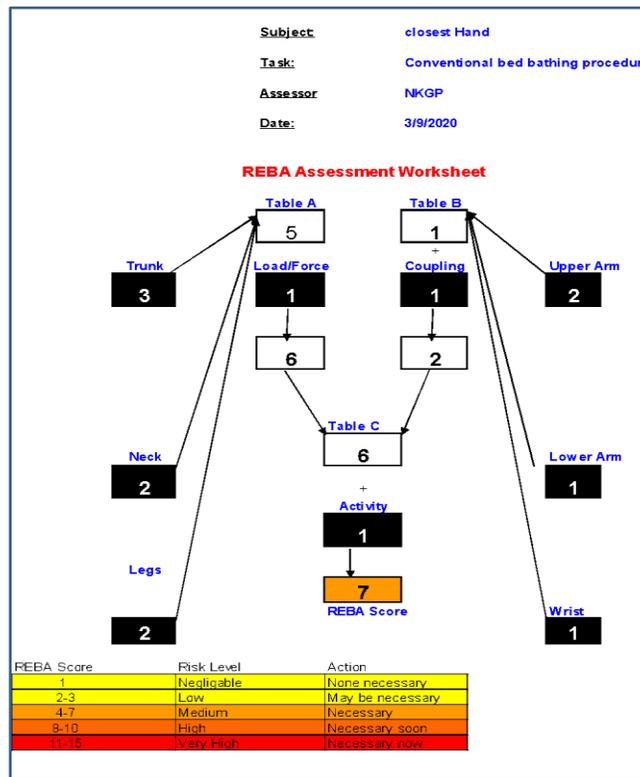


Figure 1. Wiping the furthest hand, Wiping nearest hands and Wiping the upper body



REBA Employee Assessment Worksheet

Permission granted by Dr Lynn McAnatomy to convert the paper based format to an Excel spreadsheet version.

