A study to assess the effect of planned teaching on knowledge and practice regarding body mechanics among nurses in critical areas at Apollo hospitals, Navi Mumbai.

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Abstract

Background- Work-related musculoskeletal disorders (WRMSDs) are prevalent among nurses, particularly those in critical care areas such as Intensive Care Units (ICUs) and Emergency Departments, due to the physical demands of their work. Proper body mechanics are essential for preventing these injuries, yet there is often a gap between knowledge and practice among nurses. Educational interventions have shown promise in bridging this gap and improving safe patient handling techniques [1].

Methods: A quasi-experimental design with a pre-test and post-test was used. The study was conducted among 150 nurses working in critical areas like OT, Cath lab, ICUs and emergency room of a hospital. A structured questionnaire and an observational checklist were used to assess knowledge and practice before and after the intervention. The planned teaching program included interactive sessions, demonstrations, and hands-on practice on body mechanics and ergonomic principles.

Results: Baseline assessments revealed that while nurses had some awareness of body mechanics, practical application was inconsistent. Post-intervention, there was a significant improvement in both knowledge and practice scores. A spearman's rank correlation A analysis was conducted to assess the relationship between knowledge and practices scores among the study participants. The coefficient is 0.778 and statically significant at < 0.001 Statistical analysis showed a marked increase in correct application of body mechanics during patient handling tasks after post planned teaching.

Conclusion: The planned teaching program significantly enhanced the knowledge and practice of body mechanics among nurses in critical areas, leading to improved safety and potentially reducing the incidence of WRMSDs. Continuous education and reinforcement of proper body mechanics are recommended to sustain these improvements

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Keywords: Body mechanics, work-related musculoskeletal disorders, patient handling, ergonomic training.

1.Introduction

Importance of Body Mechanics in Nursing.

Nurses, particularly those working in critical care areas such as Intensive Care Units (ICUs), Coronary Care Units (CCUs), and Emergency Departments, frequently perform physically demanding tasks. These tasks often involve lifting, transferring, and repositioning patients, which can pose significant risks to their musculoskeletal health if proper body mechanics are not utilized. Body mechanics refer to the efficient and safe use of the body during activity, and proper techniques are essential for preventing work-related injuries among healthcare workers [2].

Prevalence of Work-Related Musculoskeletal Disorders (WRMSDs)

Work-related musculoskeletal disorders (WRMSDs) are prevalent among nurses due to the physical demands of their job. Studies have shown that nurses are at high risk for developing WRMSDs, with lower back pain being the most common complaint. According to the U.S. Bureau of Labour Statistics (2020), nursing assistants and registered nurses rank among the top occupations for musculoskeletal disorders due to overexertion in lifting and transferring patients. These injuries not only affect the health and well-being of the nurses but also lead to increased absenteeism, reduced productivity, and higher healthcare costs [3].

Knowledge and Practice Gaps

Despite the high prevalence of WRMSDs, many nurses lack adequate knowledge and training in proper body mechanics. Research indicates that while nurses may be aware of the basic principles of body mechanics, there is often a gap between knowledge and practice. Factors contributing to this gap include time constraints, insufficient training, lack of ergonomic equipment, and the urgency of patient care in critical settings [4].

Role of Education and Training.

Education and training are crucial in bridging the knowledge-practice gap and promoting the use of proper body mechanics among nurses. Planned teaching programs can significantly enhance nurses' understanding of body

mechanics and their application in daily tasks. These programs typically include theoretical knowledge, practical demonstrations, and hands-on practice sessions that emphasize the importance of ergonomics and safe patient handling techniques. Previous several studies have investigated the impact of educational interventions on nurses' knowledge and practice regarding body mechanics [5]. For example, a study by Waters et al. (2009) demonstrated that a comprehensive training program on safe patient handling and movement techniques significantly reduced the incidence of WRMSDs among healthcare workers[6]. Similarly, Yassi et al. (2001) found that implementing an ergonomic intervention program, including training and the use of assistive devices, led to a substantial decrease in musculoskeletal injuries among nurses [7].

2. Review of literature

1.Prevalence of Musculoskeletal Disorders (MSDs) in Nurses:

Smith et al. (2018) [8] found that nearly 50% of nurses report experiencing lower back pain at some point in their careers. Impact on Nursing Practice: MSDs can lead to decreased productivity, increased absenteeism, and even early retirement, highlighting the need for effective preventative measures.

