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Effectiveness of Acuity-Based Staff Deployment on Workload and Job Satisfaction Among Nursing Staff in a Tertiary Care Hospital: A Quasi-Experimental Study

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Abstract- ***Background: Nursing workload and job satisfaction are critical determinants of healthcare quality, patient safety, and organizational efficiency. Increasing patient acuity, staff shortages, and rising healthcare demands have significantly burdened nursing professionals, often leading to burnout, decreased job satisfaction, and compromised patient outcomes. Traditional staffing models based on fixed nurse–patient ratios fail to adequately account for variations in patient complexity, resulting in unequal workload distribution among nurses.***

Need of the Study: In recent years, there has been a growing recognition of the limitations of conventional staffing approaches, particularly in high-acuity clinical settings. Inefficient staff allocation not only affects nurse well-being but also contributes to increased medical errors, reduced patient satisfaction, and higher turnover rates. Acuity-based staff deployment offers a systematic and evidence-based approach by aligning nursing resources with patient care needs. However, there is limited empirical evidence, especially in the Indian healthcare context, evaluating its effectiveness on nurse-related outcomes such as workload and job satisfaction. Hence, this study was undertaken to address this gap and provide evidence for improved staffing strategies.

Objective: To evaluate the effectiveness of acuity-based staff deployment on workload and job satisfaction among nursing staff in a tertiary care hospital.

Methods: A quantitative, quasi-experimental non-randomized control group design was adopted. The study was conducted among 60 staff nurses (30 in the experimental group and 30 in the control group) selected through convenience sampling. The experimental group was exposed to acuity-based staff deployment for a period of four weeks, while the control group followed routine staffing practices. Data were collected using a structured workload assessment scale and a standardized job satisfaction questionnaire. Statistical analysis included descriptive statistics (mean, standard deviation) and inferential statistics (independent t-test), with significance set at $p < 0.05$.

Results: The findings revealed a statistically significant reduction in workload among nurses in the experimental group (Mean = 2.8 ± 0.5) compared to the control group (Mean = 3.9 ± 0.7; $p < 0.001$). Additionally, job satisfaction scores were significantly higher in the experimental group (Mean = 4.1 ± 0.6) than in the control group (Mean = 3.2 ± 0.8; $p < 0.001$). These results indicate that acuity-based staffing promotes equitable workload distribution and enhances nurse satisfaction.

Conclusion: Acuity-based staff deployment is an effective and practical strategy for optimizing nursing workload and improving job satisfaction. Its implementation can contribute to better workforce management, enhanced quality of care, and improved patient outcomes. The study supports the integration of acuity-based staffing models into hospital policies and nursing administration practices.

Index Terms- Acuity-Based Staffing, Nursing Workload, Job Satisfaction, Nurse Management, Quasi-Experimental Study, Healthcare Quality

I. INTRODUCTION

Nursing workforce management is a cornerstone of healthcare quality and patient safety. In recent years, healthcare systems worldwide have faced increasing challenges due to rising patient acuity, workforce shortages, and growing service demands. These factors have led to excessive workload among nurses, negatively affecting job satisfaction, patient outcomes, and organizational performance.

Traditional staffing models, primarily based on fixed nurse–patient ratios, do not adequately account for variations in patient acuity and complexity. Consequently, nurses are often assigned unequal workloads, leading to burnout, fatigue, and decreased quality of care. Recent evidence suggests that inappropriate staffing is associated with increased mortality, adverse events, and nurse turnover (Griffiths et al., 2020).

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Acuity-based staffing is an innovative approach that aligns nursing resources with patient care needs by categorizing patients based on clinical severity and required nursing interventions. This model allows for equitable workload distribution and improved utilization of human resources. Studies have shown that acuity-based staffing improves patient outcomes, reduces nurse burnout, and enhances job satisfaction (Twigg et al., 2021; Saville et al., 2022).