A. Neck, Trunk and Leg Analysis

Step 1: Locate Neck Position

 Neck Score: **2**

Step 2: Locate Trunk Position

 Trunk Score: **3**

Step 3: Legs

 Leg Score: **2**

Step 4: Look up Posture Score in Table A
 Posture Score A: **5**

Step 5: Add Force/Load Score
 Force/Load Score: **1**

Step 6: Score A, Find Row in Table C
 Score A: **6**

B: Arms and Wrist Analysis

Step 7: Locate Upper Arm Position

 Upper Arm Score: **2**

Step 8: Locate Lower Arm Position

 Lower Arm Score: **1**

Step 9: Locate Wrist Position

 Wrist Score: **1**

Step 10: Look up Posture Score in Table B
 Posture Score B: **1**

Step 11: Add Coupling Score
 Coupling Score: **+**

Step 12: Score B, Find Column in Table C
 Score B: **1**

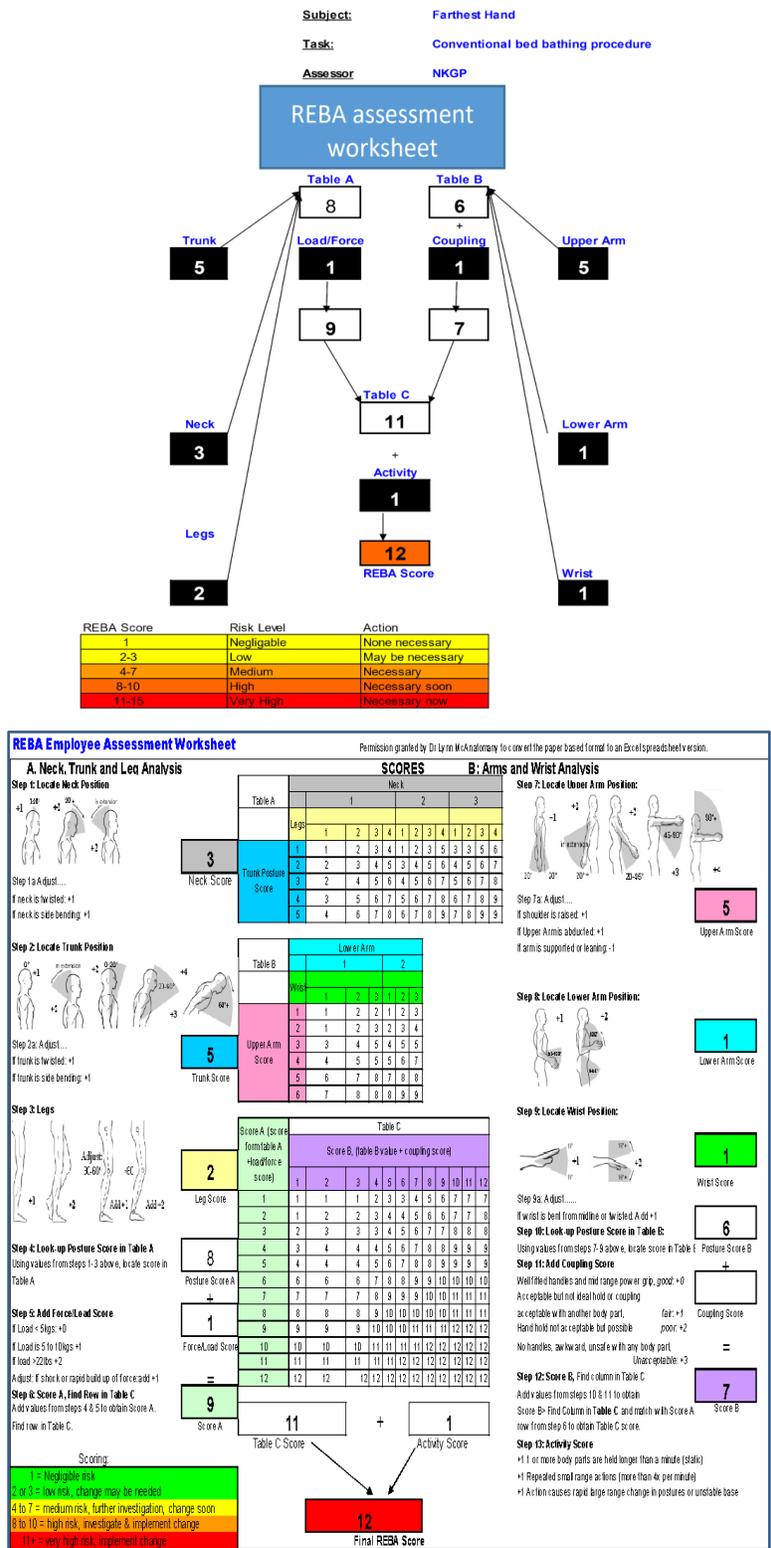
Step 13: Activity Score
 Activity Score: **1**

Table C Score: **6** + Activity Score: **1** = **7**
Final REBA Score

Task Name: Conventional bed bathing procedure | Reviewer: NKGP | Date: 03/09/2020

This tool is provided without warranty. The author has automated the paper version of this tool for applying the concepts provided in REBA.

Figure 2. REBA score for work posture when wiping nearest hands



REBA Employee Assessment Worksheet

Permission granted by Dr Lynn McArdle to convert the paper based format to an Excel spreadsheet version.

A. Neck, Trunk and Leg Analysis

Step 1: Locate Neck Position

Step 1a Adjust...
If neck is twisted: +1
If neck is side bending: +1

Step 2: Locate Trunk Position

Step 2a Adjust...
If trunk is twisted: +1
If trunk is side bending: +1

Step 3: Legs

Step 3a Adjust...
If leg is twisted: +1
If leg is side bending: +1

Step 4: Look up Posture Score in Table A

Using values from steps 1-3 above, locate score in Table A

Step 5: Add Force/Load Score

If Load = Slips: +0
If Load ≤ 5 to 10 lbs: +1
If Load > 20 lbs: +2

Adjust: check for rapid build up of force: add +1

Step 6: Score A, Find Row in Table C

Add values from steps 4 & 5 to obtain Score A.

Find row in Table C.

SCORES

Table A

	Neck		
	1	2	3
Legs	1	2	3
Trunk Posture Score	1	2	3
Neck Score	1	2	3
Trunk Score	1	2	3
Leg Score	1	2	3
Force/Load Score	1	2	3
Score A (score from Table A + Head/Force score)	1	2	3
Score B (Table B value + coupling score)	1	2	3
Table C	1	2	3
Score A	1	2	3
Table C Score	1	2	3
Activity Score	1	2	3
Final REBA Score	1	2	3

Table B: Arms and Wrist Analysis

Step 7: Locate Upper Arm Position:

Step 7a Adjust...
If shoulder is raised: +1
If upper arms abducted: +1
If arms supported or leaning: -1

Step 8: Locate Lower Arm Position:

Step 8a Adjust...
If wrist is bent from midline or twisted: Add +1

Step 9: Locate Wrist Position:

Step 9a Adjust...
If wrist is bent from midline or twisted: Add +1

Step 10: Look up Posture Score in Table B:

Using values from steps 7-9 above, locate score in Table B

Step 11: Add Coupling Score

Well fitted handles and mid range power grip: good: +0
Acceptable but not ideal hold or coupling: fair: +1
Hand hold not acceptable but possible: poor: +2
No handles, awkward, unsafe with any body part: unacceptable: +3