2.Effectiveness of Training Programs:

Lin et al. (2019) [9] conducted a study which showed a marked increase in knowledge scores post-intervention compared to pre-intervention scores. Several studies have demonstrated that educational interventions significantly improve nurses' knowledge of body mechanics.

A. Hernandez et al. (2020) [10] found that nurses who received structured body mechanics training demonstrated better posture and lifting techniques in clinical settings. Study showed that training programs not only increase knowledge but also enhance practical application.

3.Types of Educational Interventions:

Miller and Hughes (2017) [11] compared traditional lecture-based teaching to interactive workshops. They found that interactive workshops, which included hands-on practice and demonstrations, were more effective in improving both knowledge and practice of body mechanics.

Johnson et al. (2018) [12] highlighted that busy schedule and staffing shortages often prevent nurses from participating in educational programs. One of the significant barriers identified in this study was the lack of time

for nurses to attend training sessions.

Brown et al. (2021) [13] found that e-learning modules were as effective as in-person workshops in improving nurses' knowledge and practices, offering a flexible and scalable option for ongoing education. With the advent of technology, online learning modules have become popular.

O'Neill et al. (2019) [14] suggested that periodic refresher courses and continuous reinforcement are necessary to sustain the benefits of initial training.

The literature reviews focused on the importance of body mechanics education for nurses, highlights the effectiveness of targeted training programs, and identifies the need for more context-specific research in India. This study will build on these findings to evaluate the impact of planned teaching on nurses' knowledge and practice of body mechanics at Apollo Hospitals, Navi Mumbai.

3. Methodology

Research Approach

For this study we adopted Quantitative research approach.

Research design

The research design adopted for the study was Quantitative experimental one group pre-test post-test design.

Description of variables

Dependent: In this study, knowledge and practice are the dependent variables

Independent: In this study, planned teaching is the independent variable

Duration of the study: 3 months

Sample: Nurses in critical areas

Inclusion criteria- Nurses selected from areas like OT, Cath-lab, ICUs & ER Nurses are in the age group from 22 to 45 years

Exclusion Criteria

a. Nurses working in wards and OPDs.

b. Age group below 22 years and above 45 years

c. Nurses who have underwent any spine-ortho treatment or surgical management.

Sample Size: In this study sample size is 150.

Sampling Method: Purposive sampling

Settings of the study- Apollo hospitals, Navi Mumbai

Tool used for data collection:

TOOL 1: Structured questionnaire
TOOL 2: Observation checklist

Data collection method - Pre and Post test

3. Findings

Table 1. Demographic variables

Description	**No. of participants**	**%**
Overall Participants 150		
Age group 20 - 29 Years	87	58.00%
30 – 39 Years	59	39.33%
40 Years and above	4	2.67%
Gender Male	58	38.67%
Female	92	61.33%
Education Diploma	62	41.33%
Degree	69	46.00%
Post Graduate	19	12.67%
Work experience Below 1 year	18	12.00%
2 - 4 years	57	38.00%
5 - 9 years	44	29.33%
10 years and above	31	20.67%
Are you aware about what is body mechanics? Yes	146	97.30%
No	4	2.70%
If yes, what is the source of information? Books	71	47.30%
Mass media	31	20.70%
Lecture	41	27.30%
Friends	7	4.70%

The majority of participants fell within the age group of 20-29 years, constituting 58% of the total study population. Only a small percentage, 2.67%, were aged 40 years and above. Nursing being a female dominated profession, Female participants slightly outnumbered male participants, comprising 61.33% and 38.67% of the total, respectively. The highest proportion of participants held a degree education, accounting for 46%. Participants with 2-4 years of work experience were the largest group, making up 38%. 97.30% of participants

reported being aware of body mechanics. Among those aware, the primary source of information was books, cited by 47.30% of participants.

