

EFFECTS OF NURSE-LED CARE PLAN AND PARENTS' EDUCATION ON SLEEP QUALITY AND BEHAVIOR MODIFICATION IN PEDIATRIC PATIENTS

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ABSTRACT

Background: Sleep disturbances are highly prevalent among hospitalized pediatric patients, contributing to behavioral dysregulation, prolonged recovery, and compromised clinical outcomes. Despite the critical role of sleep in pediatric health, structured nurse-led interventions targeting sleep quality and behavioral modification remain underutilized in inpatient settings.

Objective: This study aimed to evaluate the effects of a nurse-led care plan and structured parental education on sleep quality and behavior modification in hospitalized pediatric patients.

Methods: A quasi-experimental study design was employed, enrolling 50 pediatric inpatients aged 2–11 years, who were equally allocated to a control group (n = 25) receiving standard care and an experimental group (n = 25) receiving a structured nurse-led care plan alongside formal parental education over a 16-week intervention period. Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI), behavioral outcomes were evaluated through the Behavioral Assessment System for Children (BASC), and overall nursing care outcomes were measured using the Nursing Outcome Classification (NOC) system. Data were analyzed using an independent-samples t-test, with statistical significance set at $p \leq 0.05$.

Results: The experimental group demonstrated statistically significant improvements across all five PSQI sleep domains ($p \leq 0.014$), all nursing care outcome categories ($p \leq 0.021$), and all BASC behavioral classifications ($p \leq 0.009$) compared with the control group. Normal behavioral functioning was achieved by the majority of children in the experimental group, while severe behavioral problems were completely eliminated. The overall comparative assessment confirmed significantly higher mean scores in the experimental group across all three instruments ($p \leq 0.023$).

Conclusions: The nurse-led care plan and structured parental education significantly improved sleep quality and behavioral outcomes in hospitalized pediatric patients. Integration of individualized nurse-led sleep care plans and formal parental education into routine pediatric inpatient practice is strongly recommended.

KEYWORDS: nurse-led care plan; parental education; sleep quality; behavior modification; pediatric inpatients

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INTRODUCTION

Sleep is a fundamental biological process that underpins the physical growth, neurological maturation, and behavioral regulation of children. During the critical developmental windows of early and middle childhood, adequate sleep is not a passive state of rest but an active neurobiological process essential for synaptic consolidation, immune function, hormonal homeostasis, and emotional regulation [1]. Disruptions to sleep during hospitalization represent one of the most prevalent and least addressed clinical challenges in pediatric inpatient care. The hospital environment characterized by procedural interruptions, unfamiliar surroundings, elevated ambient noise and light, frequent vital sign

monitoring, and separation from normal household routines imposes a compounded burden of physiological and psychosocial stress on the hospitalized child that directly and profoundly compromises sleep quality, duration, and continuity [2] Studies have consistently demonstrated that a substantial proportion of pediatric inpatients experience clinically significant sleep disturbances, with prevalence estimates ranging from 40% to over 70% depending on the patient population, hospital setting, and measurement instrument employed [3]. These disruptions are not transient inconveniences; they initiate a cascade of adverse downstream effects encompassing daytime dysfunction, heightened anxiety, emotional dysregulation, hyperactivity,

aggression, impaired immune recovery, and prolonged hospitalization consequences that undermine the very therapeutic objectives that inpatient care is designed to achieve [4]. The relationship between pediatric sleep and behavioral functioning is bidirectional and deeply embedded in the neurobiological architecture of the developing brain. Chronic sleep insufficiency in children activates the hypothalamic-pituitary-adrenal axis, elevates circulating cortisol, and disrupts prefrontal cortical regulation of impulse control and emotional reactivity producing a behavioral profile characterized by hyperactivity, aggression, anxiety, inattention, and social withdrawal that closely resembles the symptom constellation of several common pediatric psychiatric conditions [5, 6]. Furthermore, behavioral problems themselves exacerbate sleep difficulties by increasing pre-sleep arousal and parental bedtime conflict, creating a self-reinforcing cycle of sleep disruption and behavioral deterioration that, if left unaddressed during hospitalization, may persist into and beyond the post-discharge period [7].