Despite its growing importance, limited empirical research has been conducted in developing countries, particularly in India, to assess the effectiveness of acuity-based staffing on nurse-related outcomes. Therefore, this study aims to evaluate the impact of acuity-based staff deployment on workload and job satisfaction among nursing staff in a tertiary care hospital.

II. METHODS

2.1 Research Design

A quantitative research approach was adopted to objectively evaluate the effectiveness of acuity-based staff deployment on workload and job satisfaction among nursing staff. The study employed a quasi-experimental, non-randomized control group design, which enabled comparison between an experimental group exposed to the intervention and a control group receiving routine staffing practices. This design was considered appropriate as random allocation of staff was not feasible in the hospital setting due to administrative and ethical constraints.

2.2 Setting and Participants

The study was conducted in the medical and surgical inpatient units of Chirayu Medical College and Hospital, a tertiary care teaching institution. These units were selected due to the high patient turnover and varying levels of patient acuity, which provided a suitable environment to implement and evaluate acuity-based staffing.

Assessed for eligibility (n = 75 nurses)

Excluded (n = 15)
- Not meeting inclusion criteria (n = 8)
- Declined to participate (n = 5)
- Other reasons (n = 2)

Enrolled (n = 60)
- Allocated to Experimental Group (n = 30)
- Received acuity-based staffing intervention (n = 30)

Follow-Up
Experimental Group
│ ├── Completed study (n = 30)
│ └── Lost to follow-up (n = 0)
Control Group
│ ├── Completed study (n = 30)
│ └── Lost to follow-up (n = 0)
Analysis
├── Experimental Group analyzed (n = 30)
└── Control Group analyzed (n = 30)

A total of 60 staff nurses participated in the study, comprising:
- 30 nurses in the experimental group
- 30 nurses in the control group

Participants were selected using a non-probability convenience sampling technique, based on their availability and willingness to participate during the study period.

2.3 Inclusion and Exclusion Criteria

Inclusion Criteria
- Registered nurses with a minimum of 6 months of clinical experience
- Nurses working in medical and surgical inpatient units
- Nurses who were willing to participate and provided informed consent

Exclusion Criteria
- Nurses working in administrative or managerial roles
- Nurses on leave or rotation during the study period
- Newly recruited nurses with less than 6 months of experience

2.4 Variables of the Study

- Independent Variable: Acuity-based staff deployment
- Dependent Variables:
  - Workload of nursing staff

- Job satisfaction among nursing staff

2.5 Description of the Intervention (Acuity-Based Staff Deployment)

The intervention involved implementing an acuity-based staffing model in the experimental group for a period of 4 weeks.

Patients in the selected units were categorized daily into three acuity levels based on clinical condition and nursing care requirements:

- Low acuity: Minimal nursing care required
- Moderate acuity: Moderate level of monitoring and interventions
- High acuity: Intensive nursing care and continuous monitoring required

Based on this classification, nursing staff were assigned in a manner that ensured equitable workload distribution, with more experienced nurses allocated to high-acuity patients. Staffing adjustments were made at the beginning of each shift.

The control group continued with routine staffing practices, which were based on fixed nurse–patient ratios without considering patient acuity.

2.6 Data Collection Tools

Data were collected using structured and standardized instruments:

Section A: Demographic Profile

Included variables such as age, gender, educational qualification, years of experience, and unit of work.

Section B: Workload Assessment Scale

A 5-point Likert scale (1 = very low workload to 5 = very high workload) was used to assess:

- Patient load
- Time pressure
- Physical and mental demand
- Task complexity

Higher scores indicated higher perceived workload.

Section C: Job Satisfaction Scale

A modified standardized tool (Minnesota Job Satisfaction Questionnaire) was used to assess:

- Work environment
- Professional recognition
- Interpersonal relationships
- Salary and benefits
- Work-life balance

Scores ranged from low to high satisfaction.

