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ORIGINAL ARTICLE

Evaluation of discomfort in the ICU of a low and middle income country.

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ABSTRACT… Objective: To evaluate the frequency and severity of discomfort among intensive care unit (ICU) patients. **Study Design:** Prospective Observational study. **Setting:** The ICU of the Sindh Institute of Urology and Transplantation (SIUT), Karachi, Pakistan. **Period:** July 2024 to December 2024. **Methods:** A total of 151 adult patients aged ≥18, admitted to the ICU for ≥48 hours, and discharged with a Glasgow Coma Scale (GCS) score of 15 were included. Data were collected within 24 hours of ICU discharge using a validated questionnaire assessing discomfort across eight domains including noise, light, bed comfort, sleep, thirst, hunger, cold, and heat, rated on a 0–10 scale. Demographic and clinical information were documented. Statistical analysis was performed using IBM-SPSS Statistics, version 25.0. **Results:** Of 151 patients, 102 (67.1%) were male, and the mean age was 39.0±14.6 years. Severe bed discomfort was reported 22 (14.6%) patients. Severe sleep disruption was reported in 20 (13.2%) patients. Severe thirst, and hunger were reported in 5 (3.3%) patients each. Patients requiring mechanical ventilation experienced higher levels of severe discomfort, with 30 (19.9%) reporting severe bed discomfort, and 27 (17.9%) severe sleep disruption. In patients on renal replacement therapy, 29 (19.2%) experienced severe bed discomfort, and 21 (13.9%) severe sleep disruption. **Conclusion:** Discomfort in the ICU is multifaceted and may be influenced by clinical interventions and duration of stay. Targeted interventions to improve bedding, reduce sleep disruption, and manage invasive procedures are essential for enhancing patient comfort, particularly in low-resource ICU settings.

Key words: Intensive Care Unit, Mechanical Ventilation, Noise, Renal Replacement Therapy, Sleep.

INTRODUCTION

Intensive care units (ICUs) are considered a major section of modern healthcare, which provide improved treatments and specialized therapy to patients in critical condition requiring careful surveillance.[1] Although the main goals in the critical care units are life and regulating physiological indicators, patient comfort is usually disregarded. Comfort in the critical care unit can be influenced by environmental factors such light and noise, medical treatments including sedation and mechanical ventilation, and psychological pressures including anxiety and sleep difficulties.[1]

High noise level machines and alarms are among environmental factors that disrupt sleep and aggravate discomfort in ICUs.[2] Illumination conditions can throw off circadian cycles, leading to fatigue and sleep deprivation.[3] Required medical treatments aggravate bodily discomfort including pain, thirst, and prolonged immobility by means of consequences.[4] Mechanical ventilation (MV) can save lives, but since endotracheal tubes are invasive and can be somewhat painful.[5] Causing discomfort through physical limitations and immobility are non-invasive ventilation (NIV), and renal replacement therapy (RRT).[6] While younger patients may feel greater discomfort from invasive treatments, older patients may be more vulnerable to sleep problems. Gender-based differences in pain perception and psychological stress further affect the patient experience.[7] Clinical scoring systems like the "Sequential Organ Failure Assessment (SOFA)" quantify illness severity but do not capture the subjective burden of discomfort.

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The length of ICU stay is also a critical consideration as long-term stays in ICU results in isolation and rigidity which is uncomfortable.[8] This study was aimed to evaluate the frequency and severity of discomfort among intensive care unit (ICU) patients

METHODS

This prospective observational study was conducted at the ICU in Sindh Institute of Urology and Transplantation (SIUT), during July 2024 to December 2024. An approval from the Institutional Ethical Committee was obtained (approval number: SIUT-ERC-2024/A-482, dated: April 9, 2024). A minimum sample size of 140 was calculated considering the proportion of children reporting sleep discomfort after PICU discharge as 63%[9], with 95% confidence level, and 8% margin of error using online OpenEpi sample size calculator. This study evaluated a total of 151 patients, aged 18 years and above, who stayed in the ICU for a minimum time span of 48 hours, and had a GCS (Glasgow Coma Scale) score of 15 on time of discharge. Patients with diminished mental capacity, dementia, psychological illness, those leaving against medical advice, those transferred to another hospital, or those with language barriers were excluded.

After obtaining written consent, patients completed the questionnaire within 24 hours of ICU discharge, either independently or with assistance. If patients reported pain, they were reassessed after receiving adequate pain relief. The study used a structured questionnaire to evaluate discomfort in different areas, such as noise, light, sleep and thirst on a scale of 0 (no discomfort) to 10 (maximum discomfort). The mean score across these factors provided the overall discomfort score. Researchers also collected demographic details such as age, gender, marital status, education, occupation, and ICU stay length, along with illness severity using APACHE II and SOFA scores. Continuous variables were described by either mean and standard deviation or median and interquartile range, depending on distribution, while categorical data were reported as counts and percentages. Descriptive statistics were shown to describe results. Data were entered and analyzed using IBM-SPSS Statistics, version 25.0.