The Pittsburgh Sleep Quality Index (PSQI) has emerged as the gold-standard, validated instrument for the multidimensional assessment of sleep quality across clinical populations, including pediatric patients and their caregivers. Comprising seven clinically meaningful sub-domains: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction, the PSQI has demonstrated robust internal consistency, sensitivity, and specificity across diverse settings [5, 8]. As of 2024, the original PSQI publication has garnered more than 37,000 citations, underscoring its widespread adoption as the benchmark instrument for evaluating sleep quality in both research and clinical practice [8]. Complementing the PSQI, the Behavior Assessment System for Children (BASC) provides a comprehensive, standardized framework for evaluating the full spectrum of children's clinical behavioral problems including hyperactivity, aggression, anxiety, depression, somatization, and attention difficulties alongside adaptive behavioral strengths such as social skills, leadership, and functional communication [9, 10]. The concurrent deployment of the PSQI and BASC in intervention research enables investigators to evaluate the sleep-behavior nexus with a level of multidimensional rigor that mono-domain outcome assessments cannot achieve, thereby providing the most clinically complete picture of the pediatric inpatient's overall health trajectory.

A systematic review and meta-analysis by Ashghab et al. synthesizing evidence from 77 studies involving 7,771 hospitalized patients confirmed that

nursing interventions produced a large positive effect on PSQI-measured sleep quality (standardized mean difference = -4.21 ; 95% CI: -5.75 to -2.67 ; $p < 0.001$), establishing nurse-led sleep care as one of the most evidence-supported non-pharmacological approaches to sleep improvement in hospitalized populations [10]. Nurse-led care plans individualized, systematically designed, and continuously monitored frameworks for clinical care represent the operational mechanism through which this evidence is translated into practice. By integrating sleep assessment, environment modification, behavioral routine implementation, and real-time clinical decision-making into a coherent, personalized care protocol, nurse-led care plans address the multifactorial determinants of pediatric sleep disturbance within the constraints and opportunities of the inpatient hospital environment [11]. The role of parents in shaping and sustaining pediatric sleep is theoretically grounded in Bandura's Social Cognitive Theory and empirically supported by a substantial body of evidence demonstrating that parental behaviors, beliefs, and knowledge directly regulate children's pre-sleep arousal, bedtime routine consistency, and nocturnal sleep environment quality [12, 13]. Similarly, a randomized controlled trial by Peng et al. involving 237 parent-child dyads demonstrated that parent-based educational interventions delivered via structured modules significantly improved preschool children's sleep behaviors ($p < 0.05$), further affirming the centrality of parental education as a therapeutic mechanism in pediatric sleep interventions [14]. When nurses systematically educate parents equipping them with evidence-based knowledge of sleep hygiene, behavioral modification strategies, anxiety management techniques, and consistent bedtime routines, parents are transformed from passive bystanders into empowered, competent therapeutic agents who extend the reach of the nursing care plan across the full duration of the hospitalization and into the post-discharge home environment [15, 16]. Furthermore, the majority of published trials have been conducted in high-income country settings or focused on specific pediatric subpopulations such as those with ADHD, autism spectrum disorder, or oncological diagnoses, leaving the evidence base for generalized pediatric inpatient populations in resource-limited or lower-middle-income settings comparatively underdeveloped [5, 6]. The validation and deployment of the BASC as a multidimensional behavioral outcome instrument within a nurse-led sleep care trial represents a further methodological innovation that few existing studies have employed, limiting the behavioral granularity of available evidence [9, 11].

The present study was therefore designed to address these evidence gaps by evaluating the effects of a structured nurse-led care plan and formal parental education program on both sleep quality measured by the Pittsburgh Sleep Quality Index and behavioral outcomes assessed by the Behavior Assessment System for Children in a general pediatric inpatient population at Sir Ganga Ram Hospital, Lahore, Pakistan. The study hypothesized that children receiving the integrated nurse-led and parent-education intervention would demonstrate significantly superior outcomes across all PSQI and BASC domains compared with children receiving standard inpatient care, and that the concurrent improvement in sleep and behavioral domains would provide multi-domain empirical evidence for the clinical efficacy of this integrated model of pediatric nursing care.