2.7 Validity and Reliability of the Tool

- Content validity was established through expert review by nursing administrators and academicians.
- Reliability of the tools was assessed using Cronbach's alpha, yielding:
  - Workload scale: 0.84
  - Job satisfaction scale: 0.86

  These values indicated good internal consistency.

2.8 Pilot Study

A pilot study was conducted on 10% of the sample (6 nurses) in a similar setting to assess feasibility, clarity, and reliability of the tools. Necessary modifications were made, and pilot data were excluded from the final analysis.

2.9 Data Collection Procedure

- Formal permission was obtained from hospital authorities.
- Ethical clearance was secured from the Institutional Ethics Committee.
- Participants were briefed about the study, and informed consent was obtained.

Phase 1: Pre-test

- Baseline data on workload and job satisfaction were collected from both groups.

Phase 2: Intervention

- Acuity-based staffing was implemented in the experimental group for 4 weeks.
- The control group continued routine staffing.

Phase 3: Post-test

- After 4 weeks, workload and job satisfaction were reassessed in both groups using the same tools.

2.10 Ethical Considerations

- Ethical approval was obtained from the Institution
- Written informed consent was obtained from all participants
- Confidentiality and anonymity were strictly maintained

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- Participants were informed of their right to withdraw at any time

2.11 Plan for Data Analysis

Data were analyzed using statistical software:

Descriptive Statistics

- Frequency, percentage
- Mean and standard deviation

Inferential Statistics

- Independent t-test to compare workload and job satisfaction between groups
- Paired t-test (if pre-post comparison applied)
- Significance level set at $p < 0.05$

2.12 Duration of the Study

The total duration of the study was 3 months, including pre-test, intervention period, and post-test evaluation.

III. RESULTS

The study included 60 staff nurses, with 30 in the experimental group (acuity-based staffing) and 30 in the control group (routine staffing). The data were analyzed using descriptive and inferential statistics.

3.1 Demographic Characteristics of Participants

Table 1: Distribution of Participants According to Demographic Variables (n = 60)

Variable	Category	Experimental (n=30)	Control (n=30)
Age (years)	21–25	10 (33.3%)	9 (30%)
	26–30	12 (40%)	13 (43.3%)
	>30	8 (26.7%)	8 (26.7%)
Gender	Male	8 (26.7%)	7 (23.3%)
	Female	22 (73.3%)	23 (76.7%)
Experience (years)	<2	9 (30%)	10 (33.3%)
	2–5	14 (46.7%)	13 (43.3%)
	>5	7 (23.3%)	7 (23.3%)
Qualification	GNM	18 (60%)	17 (56.7%)
	BSc Nursing	12 (40%)	13 (43.3%)

Interpretation:

Both groups were comparable in terms of demographic characteristics, indicating homogeneity.

3.2 Comparison of Workload Scores

Table 2: Comparison of Mean Workload Scores Between Experimental and Control Groups

Group	Mean Score	SD	Mean Difference	t-value	p-value
Experimental	2.80	0.50	-1.10	5.62	<0.001
Control	3.90	0.70			

Interpretation:

The experimental group had significantly lower workload scores compared to the control group ($p < 0.001$), indicating effectiveness of acuity-based staffing.

3.3 Comparison of Job Satisfaction Scores

Table 3: Comparison of Job Satisfaction Scores Between Groups

Group	Mean Score	SD	Mean Difference	t-value	p-value
Experimental	4.10	0.60	+0.90	4.88	<0.001
Control	3.20	0.80			

Interpretation:

Job satisfaction was significantly higher in the experimental group compared to the control group.