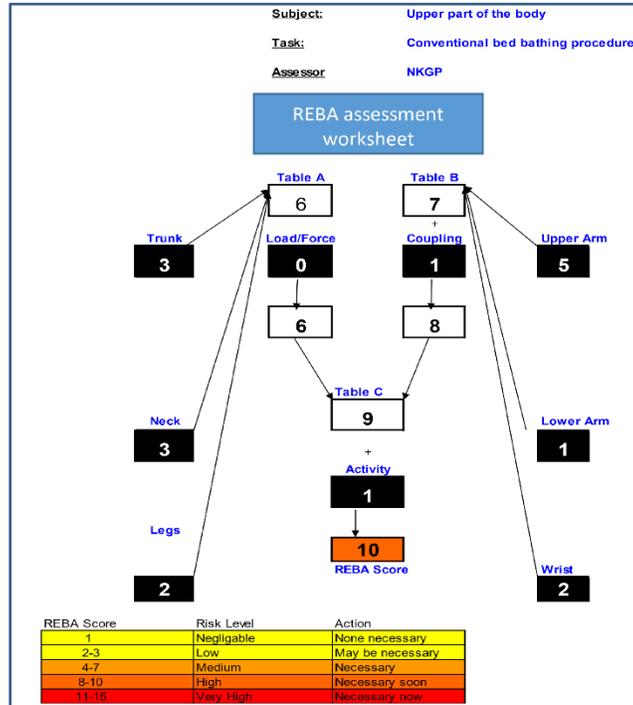
Step 12: Score B, Find column in Table C

Add values from steps 10 & 11 to obtain Score B. Find Column in Table C and match with Score A row from step 6 to obtain Table C score.

Step 13: Activity Score

+1 if more body parts are held longer than a minute (static)
+1 Repeated small range of force (more than 4x per minute)
+1 Action causes rapid large range change in postures or unstable base

Figure 3. REBA score for work posture when wiping furthest hands



REBA Employee Assessment Worksheet

Permission granted by Dr Lynn McNamara to convert the paper based format to an Excel spreadsheet version.

A. Neck, Trunk and Leg Analysis

Step 1: Locate Neck Position

Step 1a: Adjust...
 If neck is twisted: +1
 If neck is side bending: -1

Step 2: Locate Trunk Position

Step 2a: Adjust...
 If trunk is twisted: +1
 If trunk is side bending: -1

Step 3: Legs

Step 4: Look-up Posture Score in Table A

Step 5: Add Force/Load Score

Step 6: Score A, Find Row in Table C

B: Arms and Wrist Analysis

Step 7a: Locate Upper Arm Position

Step 7a: Adjust...
 If shoulder is raised: +1
 If upper arms abducted: +1
 If arm is supported or leaning: -1

Step 8: Locate Lower Arm Position

Step 8: Adjust...
 If wrist is bent from midline or twisted: Add +1

Step 9: Locate Wrist Position

Step 9a: Adjust...
 If wrist is bent from midline or twisted: Add +1

Step 10: Look-up Posture Score in Table B

Step 11: Add Coupling Score

Step 12: Score B, Find Column in Table C

Step 13: Activity Score

SCORES		Table C												
		Neck				Upper Arm				Lower Arm				
		Score B, (table B value + coupling score)												
Neck Score	3	1	2	3	4	1	2	3	4	1	2	3	4	
Trunk Posture Score	3	1	1	2	3	4	1	2	3	4	1	2	3	4
Leg Score	2	1	1	1	1	2	3	4	5	6	7	8	9	10
Posture Score A	6	6	6	6	6	7	8	8	8	9	9	10	10	10
Force/Load Score	0	7	7	7	7	8	9	9	9	10	10	10	10	11
Score A	9	9	9	9	9	10	10	10	10	11	11	11	11	12
Table C Score	9	10	10	10	10	11	11	11	11	12	12	12	12	13
Activity Score	1													
Final REBA Score	10													

Scoring:
 1 = Negligible risk
 2 or 3 = low risk, change may be needed
 4 to 7 = medium risk, further investigation, change soon
 8 to 10 = high risk, investigate & implement change
 11+ = very high risk, implement change

Figure 4. REBA scores for work posture when wiping the upper body.

