

Research Article

Impact of Clinical Care Determinants on Biochemical, Hematological, and Pharmacological Outcomes in Hospitalized Patients

Ammara Asghar^{1*}, Aisha Hameed², Rafaya Ahmed³, Safiya Javed⁴, Kiran Shaikh⁵, Sidra Anwar⁶

^{1*}PhD (Public Health) Scholar, Institute of Public Health, Health Services Academy, Islamabad, Pakistan.

²MBBS, MPhil, CHPE, PhD, Associate Professor, Department of Pathology, Gujranwala Medical College, Gujranwala, Pakistan.

³Coordinator and Faculty Member, Faculty of Pharmacy, Iqra University, Karachi, Pakistan.

⁴Associate Professor, Department of Pathology, Isra University, Hyderabad, Sindh, Pakistan.

⁵Assistant Professor, Department of Pathology, Isra University Hospital, Hyderabad, Sindh, Pakistan.

⁶Assistant Professor, Department of Biochemistry, Independent Medical College, Faisalabad, Pakistan.

Corresponding Author: Ammara Asghar

PhD (Public Health) Scholar, Institute of Public Health, Health Services Academy, Islamabad, Pakistan.

Email: ammararehan01@yahoo.com

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ABSTRACT

Background: Clinical care determinants, including healthcare staff behavior, emotional support, patient autonomy, communication, and medication-related counseling, play a critical role in influencing patient recovery and well-being. In addition to psychological effects, stressful healthcare experiences may alter biochemical, hematological, inflammatory, and pharmacological responses associated with immune function, physiological stress, and treatment outcomes. However, limited evidence from Pakistan has explored these multidimensional effects among hospitalized patients.

Objective: To determine the influence of clinical care determinants on psychological, biochemical, hematological, inflammatory, and pharmacological responses in hospitalized patients admitted to tertiary care hospitals.

Methods: A cross-sectional analytical study was conducted among 215 hospitalized patients in a tertiary care of Islamabad from January to June 2024. Clinical care determinants were assessed using a structured questionnaire, while patient well-being was evaluated using the WHO-5 Well-being Index. Biochemical parameters including serum cortisol, C-reactive protein (CRP), blood glucose, and serum albumin were assessed. Hematological parameters including hemoglobin, total leukocyte count (TLC), neutrophil-to-lymphocyte ratio (NLR), platelet count, and erythrocyte sedimentation rate (ESR) were analyzed. Pharmacological indicators including medication adherence, analgesic requirement, sedative use, adverse drug reactions, and satisfaction with medication counseling were also evaluated. Statistical analysis was performed using SPSS version 21 with $p \leq 0.05$ considered statistically significant.

Results: Among the participants, staff cooperation was reported by 64.2% patients, social support by 68.8%, and bed adjustability by 69.3%. Significant associations with patient well-being were observed for staff cooperation ($p < 0.001$), social support ($p < 0.001$), staff visibility ($p = 0.001$), light control ($p < 0.001$), and bed adjustability ($p < 0.001$). Patients with poor well-being demonstrated significantly higher serum cortisol levels ($21.6 \pm 4.5 \mu\text{g/dL}$ vs $14.2 \pm 3.1 \mu\text{g/dL}$), CRP levels ($12.9 \pm 4.7 \text{ mg/L}$ vs $5.8 \pm 2.2 \text{ mg/L}$), TLC ($11.1 \pm 2.6 \times 10^3/\mu\text{L}$ vs $7.4 \pm 1.8 \times 10^3/\mu\text{L}$), NLR (4.8 ± 1.3 vs 2.1 ± 0.7), and ESR ($31 \pm 9 \text{ mm/hr}$ vs $14 \pm 5 \text{ mm/hr}$) compared to patients with good well-being ($p < 0.05$). Hemoglobin and serum albumin levels were significantly lower in patients with poor well-being. Medication adherence was higher among patients with good well-being (88.4% vs 61.7%), while sedative use and analgesic requirement were significantly greater among psychologically distressed patients.

Conclusion: Clinical care determinants significantly influence not only psychological well-being but also biochemical, hematological, inflammatory, and pharmacological responses in hospitalized patients. Improving patient-centered care, emotional support, healthcare communication, and medication counseling may enhance both psychological and physiological recovery outcomes.

Keywords: Clinical Care Determinants, Patient Well-Being, Inflammation, Biochemical Markers, Hematological Parameters, Pharmacological Response, Medication Adherence, Stress Response, Hospitalized Patients.