Table 2a. Question wise pre and post knowledge among the participants

Question	Pre		Post		p- value	Numb
	er	%	Number	%		
The correct response for Definition of body mechanics.	72	48.00%	138	92.00%	<0.001	121 80.70%
The correct response for the purpose of Body mechanics	132	88.00%			0.227	
The responses for definition of Ligaments	37	24.70%	121	80.70%	<0.001	
The correct response for the rules of good body mechanics	66	44.00%	66	44.00%	0.999	
The correct response	32	21.30%	102	68.00%	<0.001	
The correct response for best technique a nurse has to follow while moving or lifting the patient	61	40.70%	119	79.30%	<0.001	121 80.70%
The correct response for complications of poor body mechanics	139	92.70%			0.023	
The correct response for not a healthy habit to prevent backache	114	76.00%	139	92.70%	0.001	84 56.00%
The correct response given for when lifting a patient, why we ask to use our arms and legs and not our back?	126	84.00%			<0.001	
The correct response given for most serious injuries related to body mechanics occur	34	22.70%	129	86.00%	<0.001	
1. The correct responses given for when sole of the foot turns medially is known as;	The correct response given for					
	90	60.00%	143	95.30%	<0.001	16 10.70%
The correct response for Muscles and the system maintains equilibrium or balance, which facilitates appropriate body alignment when lifting, bending, moving and doing other activities.	41	27.30%			0.001	

wide base support 32 21.30% 71 47.30% <0.001
measurement needed to keep a

When toes curl downwards

known as; 67 44.70% 139 92.70% <0.001 Which of the following lift
techniques would be the most appropriate with lower back ache, who attempt
for picking up light object from the floor? to transfer the patient?
Which of the following maneuver must be The correct response for definition of
implemented by a nurse 68 45.30% 134 89.30% <0.001

61 40.70% 61 40.70% 0.999

center of gravity 56 37.30% 130 86.70% <0.001 The patient response for While
providing back care to the patient,
height of the bed
should be

Which of the following desk 48 32.00% 143 95.30% <0.001 26 17.30%
ergonomic recommendations would
be the most appropriate?
If you want to strengthen your back the 139 92.70% <0.001
most crucial area of the body you can
improve to help
support your back is:
122 81.30% 150 100.00% <0.001

Table 2b. Question wise pre and post practice among the participants

Keep weight balance above base

of support. Enlarge base of 7 4.67% 130 86.67% <0.001 support as necessary to
increase
the body's stability
Lower center of gravity towards
base of support in the direction in 6 4.00% 136 90.67% <0.001
which force is applied
Enlarge base of support in the

applied 3 2.00% 138 92.00% <0.001
direction in which force is

Faces in the direction of task

and turns body in one plane 85 56.67% 144 96.00% <0.001 Bend hips and knees
(read the

back) when lifting 3 2.00% 147 98.00% <0.001 Move objects on level surface
when possible. Slides (rather than lift) 3 2.00% 144 96.00% <0.001
objects on smooth surface when possible
Hold objects close to body and

stand close objects to be moved 18 12.00% 146 97.33% <0.001 Raise the working surface to

waist level when possible 9 6.00% 139 92.67% <0.001 Stand with body erect and body

waist level5 3.33% 144 96.00% <0.001
segments balanced one over to

Stay as close as possible to an

object to be lifted or moved 23 15.33% 148 98.67% <0.001 While lifting/ picking up
objects, Face in the direction of work, 9 6.00% 135 90.00% <0.001
Flex the knees
Carry heavy objects to the body

trunk and the back kept erect23 15.33% 140 93.33% <0.001
with elbows held close to the

Table 2a and b presents the pre and post intervention knowledge and practices regarding body mechanics among the participants. Participants showed significant improvements in understanding body mechanics, including body posture and balance, knowledge about musculoskeletal system, proper lifting techniques, healthy habitsto prevent backache, injuriesrelated to body mechanics, and recognition oftermsrelated to joint movements. Post-intervention, participants demonstrated enhanced practices related to maintaining weight balance above the base of support, lowering the centre of gravity towards the base of support, implementing effective object handling techniques (such as bending hips and knees when lifting), adhering to ergonomic recommendations in the workplace, and mastering techniques for carrying heavy objects while maintaining proper posture ($p < 0.001$).Overall, the findings demonstrate a significant enhancement in both knowledge and practices regarding body mechanics among the participants following the planned intervention. These improvements have implications for promoting safety and reducing the risk of musculoskeletal injuries among healthcare professionals.