RESULTS

In a total of 151 patients, 102 (67.1%) patients were male, and the mean age was 39.0±14.6 years. There were 81 (53.6%) patients who were medical patients, 70 (46.4%) surgical patients. In terms of ventilation requirements, 49 (32.4%) patients required invasive mechanical ventilation, and 38 (25.2%) needed non-invasive ventilation. The mean duration of mechanical ventilation was 3.3±2.9 days. The mean SOFA score, and APACHE II score were 5.0±3.6, and 13.1±9.0, respectively. The median length of ICU stay was 4.0 (2.0-7.0) days. Table 1 provides the demographics and clinical characteristics of the patient.

Category	Variables	Value
Gender	Male	102 (67.1%)
	Female	49 (32.2%)
Treatment Category	Medical	81 (53.3%)
	Surgical	70 (46.1%)
Education	No Education	54 (36%)
	Primary Education	25 (16.7%)
	Matric/Secondary Education	49 (32.7%)
	Intermediate or above	23 (15.3%)
Need for mechanical Ventilation		49 (32.4%)
Use of Non-invasive		38 (25.2%)
Use of Physical Restrains		3 (2.0%)
Vasopressors use		38 (25.17%)
Renal Replacement therapy		61 (40.4%)

Table-I. Demographic and clinical characteristics among intensive care unit patients (n=151)

The majority of patients reported no discomfort due to noise 108 (71.5%), or light 119 (78.8%). Mild discomfort was reported in 26 (17.2%) patients for noise, and 17 (11.3%) for light, while moderate and severe discomfort levels were less common, accounting in 12 (7.9%) and 4 (2.6%) for noise, and 8 (5.3%) and 6 (4.0%) for light, respectively. Bed discomfort was reported in 117 (77.5%) patients as no discomfort, and 22 (14.6%) experienced severe discomfort. There

were 104 (68.9%) patients who did not report any sleep pattern disruption, and 20 (13.2%) experienced severe disruptions. There were 119 (78.8%) patients who reported no discomfort due to thirst, while 12 (7.9%) reported mild discomfort, and 5 (3.3%) severe thirst discomfort. There were 122 (80.8%) patients who reported no hunger discomfort, whereas, 5 (3.3%) reported severe hunger discomfort. Table-2 is showing details about the discomfort levels among ICU patients.

Category	No Discomfort (%)	Mild (%)	Moderate (%)	Severe (%)
Noise	108 (71.5%)	26 (17.2%)	12 (7.9%)	4 (2.6%)
Light	119 (78.8%)	17 (11.3%)	8 (5.3%)	6 (4.0%)
Bed	117 (77.5%)	7 (4.6%)	4 (2.6%)	22 (14.6%)
Sleep	104 (68.9%)	16 (10.6%)	10 (6.6%)	20 (13.2%)
Thirst	119 (78.8%)	12 (7.9%)	14 (9.3%)	5 (3.3%)
Hunger	122 (80.8%)	12 (7.9%)	8 (5.3%)	5 (3.3%)
Cold	131 (86.8%)	9 (6.0%)	5 (3.3%)	5 (3.3%)
Heat	135 (89.4%)	7 (4.6%)	3 (2.0%)	5 (3.3%)

Table-II. Discomfort levels among intensive care unit patients (n=151)

Patients requiring MV experienced higher levels of severe discomfort, with 30 (19.9%) reporting severe bed discomfort, and 27 (17.9%) severe sleep disruption. In patients on renal replacement therapy, 29 (19.2%) experienced severe bed discomfort, and 21 (13.9%) severe sleep disruption. The severity of discomfort varied with clinical conditions and the details are shown in Figure-1.

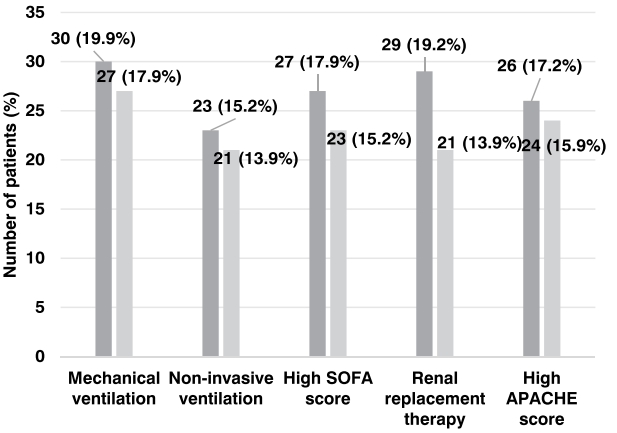

Figure-1. Severe Bed, and Sleep discomfort by clinical conditions

DISCUSSION

The findings of this study highlight important and critical areas of discomfort experienced by ICU patients. The observations of the study emphasize the complex nature of these challenges. The statistics emphasizes the importance of focused treatments to improve patient comfort and promote recovery.[10,11]