INTRODUCTION

Healthcare quality extends beyond medical treatment and includes multiple psychosocial and therapeutic determinants that influence patient recovery and satisfaction. Clinical care determinants such as healthcare staff behavior, emotional support, communication, environmental comfort, patient autonomy, and medication-related counseling play a central role in shaping the overall healthcare experience. Recent evidence suggests that patient-centered healthcare environments are strongly associated with improved psychological outcomes and treatment compliance among hospitalized patients.^{1,2}

Hospitalization is frequently associated with anxiety, stress, fear, uncertainty, and loss of independence. These psychological stressors may negatively affect patient well-being and contribute to alterations in endocrine, inflammatory, immune, and hematological responses. Stress-induced activation of the hypothalamic-pituitary-adrenal (HPA) axis can increase cortisol secretion and inflammatory cytokine production, potentially impairing immune regulation, wound healing, and recovery outcomes.^{3,4}

Several studies have demonstrated associations between psychological stress and elevated inflammatory markers including C-reactive protein (CRP), oxidative stress markers, leukocytosis, and altered neutrophil-to-lymphocyte ratio (NLR).^{5,6} Inadequate emotional support and poor communication during hospitalization may also negatively influence medication adherence, patient cooperation, pain perception, and pharmacological treatment outcomes.^{7,8} Conversely, supportive clinical care environments characterized by empathy, patient-centered communication, social support, and effective counseling may improve psychological stability, reduce physiological stress, enhance treatment adherence, and promote faster recovery.^{9,10}

Despite growing international evidence, limited research from Pakistan has comprehensively evaluated the combined psychological, biochemical, hematological, inflammatory, and pharmacological effects of clinical care determinants among hospitalized patients.^{11,12} Therefore, this study was conducted to assess the impact of clinical care determinants on multidimensional patient outcomes among hospitalized patients in a tertiary care hospital in Islamabad.

Objective

- To determine the impact of clinical care determinants on psychological, biochemical, hematological, and pharmacological outcomes in hospitalized patients.

METHODOLOGY

A cross-sectional analytical study was conducted from January to June 2024 in a tertiary care hospital in Islamabad, Pakistan. A total of 215 hospitalized patients were selected using a non-probability purposive sampling technique. Patients aged 18 years and above who had been admitted for more than 48 hours and were willing to participate were included in the study. Critically ill or unconscious patients, individuals with diagnosed psychiatric disorders, and patients unwilling to provide informed consent were excluded from the study.

Clinical care determinants assessed in the study included staff cooperation and friendliness, social support, staff visibility, alarm system availability, patient privacy, bed adjustability, lighting control, communication quality, medication counseling, food quality, physical security, and multimedia facilities. Psychological well-being was assessed using the WHO-5 Well-Being Index. Each of the five items was scored from 0 to 5, yielding a total raw score ranging from 0 to 25. Participants scoring ≤ 13 were categorized as having poor well-being, while those scoring > 13 were categorized as having good well-being. Biochemical parameters including serum cortisol, C-reactive protein (CRP), blood glucose, and serum albumin were obtained from hospital laboratory records where available. Hematological parameters including hemoglobin (Hb), total leukocyte count (TLC), neutrophil-to-lymphocyte ratio (NLR), platelet count, and erythrocyte sedimentation rate (ESR) were also analyzed. Pharmacological indicators such as medication adherence, sedative use, analgesic requirement, adverse drug reactions, and satisfaction with medication counseling were assessed through patient interviews and review of medical records.

Data were collected using a structured questionnaire adapted from previously validated studies assessing healthcare environment and patient-centered care determinants. Data were entered and analyzed using SPSS version 21. Descriptive statistics including frequencies, percentages, means, and standard deviations were calculated. Chi-square test, independent t-test, and one-way ANOVA were applied where appropriate to

determine associations between clinical care determinants and psychological, biochemical, hematological, inflammatory, and pharmacological outcomes. Correlation analysis was also performed to assess relationships between well-being scores and laboratory parameters. A p-value of ≤ 0.05 was considered statistically significant.

RESULTS

The findings of Table 1 demonstrate that supportive clinical care determinants were available for a majority of hospitalized patients. Bed adjustability (69.3%), social support (68.8%), and staff cooperation (64.2%) were the most commonly reported positive factors, indicating relatively good interpersonal care and patient support within the hospital setting. Staff visibility and alarm system availability were also reported by more than half of the participants, suggesting moderate accessibility of healthcare staff and patient safety measures. However, environmental autonomy-related factors such as light control (37.2%) and

privacy maintenance (47.9%) showed comparatively lower availability, highlighting potential deficiencies in patient-centered environmental comfort and privacy-related infrastructure.