Table 4a. Question wise pre and post knowledge and practices among the participants

Description	**Pre**	**Post**	**Test statistics***	**p-value**
~~Median (IQR)~~	Mean ± SD	Minimum	~~<0.001~~	9 ± 3 16 ± 2 2 11
Maximum			15 20	
~~9 (7 - 11) 16 (15 - 17) -10.662~~				

Table 4b. Question wise pre and post knowledge and practices among the participants

Median (IQR)	1 (1 - 2)	12 (11 - 12)
Mean ± SD	-10.703	1 ± 1 11 ± 1
Minimum	0	8
Maximum	5	12

Table 4a and b illustrates a comparison between pre- and post-intervention scores, demonstrating notable advancements in both knowledge and practices among the participants. Pre-intervention, the median knowledge score stood at 9 (IQR: 7 - 11), which significantly increased post- intervention to 16 (IQR: 15 - 17) ($p < 0.0001$). Similarly, the median practices score showed a remarkable rise from 1 (IQR: 1 - 2) pre intervention to 12 (IQR: 11 - 12) post-intervention ($p < 0.0001$). The Wilcoxon signed-rank test underscored the significant disparities between pre- and post-intervention scores for both knowledge and practices ($p < 0.0001$). Test statistics revealed substantial improvements, with knowledge and practices registering -10.662 and -10.703, respectively. These findings affirm the effectiveness of the intervention in enhancing participants' understanding and application of body mechanics principles.

Table 5: Correlation between knowledge and practice score among staff nurses on body mechanics

	Spearman's rank correlation coefficient	**p-value**
Knowledge Post score Vs Practices Post score	0.778	<0.001

A spearman's rank correlation A analysis was conducted to assess the relationship between knowledge and practices scores among the study participants. The coefficient is 0.778and statically significant at < 0.001.

Table 6a: Demographic details wise knowledge and practice score among staff nurses on body mechanics

Description	**Pre score**		**Post Score**		**Wilcoxon Signed**	
	Mean ± SD	**Median (IQR)**	**Mean ± SD**	**Median (IQR)**	**p-value**	**Rank Test statistics***
Age 20 - 29 Years	9 ± 3	9 (7 - 11)	16 ± 2	16 (15 - 17)	<0.001	-8.14
30 - 39 Years	9 ± 3	9 (7 - 10)	16 ± 2	16 (15 - 17)	<0.001	-6.707
40 Years and above	12 ± 3	12 (10 - 14)	17 ± 2	17 (15 - 18)	0.066	-1.841
Gender Male	9 ± 3	9 (7 - 10)	16 ± 2	16 (15 - 17)	<0.001	-6.655
Female	9 ± 3	9 (7 - 11)	16 ± 2	16 (15 - 17)	<0.001	-8.356
Education Diploma	9 ± 3	9 (7 - 11)	16 ± 2	16 (15 - 17)	<0.001	-6.868
Degree	9 ± 3	9 (7 - 11)	16 ± 2	16 (15 - 17)	<0.001	-7.251
Post Graduate	8 ± 2	8 (7 - 9)	15 ± 2	15 (14 - 16)	<0.001	-3.846
Experience Below 1 year	8 ± 2	8 (6 - 9)	16 ± 1	16 (15 - 16)	<0.001	-3.767
2 - 4 years	9 ± 2	9 (7 - 11)	16 ± 2	16 (15 - 17)	<0.001	-6.592
5 - 9 years	9 ± 3	9 (6 - 11)	16 ± 2	15 (15 - 17)	<0.001	-5.801
10 years and above	9 ± 3	9 (8 - 11)	15 ± 2	16 (14 - 17)	<0.001	-4.888

Table 6b: Demographic details wise knowledge and practice score among staff nurses on body mechanics

~~Age 20 - 29 Years 1 ± 1 1 (1 - 2) 11 ± 1 12 (11 - 12) <0.001 -~~8.169 30 - 39 Years 1 ± 1 1 (1 - 2) 11 ± 1 11 (11 - 12) <0.001 -6.753 40 Years and above 2 ± 1 2 (1 - 3) 11 ± 2 12 (10 - 12) 0.066 -1.841 Gender Male 1 ± 1 1 (0 - 2) 11 ± 1 12 (11 - 12) <0.001 -6.679 Female 1 ± 1 1 (1 - 2) 11 ± 1 11 (11 - 12) <0.001 -8.389 Education Diploma 2 ± 1 2 (1 - 2) 11 ± 1 12 (11 - 12) <0.001 -6.92 Degree 1 ± 1 1 (0 - 2) 11 ± 1 12 (11 - 12) <0.001 -7.266 Post Graduate 1 ± 1 1 (0 - 2) 11 ± 1 11 (11 - 12) <0.001 -3.861 Experience Below 1 year 1 ± 1 1 (1 - 2) 11 ± 1 12 (11 - 12) <0.001 -3.768 2 - 4 years 1 ± 1 1 (0 - 1) 11 ± 1 12 (11 - 12) <0.001 -6.638 5 - 9 years 1 ± 1 1 (1 - 2) 11 ± 1 12 (11 - 12) <0.001 -5.814 10 years and above 2 ± 1 2 (1 - 2) 11 ± 1 11 (11 - 12) <0.001 -4.918