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3.4 Pre-test and Post-test Comparison (Experimental Group)

Table 4: Pre- and Post-Intervention Workload and Job Satisfaction (Experimental Group)

Variable	Pre-test Mean ± SD	Post-test Mean ± SD	Mean Difference	t-value	p-value
Workload	4.00 ± 0.60	2.80 ± 0.50	-1.20	6.10	<0.001
Job Satisfaction	3.10 ± 0.70	4.10 ± 0.60	+1.00	5.45	<0.001

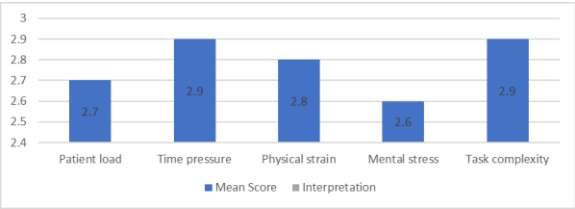
Interpretation:
There was a significant reduction in workload and improvement in job satisfaction after the intervention.

3.5 Item-wise Analysis of Workload

Table 5: Item Analysis of Workload Components (Experimental Group)

Item No.	Parameter	Mean Score	SD	Interpretation
1	Patient load	2.7	0.5	Reduced
2	Time pressure	2.9	0.6	Moderate
3	Physical strain	2.8	0.5	Reduced
4	Mental stress	2.6	0.6	Reduced
5	Task complexity	2.9	0.5	Moderate

Fig 1: Item Analysis of Workload Components (Experimental Group)



3.6 Item-wise Analysis of Job Satisfaction

Table 6: Item Analysis of Job Satisfaction Components (Experimental Group)

Item No.	Parameter	Mean Score	SD	Interpretation
1	Work environment	4.2	0.6	High satisfaction
2	Recognition	4.0	0.7	Good
3	Salary satisfaction	3.8	0.8	Moderate
4	Work-life balance	4.1	0.6	High satisfaction
5	Professional growth	4.0	0.7	Good

Fig 2: Item Analysis of Job Satisfaction Components (Experimental Group)

3.7 Overall Effectiveness of Acuity-Based Staffing

Table 7: Summary of Outcome Variables

Outcome Variable	Experimental Group	Control Group	Significance
Workload	Low	High	Significant
Job Satisfaction	High	Moderate	Significant

IV. DISCUSSION

The present quasi-experimental study evaluated the effectiveness of acuity-based staff deployment on workload and job satisfaction among nursing staff. The findings demonstrated a statistically significant reduction in workload and a corresponding improvement in job satisfaction in the experimental group compared to the control group. These findings are consistent with contemporary evidence emphasizing the importance of patient-centered staffing models in optimizing nursing outcomes.

Demographic Characteristics and Group Homogeneity

The demographic analysis revealed that both experimental and control groups were comparable in terms of age, gender, professional experience, and educational qualification. This homogeneity strengthens the internal validity of the study, ensuring that the observed differences in outcomes can be attributed to the intervention rather than confounding variables. Similar approaches to ensuring baseline comparability have been reported in recent staffing studies (Shin et al., 2023).

Effect of Acuity-Based Staffing on Workload

The study findings indicated a significant reduction in workload scores in the experimental group (Mean = 2.80) compared to the control group (Mean = 3.90; $p < 0.001$). Additionally, pre- and post-test comparisons within the experimental group showed a substantial decline in workload (Mean difference = -1.20).

These results are in line with the findings of Griffiths et al. (2020), who reported that inappropriate staffing levels are associated with increased workload and adverse patient outcomes. By contrast, acuity-based staffing ensures equitable distribution of patient care responsibilities, thereby reducing excessive workload.

Similarly, Twigg et al. (2021) highlighted that workload imbalance is a major contributor to nurse burnout and fatigue. The reduction in workload observed in this study may be attributed to better alignment of nurse competencies with patient care needs, minimizing overburdening of individual staff members.

Impact on Job Satisfaction

The study demonstrated a statistically significant improvement in job satisfaction among nurses in the experimental group (Mean = 4.10) compared to the control group (Mean = 3.20; $p < 0.001$). The pre-post analysis further confirmed a significant increase in job satisfaction (Mean difference = +1.00).