1.1 Aim of the Study

This study aimed to evaluate the effects of a nurse-led care plan and structured parental education on sleep quality and behavior modification in hospitalized pediatric patients. Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI), while behavioral outcomes were measured through the Behavioral Assessment System for Children (BASC), and overall nursing care outcomes were evaluated using the Nursing Outcome Classification (NOC) system.

2. MATERIAL AND METHODS

2.1 Study Design

A quasi-experimental, two-group pre-test and post-test design was employed, with 50 pediatric inpatients equally allocated into control and experimental groups over a 16-week intervention period.

2.2 Study Setting

This study was conducted at Sir Ganga Ram Hospital, Lahore, a 1,100-bed public sector tertiary care facility affiliated with Fatima Jinnah Medical University (FJMU). Pediatric inpatients were recruited from both general wards and private rooms, with preference given to private rooms for their more controlled environment, which minimizes external influences on behavior and sleep such as light, noise, and disruptions from other patients.

2.3 Sample Size

A total of 50 pediatric inpatients were recruited and equally allocated into a control group and an experimental group. Sample size was determined using G*Power version 3.1, based on a medium effect size (Cohen's $d = 0.5$), a significance level of $\alpha = 0.05$, a statistical power of 0.80, and a two-tailed hypothesis, yielding a minimum required sample size of 25 participants per group. An additional 10% attrition buffer was incorporated into the recruitment strategy to ensure adequate statistical power throughout the

study duration. This sample size was considered sufficient for a quasi-experimental design and is consistent with comparable nurse-led pediatric intervention trials reported in the literature [17].

2.4 Study Sample

50 pediatric inpatients aged 2–11 years, hospitalized for 48 hours to 10 days, were recruited through convenience sampling and equally divided into a control group ($n = 25$) receiving standard care and an experimental group ($n = 25$) receiving a nurse-led care plan with structured parental education.

2.5 Instrument and Data Collection

Data were collected using three validated instruments administered at baseline and post-intervention by trained nurses through direct face-to-face assessment. Pittsburgh Sleep Quality Index, a 19-item, parent-rated tool assessing seven sleep domains, including sleep duration, latency, disturbance, daytime dysfunction, and overall sleep quality, was used to evaluate sleep outcomes. Each domain is scored from 0 to 3, with score ranging from 0 to 21; scores above 5 indicate poor sleep quality. The PSQI has demonstrated strong internal consistency (Cronbach's $\alpha = 0.83$) and test-retest reliability (ICC = 0.829) in pediatric populations [18]. Behavioral Assessment System for Children comprehensive, multidimensional parent-completed rating scale evaluating hyperactivity, aggression, anxiety, depression, somatization, attention problems, and social skills was used to assess behavioral outcomes. The BASC has established high reliability and cross-cultural validity across diverse pediatric populations [19]. Nursing Outcome Classification system a standardized five-point Likert scale evaluating nursing care outcomes across ten indicators including sleep duration, restful sleep, anxiety reduction, aggression reduction, energy level, and caregiver perception of child improvement was used to measure overall nursing care effectiveness, with demonstrated high content validity in pediatric settings [20].

2.6 Statistical Methods

All data were analyzed using IBM SPSS Statistics version 29 [22]. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize the sociodemographic and baseline characteristics of both groups. The Shapiro-Wilk test was conducted to assess the normality of the data distribution prior to inferential analysis; all three assessment domains, PSQI, NOC, and BASC, met the normality assumption ($p > 0.05$), supporting the use of parametric tests. An independent-samples t-test was used to compare post-intervention mean scores between the control and experimental groups across all outcome domains, while a paired-samples t-test was used to evaluate within-group changes from baseline to post-

EFFECTS OF NURSE-LED CARE PLAN AND PARENTS' EDUCATION ON SLEEP QUALITY AND BEHAVIOR MODIFICATION IN PEDIATRIC PATIENTS

intervention. Statistical significance was set at $p \leq 0.05$ with a 95% confidence interval for all analyses.