Sleep disturbance and severe bed discomfort were the frequently reported discomforts among all patient groups. There were 14.5% of patients who reported bed discomfort. This can be ascribed to extended immobility and the limited flexibility of ICU beds to meet particular patient needs.[12] A group of 13.2% patients reported sleep disruption as a source of discomfort which is an indicator of challenges related to rest in an ICU environment characterized by constant monitoring, noise, and interruptions.[12,13] These findings clearly show that better bedding options such as pressure-relieving mattresses and ergonomic designs suited for prolonged ICU stays are badly needed. Dealing with this ongoing issue also calls for strategies to promote sound sleep, including noise-cancelling devices, illumination changes, and lessening of nighttime disturbances.[2]

Medical interventions, although lifesaving, significantly contribute to patient discomfort. MV was associated with the highest levels of severe bed discomfort (20%) and sleep disruption (18%). The invasive nature of MV, combined with the immobility it imposes, aggravates physical and psychological discomfort.[14] Patients undergoing renal replacement therapy (RRT) experienced substantial discomfort, with 19% reporting severe bed discomfort, and 14% severe sleep disruption. The prolonged immobility and vascular access required for RRT sessions likely contribute to these discomforts.[14,15] These findings suggest a need for innovative approaches to reduce the

discomfort associated with these interventions. Providing regular repositioning, using advanced ventilator equipment with improved patient acceptability, and offering psychological support during RRT sessions can ease some of the physical and mental sufferings. Discomfort levels varied significantly across different demographic groups, highlighting the importance of individualized care. Older patients experienced higher levels of severe sleep disruption and anxiety, likely due to prolonged ICU stays and increased susceptibility to psychological stress. Females reported slightly higher discomfort levels for restricted visiting hours, which may reflect a stronger emotional response to isolation or different social support needs compared to males. These results highlight the need for demographic-specific approaches. Older patients may benefit from personalized psychological interventions, while female patients could benefit from enhanced communication with family members or flexible visiting policies.[16]

Noise and light discomfort, although predominantly reported as mild or moderate, remain significant contributors to overall discomfort in the ICU.[2,16] Noise, generated by alarms, monitors, and staff activity, can disrupt sleep, impair anxiety, and delay recovery.[2] Improper lighting conditions can interfere with circadian rhythms, contributing to sleep disturbances and fatigue.[2] While these issues were less commonly rated as severe, their cumulative impact on patient well-being should not be underrated.[17,18] Interventions such as noise reduction protocols, soundproofing measures, and adjustable lighting systems can create a more favorable environment for recovery. Training ICU staff to minimize unnecessary noise and employing technologies such as noise-canceling devices can further alleviate these issues.

This study underscores the high burden of discomfort experienced by ICU patients, particularly in relation to bed comfort and sleep disruption, and highlights the need for targeted interventions to address these issues. The findings suggest that enhancing the quality of bedding, optimizing sleep hygiene, and minimizing the impact of invasive procedures may significantly improve patient comfort and overall ICU experience.[19,20] Incorporating routine discomfort assessments into clinical practice can guide individualized care, facilitate early intervention, and potentially improve patient outcomes, especially in resource-limited settings.[21,22]

This study was limited by its single-center design and relatively modest sample size, which may affect the generalizability of the findings. The assessment of discomfort was based on self-reported measures, which are subject to recall and reporting bias. The study included only patients who were discharged with a GCS score of 15, potentially excluding those with more severe illness or cognitive impairment, and the evaluation was performed at a single time point, not capturing changes in discomfort over time.

CONCLUSION

Discomfort in the ICU is multifaceted and may be influenced by clinical interventions and duration of stay. Targeted interventions to improve bedding, reduce sleep disruption, and manage invasive procedures are essential for enhancing patient comfort, particularly in low-resource ICU settings. Enhancing ambient elements like noise and illumination helps to create a patient-centered approach of treatment. Future studies should investigate the long-term effects of ICU discomfort and create creative treatments to properly handle several difficulties.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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2	**Fakhir Raza Haidri:** Conception, design, proof reading.
3	**Abdul Rehman Azam:** Data analysis, interpretations.
4	**Heeralal:** Critical revisions, proof reading, data analysis.
5	**Nazia Arain:** Literature review, drafting.
6	**Syeda Maheen Fahim:** Proof reading, drafting, literature review.
7	**Muhammad Imran:** Methodology, critical revision.