Figure 1: Median values of knowledge score among study participants for various demographic variables

Figure 2: Median values of practice score among study participants for various demographic variables

4. Recommendation

1. Future studies can be conducted with a larger and more diverse sample size across multiple hospitals and healthcare settings to enhance the generalizability of the findings.
2. Nurses from various types of critical care units (e.g., ICU, emergency department, surgical wards) can be included to capture a broader range of experiences and practices. Implement L
3. Collaborate with hospital management to ensure that adequate ergonomic equipment and resources are

available to support the application of proper body mechanics.

4. Advocate for organizational policies that prioritize ongoing training and reinforcement of body mechanics principles.

5. Conclusion

This study assessed the impact of a planned teaching program on the knowledge and practice regarding body mechanics among nurses working in critical care areas of a hospital. The findings indicate that such educational interventions can significantly enhance nurses' understanding and application of proper body mechanics, which is crucial for preventing musculoskeletal disorders and promoting a safer working environment.

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7. References

1. Frey G, Bennett M, Ferguson Denise. The importance of proper body mechanics - keeping your spine healthy. Colorado Comprehensive Spine Institute.2009.
2. Jaafar, N., & AN, M. G. (2015). Knowledge and Practice of Body Mechanics Techniques Among Nurses in. *Nursing (AJN)*, *107*(8), 53-56.
3. Yang, S., Li, L., Wang, L., Zeng, J., & Li, Y. (2020). Risk factors for work-related musculoskeletal disorders among intensive care unit nurses in China: a structural equation model approach. Asian nursing research, 14(4), 241-248.
4. Naranjo-Chávez, G. M., Rojas-González, L. R., & Olalla Garcia, M. H. (2021). Knowledge and Application of Body Mechanics: Nurses of a Hospital in Ecuador. Polo del Conocimiento, 6(7), 295-312. 5. Douhal H, Jarrah S, Masa'deh R, Shudifat R. Nurses' Knowledge and Practice of Appropriate Techniques of Body Mechanics and Non-specific Back Pain. Cureus. 2024 Mar 19;16(3): e56478. doi: 10.7759/cureus.56478. PMID: 38638724; PMCID: PMC11025875.
6. Waters, T. R., Nelson, A., Hughes, N., & Menzel, N. (2009). Safe patient handling and movement programs: A practical guide for development and implementation. American Journal of Nursing, 109(3), 23-29.

7. Yassi, A., Lockhart, K., & WorkSafeBC. (2001). Ergonomic interventions for reducing musculoskeletal disorders among nurses: A review of the literature. International Journal of Occupational Safety and Ergonomics (JOSE), 7(2), 152-164
8. Smith, J., et al. (2018). Prevalence of Musculoskeletal Disorders among Nurses. Journal of Nursing Research, 26(4), 245-252.
9. Lin, Y., et al. (2019). Impact of Educational Interventions on Nursing Knowledge. Nurse Education Today, 35(3), 192-198.
10. Hernandez, A., et al. (2020). Improving Nursing Practices through Training. Clinical Nursing Studies, 8(2), 45-52.
11. Miller, D., & Hughes, R. (2017). Comparing Teaching Methods in Nursing Education. Nursing Education Perspectives, 38(1), 16-21.
12. Johnson, K., et al. (2018). Barriers to Effective Training in Nursing. Nursing Management, 29(6), 33-39.
13. Brown, T., et al. (2021). E-Learning Modules in Nursing Education. Journal of Online Learning and Teaching, 17(2), 130-138.
14. O'Neill, J. et al. (2019). Sustainability of Training Effects. Journal of Continuing Education in Nursing, 50(4), 165-171.