Table 2 revealed significant associations between several clinical care determinants and patient well-being. Staff cooperation, social support, light control, and bed adjustability demonstrated highly significant relationships with improved well-being ($p < 0.001$), emphasizing the importance of emotional support, effective communication, and patient autonomy during hospitalization. Staff visibility and alarm system availability also showed significant positive associations with psychological well-being. In contrast, privacy did not demonstrate a statistically significant association ($p = 0.539$), suggesting that interpersonal and supportive aspects of care may have a greater influence on patient well-being than environmental privacy within the studied population.

Table 1: Availability of Clinical Care Determinants (n=215)

Variable	Yes n (%)	No n (%)
Staff cooperation	138 (64.2%)	77 (35.8%)
Social support	148 (68.8%)	67 (31.2%)
Staff visibility	133 (61.9%)	82 (38.1%)
Alarm system	123 (57.2%)	92 (42.8%)
Bed adjustability	149 (69.3%)	66 (30.7%)
Light control	80 (37.2%)	135 (62.8%)
Privacy maintained	103 (47.9%)	112 (52.1%)

Table 2: Association of Clinical Care Determinants with Patient Well-being

Variable	p-value	Significance
Staff cooperation	<0.001	Significant
Social support	<0.001	Significant
Staff visibility	0.001	Significant
Alarm system	0.034	Significant
Light control	<0.001	Significant
Bed adjustability	<0.001	Significant
Privacy	0.539	Not significant

Table 3: Biochemical Parameters According to Well-being Status

Parameter	Good Well-being	Poor Well-being	p-value
Serum cortisol ($\mu\text{g/dL}$)	14.2 $\pm$ 3.1	21.6 $\pm$ 4.5	<0.001
CRP (mg/L)	5.8 $\pm$ 2.2	12.9 $\pm$ 4.7	<0.001
Blood glucose (mg/dL)	112 $\pm$ 18	146 $\pm$ 26	0.002
Serum albumin (g/dL)	4.1 $\pm$ 0.4	3.3 $\pm$ 0.5	0.004

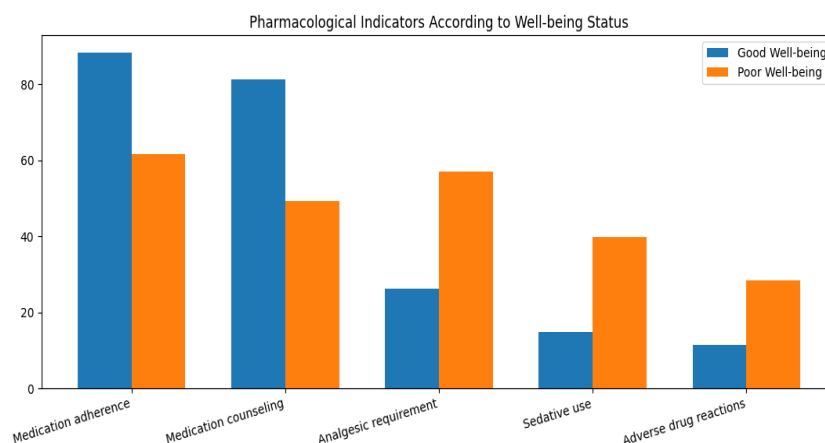
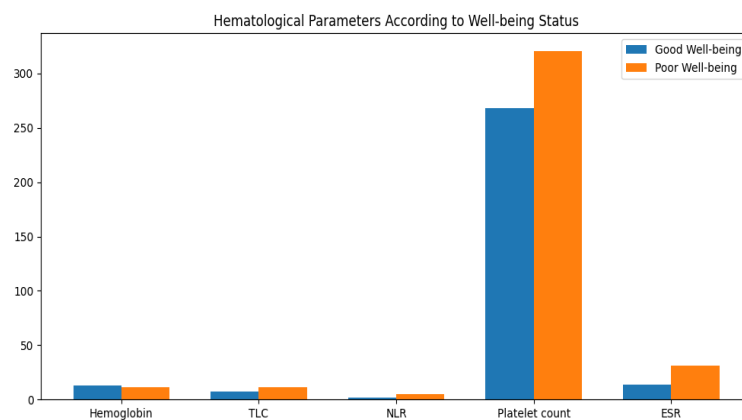
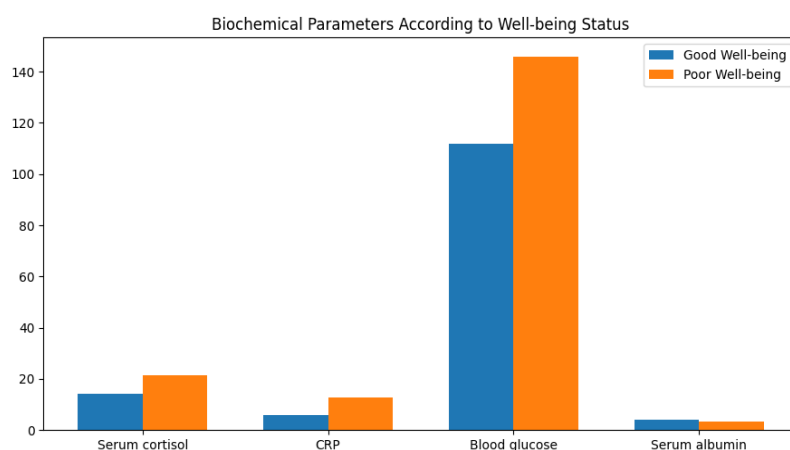
Table 4: Hematological Parameters According to Well-being Status