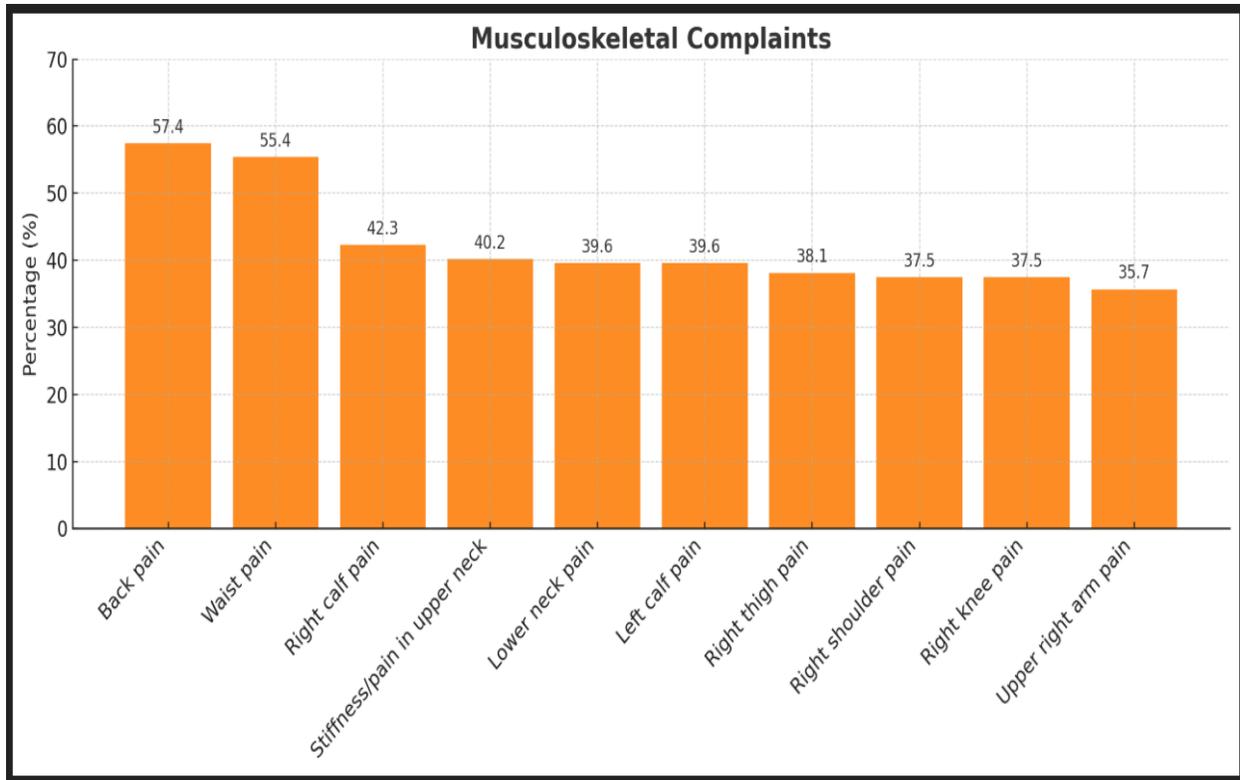


Figure 5. Most Common Musculoskeletal Complaints

Discussion

Personal Capacity

The findings of this study show that age and sex influence the physical capacity of nursing students to perform tasks. According to Suorsa et al. (2022), work capacity depends on physical fitness, nutritional status, and age, all of which affect the endurance and susceptibility to fatigue. Paes et al. (2024) support this by stating that menstruation in women can lead to increased fatigue, while peak muscle strength in both men and women occurs around age 20, as noted by Wu et al. (2016). In contrast, Dolan and Adams (2000) focused on spinal pressure from an awkward posture but did not address differences based on age or sex. The present study aligns with Suma'mur and Paes's findings, as nursing students, mostly aged 19 to 21, are likely at peak strength but may still face physiological challenges due to gender, thus influencing how they perform patient care tasks.

REBA Scores and Musculoskeletal Risk

Tasks such as wiping the furthest hand, back, and foot were found to have high REBA scores, indicating an elevated risk of musculoskeletal complaints. Nakamura et al. (2018) emphasized that static muscular contractions during patient bathing increase musculoskeletal strain. (Karthi et al., 2018) similarly noted that sustained muscle loading can result in pain owing to repetitive and prolonged physical tasks. In contrast, Wu et al. (2016) focused more on peak strength rather than posture-induced strain, providing less relevance to musculoskeletal disorders. These results suggest that specific patient bathing movements exert physical stress, confirming previous findings and highlighting the need for immediate ergonomic interventions.