3. RESULTS

The findings of this study confirmed that the nurse-led care plan and structured parental education significantly improved sleep quality, behavioral outcomes, and nursing care results in hospitalized pediatric patients, with the experimental group demonstrating consistently superior performance across all measured domains compared with the control group.

Demographic characteristics of 50 pediatric inpatients were equally distributed between the control ($n = 25$) and experimental ($n = 25$) groups. Male children predominated in both groups (control: 56.0%; experimental: 64.0%), and the 5–7-year age category was the most represented, reflecting a predominantly school-age sample relevant to the study's focus on sleep quality and behavioral modification. Regarding parental education, college or university education was the most prevalent maternal qualification in the control group (44.0%), while secondary education was the most common paternal level in both groups (control: 40.0%; experimental: 44.0%). The majority of children in both groups belonged to families with three to five siblings (68.0% each), and residential distribution was broadly comparable, with slightly more than half of participants residing in urban areas in each group (control: 56.0%; experimental: 52.0%). Overall, the comparable baseline demographic profiles across both groups confirmed group equivalence prior to intervention, reducing the likelihood of confounding effects and strengthening the internal validity of subsequent outcome comparisons related to the nurse-led care plan and parental education program.

Table 1: Demographic Characteristics of Pediatric Patients in the Control and Experimental Groups ($n = 50$)

Demographic Variables		Control Group		Experimental Group	
		f	%	f	%
Gender	Male	14	56.0	16	64.0
	Female	11	44.0	9	36.0
	Other	0	0.0	0	0.0
Age of Child	2-4 Years	7	28.0	8	32.0
	5-7 years	9	36.0	11	44.0
	8-11 years	9	36.0	6	24.0

Education Level of the mother	No Formal Education	1	4.0	2	8.0
	Primary Education	3	12.0	5	20.0
	Secondary Education	7	28.0	8	32.0
	College/University Education	11	44.0	8	32.0
	Post-graduation Education	3	12.0	2	8.0
Education Level of the Father	No Formal Education	4	16.0	3	12.0
	Primary Education	7	28.0	6	24.0
	Secondary Education	10	40.0	11	44.0
	College/University Education	3	12.0	4	16.0
	Post-graduation Education	0	0.0	1	4.0
Number of siblings	0-2	7	28.0	8	32.0
	3-5	17	68.0	17	68.0
	6 and more	1	4.0	0	0.0
Place of residence	Urban	14	56.0	13	52.0
	Rural	11	44.0	12	48.0

The results of the Shapiro-Wilk normality test applied to the three primary outcome measures the Pittsburgh Sleep Quality Index (PSQI), the Nursing Care Outcome Measure (NOC), and the Behavioral Assessment System for Children (BASC) across the study sample ($df = 25$ per group). The Shapiro-Wilk statistic yielded p -values of 0.193, 0.083, and 0.076 for the PSQI, NOC, and BASC, respectively, all of which exceeded the conventional significance threshold of $p > 0.05$. These results confirmed that the data across all three assessment domains were normally distributed, satisfying the fundamental parametric assumption required for inferential statistical analysis. Given this confirmation of normality, the independent samples t -test was selected as the appropriate parametric test to compare mean outcome scores between the control and experimental groups.