Parameter	Good Well-being	Poor Well-being	p-value
Hemoglobin (g/dL)	13.1 $\pm$ 1.2	11.2 $\pm$ 1.5	0.001
TLC ($\times 10^3/\mu\text{L}$)	7.4 $\pm$ 1.8	11.1 $\pm$ 2.6	<0.001

NLR	2.1 ± 0.7	4.8 ± 1.3	<0.001
Platelet count ($\times 10^3/\mu\text{L}$)	268 ± 54	321 ± 70	0.018
ESR (mm/hr)	14 ± 5	31 ± 9	<0.001

Table 5: Pharmacological Indicators According to Well-being Status

Parameter	Good Well-being	Poor Well-being	p-value
Medication adherence (%)	88.4%	61.7%	<0.001
Adequate medication counseling (%)	81.2%	49.3%	0.002
Frequent analgesic requirement (%)	26.3%	57.1%	<0.001
Sedative use (%)	14.8%	39.7%	0.004
Adverse drug reactions (%)	11.5%	28.4%	0.018



DISCUSSION

The present study demonstrated that clinical care determinants significantly influence psychological well-being and physiological recovery among hospitalized patients. Positive staff behavior, emotional support, patient autonomy, and effective communication were strongly associated with improved well-being outcomes. Similar findings have been reported in recent studies emphasizing the importance of patient-centered care and psychosocial support in improving healthcare experiences and recovery outcomes.^{13, 14}

Patients with poor well-being demonstrated significantly elevated serum cortisol and CRP levels, suggesting activation of stress and inflammatory pathways. Elevated TLC, NLR, platelet count, and ESR further indicated increased systemic inflammatory and immune responses among psychologically distressed patients. Lower hemoglobin and serum albumin levels observed among patients with poor well-being may reflect the combined effects of stress, inflammation, nutritional compromise, and delayed recovery. Comparable findings have been reported in recent studies investigating the relationship between psychological stress, inflammatory biomarkers, and immune dysregulation among hospitalized individuals.^{15, 16}

Pharmacological findings revealed that patients with better psychosocial support demonstrated significantly improved medication adherence and greater satisfaction with medication counseling. In contrast, psychologically distressed patients required more analgesics and sedatives, possibly due to increased anxiety, heightened stress perception, and reduced pain tolerance. Recent evidence suggests that medication adherence and effective therapeutic communication significantly influence hospitalization outcomes, treatment effectiveness, and healthcare costs.^{17, 18}

The findings of the present study emphasize the importance of integrating patient-centered care, supportive communication, emotional support, and effective pharmacological counseling into routine healthcare practice. Improving clinical care determinants may enhance not only psychological well-being but also biochemical, hematological, inflammatory, and pharmacological recovery outcomes among hospitalized patients.^{19, 20}

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Authors' Contribution

Concept & Design of Study: Ammara Asghar, Aisha Hameed

Drafting: Rafaya Ahmed, Safiya Javed,

Data Analysis: Kiran Shaikh, Sidra Anwar

Critical Review: Ammara Asghar, Aisha Hameed

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