Work Posture and Bed Height

This study observed that students often neglected correct working postures, especially those related to the standing position and bed height. Lin et al. (2015) confirmed that the ideal working height in a standing posture is 5–10 cm below the elbow, which supports optimal ergonomics. However, the mismatch between the students' reach and bed dimensions created ergonomic strain despite the adjustable beds. Wicaksono et al. (2025) found that ergonomic training improves posture and reduces complaints, which is consistent with these observations. In contrast, Daiyah et al. (2021) emphasized physiological fatigue over ergonomic training, showing less relevance. These findings support the conclusion that adjustments to the equipment and targeted training are essential for preventing strain.

Importance of Ergonomic Posture

Ergonomic posture is frequently neglected, which contributes to an increased risk of injury and fatigue among students. Samadi et al. (2018) emphasized the importance of posture in intervention effectiveness and injury prevention, echoing the significance of the correct posture found in this study. In contrast, Suma'mur (2014) focused on personal capacity and did not explore the postural effects. This gap reinforces the idea that posture-specific training, beyond general fitness, is essential for nursing students during patient care procedures.

Standing Posture and Fatigue

A standing position without mechanical aids is commonly used, which increases the fatigue risk. Souza et al. (2022) noted that repetitive, forceful movements during caregiving lead to fatigue and musculoskeletal complaints. Santoso (2004) and Tarwaka et al. (2004) explained how prolonged standing affects circulation and posture, Feng et al. (2021) demonstrated that ergonomic movements reduce energy use, and Wu et al. (2016) focused on age and strength but not fatigue from posture. The current study highlights the need to minimize prolonged standing and to introduce assistive tools to reduce energy expenditure. The key point regarding this phenomenon is that prolonged standing during nursing procedures, such as bed bathing, significantly contributes to physical strain and the development of musculoskeletal disorders among nursing students and practitioners. Therefore, minimizing prolonged standing and incorporating assistive tools or ergonomic adjustments are essential to enhance occupational safety, reduce energy expenditure, and improve the overall quality of nursing care and training environments.

Awkward Postures and Tissue Strain

Bed bathing requires awkward postures, such as bending and twisting, which can damage muscles and tissues. Dolan and Adams (2000) found that such positions stress spinal structures, and Kamon and Yates (1979) noted that static conditions reduce blood flow, leading to lactic acid build-up and fatigue. These findings differ from those of Lin et al. (2015), who focused on the optimal working height rather than tissue strain. This study confirmed that unnatural postures during caregiving disrupt circulation and oxygen flow, emphasizing the importance of postural awareness and rest intervals.

Limitations

This study has several limitations related to personal capacity variables, particularly age and gender, which were not controlled for in the research design. Although most

respondents were aged 19–21 years, which is an age group associated with peak muscle strength, the study did not account for the natural physiological differences between male and female participants, such as muscle strength, endurance, and the influence of menstruation on fatigue levels among women. These factors may have affected performance and susceptibility to musculoskeletal complaints during patient bathing procedures. Furthermore, individual variations in physical fitness, posture awareness, and ergonomic understanding were not thoroughly assessed, potentially introducing inconsistencies in how the respondents performed the tasks. Therefore, the observed physical and ergonomic risks may not be generalizable across a broader demographic or reflective of typical nursing populations with more diverse physical profiles.

Contribution to global nursing practice

This study contributes to global nursing practice by emphasizing the critical role of ergonomics in reducing musculoskeletal complaints and fatigue during patient care procedures, particularly during bed bathing. By highlighting the impact of non-ergonomic postures such as bending, reaching, and prolonged standing on physical strain, this research reinforces the need to integrate ergonomic principles into nursing education and practice worldwide. These findings support the implementation of structured awareness programs and practical training that equip nursing students and professionals with the knowledge and skills needed to maintain proper body mechanics, ultimately promoting occupational health and safety. As patient handling procedures are universally practiced, this study provides valuable insights that can inform global standards and policies aimed at enhancing nurses' well-being, preventing work-related injuries, and improving overall quality of care in various healthcare settings.

Conclusion

Unergonomic work postures during bed bathing can contribute to musculoskeletal complaints. Ergonomic considerations related to posture are crucial, and should not be overlooked. Work procedures must be designed to enable workers such as nursing students or nurses to perform tasks effectively and efficiently, thereby reducing the risk of musculoskeletal disorders. The current procedures for bathing patients in bed should be reevaluated in light of the significant impact of inefficient and ineffective practices. Therefore, modifying these procedures using a comprehensive ergonomic approach is essential to ensure both worker well-being and optimal patient care.

Author Contribution

The first author designed the study, collected the data, and performed the primary analysis and interpretation of the results. The second author contributed to the literature review, assisted in developing the discussion and conclusion, and helped revise and finalize the manuscript.

Conflict of interest

The authors declare no conflict of interest related to this study.

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