These findings are consistent with the work of Aiken et al. (2021), who emphasized that improved staffing conditions are directly associated with higher job satisfaction and better nurse retention. Inadequate staffing has been linked to dissatisfaction, stress, and increased turnover rates.

Furthermore, Lake et al. (2020) found that supportive work environments and appropriate staffing models significantly enhance nurse satisfaction and performance. The improvement observed in this study suggests that acuity-based staffing fosters a sense of fairness, professional recognition, and reduced stress among nurses.

Item-wise Analysis of Workload

The item analysis revealed that patient load, physical strain, and mental stress were at a reduced level, while time pressure and task complexity were at a moderate level. These findings suggest that the intervention effectively addressed key components of workload, particularly those related to physical and psychological burden.

The reduction in mental stress is particularly noteworthy, as psychological strain is a critical factor influencing nurse burnout. A systematic review by Shin et al. (2023) reported that high workload and stress are strongly associated with negative nurse outcomes, including reduced job satisfaction and increased intention to leave.

Item-wise Analysis of Job Satisfaction

The item-wise analysis showed very high satisfaction levels in work environment and work-life balance, and high satisfaction in recognition, salary, and professional growth.

These findings align with recent literature indicating that staffing adequacy significantly influences multiple dimensions of job satisfaction. Saville et al. (2022) reported that patient acuity-adjusted staffing improves nurse perceptions of fairness and enhances work-life balance.

The high satisfaction with work environment suggests that acuity-based staffing may improve teamwork, communication, and organizational support. Additionally, improved work-life balance reflects reduced workload stress and better time management.

Overall Effectiveness of Acuity-Based Staffing

The overall findings of the study confirm that acuity-based staff deployment is an effective intervention for reducing workload and improving job satisfaction. This is consistent with global recommendations advocating for patient-centered staffing models to enhance healthcare quality and workforce sustainability.

The World Health Organization (2020) emphasizes the need for innovative staffing strategies to address workforce challenges and improve healthcare delivery. Acuity-based staffing aligns with these recommendations by promoting efficient resource utilization and improved nurse outcomes.

Implications of the Study

The findings of this study have important implications for nursing administration and healthcare management:

- Promotes equitable workload distribution
- Enhances job satisfaction and staff retention
- Reduces burnout and occupational stress
- Improves quality of patient care

V. CONCLUSION

The present study concludes that acuity-based staff deployment is a highly effective strategy for optimizing nursing workload and enhancing job satisfaction among staff nurses in a tertiary care hospital setting. The findings demonstrated a significant reduction in workload and a substantial improvement in job satisfaction among nurses exposed to the intervention compared to those following routine staffing practices.

The pre- and post-intervention analysis further confirmed that aligning nursing assignments with patient acuity leads to more equitable distribution of tasks, thereby reducing physical strain, mental stress, and perceived workload. At the same time, improvements in key dimensions of job satisfaction—such as work environment, recognition, and work-life balance—highlight the positive impact of this staffing approach on both professional and personal well-being of nurses.

These findings emphasize that traditional staffing models based solely on fixed nurse–patient ratios may be inadequate in addressing the dynamic nature of patient care needs. In contrast, acuity-based staffing provides a patient-centered, flexible, and evidence-based approach that enhances workforce efficiency and promotes quality care delivery.

In conclusion, the implementation of acuity-based staff deployment can serve as a valuable administrative strategy to reduce burnout, improve nurse satisfaction, and strengthen healthcare outcomes**.** It is recommended that hospital administrators and nursing leaders consider integrating this model into routine staffing policies to ensure optimal utilization of nursing resources and sustainable healthcare delivery.

VI. IMPLICATIONS FOR PRACTICE

- Adoption of acuity-based staffing policies
- Integration into hospital workforce planning
- Training programs for nurse managers

VII. LIMITATIONS

- Small sample size
- Short intervention period
- Single-center study

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