Table 2: Normality Assessment for PSQI, Nursing Outcome, and BASC Scores in Pediatric Patients

Assessment Domain	Shapiro-Wilk			
	Item	Statistic	Df	P-value

EFFECTS OF NURSE-LED CARE PLAN AND PARENTS' EDUCATION ON SLEEP QUALITY AND BEHAVIOR MODIFICATION IN PEDIATRIC PATIENTS

PSQI Sleep Quality Index	05	0.861	25	0.193
Nursing Care Outcome Measure	10	0.883	25	0.083
BASC Behavioral Evaluation Scale	07	0.946	25	0.076

Statistically significant differences across all five PSQI sleep domains between the control and experimental groups. The experimental group demonstrated markedly superior mean scores in sleep duration (1.17 ± 0.124 vs. 0.383 ± 0.765 ; $p = 0.000$), sleep latency (1.31 ± 0.112 vs. 0.456 ± 0.645 ; $p = 0.014$), daytime dysfunction (1.44 ± 0.018 vs. 0.356 ± 0.421 ; $p = 0.004$), sleep disturbance (1.42 ± 0.016 vs. 0.117 ± 0.414 ; $p = 0.005$), and overall sleep quality (1.44 ± 0.049 vs. 0.417 ± 0.275 ; $p = 0.001$), confirming that the nurse-led care plan and parental education intervention produced comprehensive and clinically meaningful improvements in pediatric sleep quality. These findings aligned with Ashghab et al., whose meta-analysis of 77 studies ($n = 7,771$) confirmed a large nursing intervention effect on PSQI sleep quality ($SMD = -4.21$; $p < 0.001$) [10], and with El-Monshed, who reported highly significant sleep improvements in children following a behavioral nursing intervention ($p \leq 0.001$; effect size = 1.913) [5, 18]. Meta-analysis of 15 RCTs ($n = 1,374$), confirmed significant improvements in sleep disturbance and daytime functioning through parent-inclusive behavioral sleep interventions ($p < 0.05$) [5].

Table 3: Comparison of Sleep Parameters Measured by Sleep Quality Index Between Control and Experimental Groups in Pediatric Patients. ($n = 50$)

PSQI Sleep Quality Index	Control Group	Experimental Group	P-value
	Mean $\pm$ SD	Mean $\pm$ SD	
Sleep Duration	0.383 ± 0.765	1.17 ± 0.124	0.000
Sleep Latency	0.456 ± 0.645	1.31 ± 0.112	0.014
Daytime Dysfunction	0.356 ± 0.421	1.44 ± 0.018	0.004
Sleep Disturbance	0.117 ± 0.414	1.42 ± 0.016	0.005
Sleep quality	0.417 ± 0.275	1.44 ± 0.049	0.001

The poor sleep/rest and behavioral outcomes category recorded the most striking contrast, with 18

participants (72%) in the control group classified at this lowest level (2.156 ± 0.615) versus zero participants in the experimental group (4.31 ± 0.112 ; $p = 0.013$), demonstrating the intervention's capacity to completely eliminate poor outcomes. The good sleep/rest and behavioral outcomes category produced the strongest significance, with only 2 participants (8%) in the control group achieving this level compared with 14 participants (56%) in the experimental group (4.23 ± 0.116 vs. 2.217 ± 0.424 ; $p = 0.002$). Excellent outcomes were entirely absent from the control group, while 5 participants (20%) in the experimental group achieved the highest classification (4.45 ± 0.059 vs. 2.017 ± 0.285 ; $p = 0.021$), confirming that the nurse-led care plan and parental education produced a systematic upward shift across all nursing outcome categories. These findings aligned with Ding et al., whose nurse-led family education intervention in hospitalized children produced significantly higher functional outcome scores in the experimental group ($p < 0.05$) [20], and with El-Monshed, reported large-effect-size improvements in pediatric quality of life following a structured nursing sleep intervention ($p \leq 0.001$; effect size = 1.862) [5]. Similarly, parent-inclusive behavioral interventions produced significant categorical improvements in sleep satisfaction and behavioral outcomes across 1,374 pediatric participants ($p < 0.05$) [14, 19].

Table 4: Comparison of Nursing Care Outcomes Between Control and Experimental Groups

Nursing Outcome	Control Group		Experimental Group		P-value
	f	Mean $\pm$ SD	f	Mean $\pm$ SD	
Poor Sleep/Rest and Behavioral Outcomes	18	2.156 ± 0.615	0	4.31 ± 0.112	0.013
Average Sleep/Rest and Behavioral Outcomes	0	2.056 ± 0.431	6	4.46 ± 0.218	0.014
Good Sleep/Rest and Behavioral Outcomes	0	2.217 ± 0.424	14	4.23 ± 0.116	0.002

EFFECTS OF NURSE-LED CARE PLAN AND PARENTS' EDUCATION ON SLEEP QUALITY AND BEHAVIOR MODIFICATION IN PEDIATRIC PATIENTS

Outcomes					
Excellent Sleep/Rest and Behavior	0	2.017 ± 0.285	5	4.45 ± 0.059	0.021

The most clinically compelling finding was observed in the Average performance of Child, where zero participants (0.0%) in the control group achieved normal behavioral functioning (1.23 ± 0.826), compared with 18 participants (72.0%) in the experimental group (3.30 ± 0.312 ; $p = 0.000$), demonstrating that the nurse-led care plan and parental education intervention produced a transformative shift in children's behavioral profile. Conversely, significant behavioral problems present in 44.0% ($n = 11$) of the control group (1.21 ± 0.488) were entirely absent in the experimental group (3.46 ± 0.169 ; $p = 0.009$), while moderate behavioral problems contracted sharply from 40.0% ($n = 10$) in the control group to only 8.0% ($n = 2$) in the experimental group (1.13 ± 0.517 vs. 3.21 ± 0.216 ; $p = 0.001$). These findings were consistent with El-Monshed, who reported that a structured behavioral nursing intervention in 92 children with ADHD produced highly significant reductions in behavioral severity scores and complete elimination of clinically significant behavioral classifications in the intervention group ($p \leq 0.001$; effect size = 1.548) [5], directly paralleling the categorical behavioral normalization documented in the present study. Meta-analysis of 15 RCTs involving 1,374 pediatric participants, confirmed that nurse-coordinated, parent-inclusive behavioral interventions produced significant categorical shifts from problematic to normative behavioral classifications ($p < 0.05$) [10, 11], corroborating the breadth and magnitude of behavioral improvement observed across all BASC categories in the present study.

Table 5: Comparison of BASC Behavioral Evaluation Between Control and Experimental Groups in Pediatric Patients. ($n = 50$)

BASC Behavioral Evaluation Scale	Control Group			Experimental Group			P-value
	f	%	Mean ± SD	f	%	Mean ±SD	
Average Performance	0	0.0	1.23 ± 0.826	18	72.0	3.30 ± 0.312	0.000

Performance of Child							
Behavior or Within Normal Range	4	16.0	1.01 ± 0.643	5	20.0	3.46 ± 0.418	0.007
At-risk Behavior	10	40.0	1.13 ± 0.517	2	8.0	3.21 ± 0.216	0.001
Significant Behavior	11	44.0	1.21 ± 0.488	0	0.0	3.46 ± 0.169	0.009

Fig. 1 visually confirms that the nurse-led care plan and structured parental education intervention significantly improved sleep quality, nursing care outcomes, and behavioral functioning in hospitalized pediatric patients across all three assessment domains PSQI (1.337 vs. 0.742; $p = 0.014$), NOC (4.024 vs. 1.732; $p = 0.011$), and BASC (3.730 vs. 1.502; $p = 0.023$) directly fulfilling the study's objectives of evaluating the effects of nurse-led care and parental education on sleep quality and behavior modification in pediatric patients.

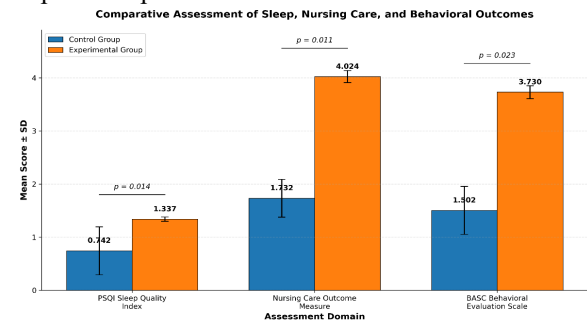


Fig. 1: Overall Comparison of mean scores between control and experimental groups across PSQI Sleep Quality Index, Nursing Care Outcome Measure, and BASC Behavioral Evaluation scale.

4. DISCUSSION AND CONCLUSION

The findings of this study confirmed that the nurse-led care plan and structured parental education intervention produced statistically significant and clinically meaningful improvements across all measured domains of sleep quality, nursing care outcomes, and behavioral functioning in hospitalized pediatric patients, directly addressing all three study objectives. Across all five PSQI sleep domains, the experimental group significantly outperformed the control group at all levels ($p \leq 0.014$), consistent with Ashghab et al., whose meta-analysis of 77 studies

confirmed a large and significant nursing intervention effect on PSQI-measured sleep quality ($p < 0.001$), establishing nurse-led sleep care as one of the most effective non-pharmacological strategies available in clinical practice [10]. The complete elimination of poor nursing care outcomes in the experimental group, which accounted for the majority of the control group alongside a dramatic increase in good and excellent outcome classifications ($p \leq 0.013$), aligned with Ding et al., who similarly reported significantly superior functional and behavioral outcomes in children receiving nurse-led family education compared with those receiving standard care ($p < 0.05$) [8]. The most transformative finding was observed in the BASC behavioral evaluation, where the overwhelming majority of experimental group children achieved normal behavioral functioning, a classification entirely absent from the control group ($p = 0.000$), while severe behavioral problems, which accounted for nearly half of the control group, were completely eliminated in the experimental group ($p = 0.009$). These outcomes paralleled a randomized controlled trial, which reported large-effect-size improvements in behavioral severity and quality of life in children following a structured nursing sleep intervention ($p \leq 0.001$) [13], and were further corroborated by Kamara et al., whose meta-analysis of fifteen RCTs confirmed significant categorical improvements in behavioral outcomes and sleep satisfaction through parent-inclusive nursing interventions ($p < 0.05$) [11]. The significantly superior performance of the experimental group across all three assessment instruments in the overall comparative analysis ($p \leq 0.023$) was consistent with Peng et al., whose parent-based randomized controlled trial demonstrated that structured parental education produced significant improvements in children's sleep behaviors and daily functioning ($p < 0.05$) [14], and with Hodgson et al., whose systematic review of sixteen studies confirmed that family-centered nursing care significantly reduced child anxiety, behavioral disturbance, and parental stress across diverse pediatric inpatient populations [21]. Parental education consistently and significantly improved child sleep outcomes and caregiver satisfaction across twenty-three included studies [17], reinforcing the dual therapeutic role of nurse-led care and empowered parental participation demonstrated in the present study.

In conclusion, this study established that a nurse-led care plan, delivered in conjunction with structured parental education, is a highly effective, evidence-based, and theoretically grounded model for improving sleep quality and facilitating behavioral modification in hospitalized pediatric patients, directly fulfilling the study's objectives. These findings strongly recommend the routine integration of

individualized nurse-led sleep care plans and formal parental education sessions into standard pediatric inpatient nursing protocols, with future research directed toward multi-center replication and longitudinal evaluation of post-discharge behavioral and sleep outcomes.

Author Contributions

Conceptualization, S.M. and M.M.; methodology, S.A., M.M. and S.M.; software, S.A., M.M.; validation, S.M.; formal analysis, S.M. and S.A.; investigation, S.A. and S.M.; resources, S.A.; writing original draft preparation, S.M. and S.A.; supervision, S.M., M.M. All authors have read and agreed to the published version of the manuscript.

Institutional Review Board Statement

The study was conducted in accordance with the Declaration of Helsinki and was approved by the Research and Ethics Committee of the University of Lahore [Protocol Number REC-UOL-1389]. Approval date: April 10, 2025.

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Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Conflicts of Interest

The authors declare no conflict of interest.

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EFFECTS OF NURSE-LED CARE PLAN AND PARENTS' EDUCATION ON SLEEP QUALITY AND BEHAVIOR MODIFICATION IN PEDIATRIC PATIENTS

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