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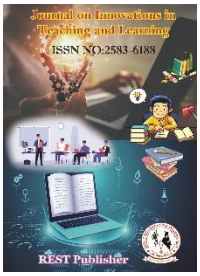

Evaluating Nursing Care Quality Using the Weighted Sum Model

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Abstract: *This study investigates the use of the Weighted Sum Model (WSM) to assess nursing care quality across five units within a healthcare environment. It focuses on four main criteria: Patient Satisfaction, Response Time, Communication Quality, and Staff Availability. By applying the WSM approach, the study offers a thorough and objective evaluation of nursing care performance. The results indicate significant differences in care quality among the units. Unit C stands out with the highest preference score (0.93726) and ranks first overall, particularly excelling in Patient Satisfaction and Response Time, which suggests effective patient-centered practices. Units B and E also perform well, securing the second and third positions respectively, with notable strengths in Communication Quality and Staff Availability. However, the study also identifies areas needing improvement, particularly for Unit D, which has the lowest preference score (0.86914) and shows the most pressing need for enhancement, especially in Response Time. The equal weighting (0.25) given to each criterion ensures a fair evaluation, preventing any single factor from skewing the results. These findings provide valuable insights for healthcare administrators and policymakers, offering a basis for adopting best practices from high-performing units, developing targeted improvement strategies, and optimizing resource allocation. The study demonstrates the effectiveness of the WSM method for evaluating nursing care quality, providing a clear, quantitative framework for comparison and supporting data-driven decisions in healthcare settings. Overall, the research underscores the importance of a comprehensive approach to healthcare quality assessment, taking into account various factors that contribute to effective nursing care. Frequent application of these analytical techniques can promote ongoing enhancements in the standard of nursing care, improving patient outcomes overall satisfaction.*

Keywords: *Nursing Care Quality, Weighted Sum Model (WSM), Healthcare Performance Evaluation, Patient Satisfaction, Healthcare Management.*

1. INTRODUCTION

Nursing care is a cornerstone of the healthcare system, providing essential support to patients across all stages of illness and recovery. Its fundamental goal is to ensure patients receive comprehensive, compassionate, and competent care, tailored to their individual needs. The importance of nursing care in enhancing patient outcomes cannot be overstated, as nurses are often the frontline healthcare providers who interact most frequently with patients, attending to both their physical and emotional requirements, psychological, and social well-being. The concept of nursing care has evolved significantly over the centuries. Historically, nursing was seen as a vocation primarily centered on providing comfort and attending to the physical needs of the ill. Florence Nightingale's work in the 19th century helped shape nursing into a recognized profession, emphasizing the need for proper sanitation, patient observation, and holistic care. Nursing care now includes a broad range of duties, such as advocacy, care coordination, patient education, and clinical skills. Many patient satisfaction tools are not grounded in patient perceptions, which may challenge their validity. This qualitative study explored the concept of good nursing care from the viewpoint of patients, using a convenience sample of 199 hospitalized adults in a public hospital located in the South-Central United States. Through content analysis, five key themes emerged: meeting my needs, treating me kindly, showing care, demonstrating competence, and offering timely care. The primary definition of nursing care is the acts and activities that nurses perform to advance health, fend off disease, restore health, and lessen suffering. This definition underscores the multifaceted role of nursing, which extends beyond administering medications and performing procedures. Effective nursing care requires an understanding of patient needs, the ability to prioritize tasks, and the application of both scientific knowledge and emotional intelligence to foster trust and empathy. Several key elements define quality nursing care, and each plays a vital role in the patient's overall healthcare experience. These elements include patient-centeredness, communication, clinical competence, compassion, and

safety. Patient-centered care is a critical element of nursing that involves recognizing the patient as an individual with unique preferences, values, and needs. It is imperative for nurses to customize their care to meet the individual needs of every patient, involving them in treatment decision-making while honoring their autonomy. By ensuring that the care provided is in line with the patient's objectives and values, this strategy improves patient satisfaction and results in better health. Effective communication is fundamental to nursing care. Nurses are responsible for not only relaying important medical information to patients and their families but also for ensuring that they understand their condition, treatment options, and care instructions. Clear, empathetic communication can alleviate patient anxiety, foster trust, and improve compliance with treatment regimens. Moreover, nurses act as a bridge between patients and other healthcare providers, ensuring that all parties are informed and that the care provided is consistent and coordinated. Clinical competence involves the ability of nurses to apply their technical skills and knowledge to provide safe and effective care. This includes administering medications, performing procedures, monitoring patient conditions, and responding to emergencies. Continuous education and training are essential for nurses to maintain their competence and stay updated on the latest medical advances and evidence-based practices. Clinical competence ensures that nursing care is not only compassionate but also scientifically sound and effective. Compassion is a defining characteristic of nursing care. Nurses often work with patients who are vulnerable, frightened, or in pain. The patient experience can be greatly improved by exhibiting compassion by paying attention to their mental and physical needs, giving comfort, and providing reassurance. Compassionate care fosters a therapeutic nurse-patient relationship that promotes healing and improves patient satisfaction. Ensuring patient safety is paramount in nursing care. Nurses are responsible for monitoring patients for signs of deterioration, preventing errors, and advocating for patient well-being. Safety protocols, such as infection control measures, proper medication administration, and fall prevention strategies, are integral to nursing practice. By prioritizing safety, nurses minimize the risk of complications and adverse events, thereby improving overall patient outcomes. Patient satisfaction is a key indicator of healthcare quality and is closely linked to the quality of nursing care. Nurses are often the primary point of contact for patients throughout their hospital stay or during outpatient visits, and their interactions with patients significantly influence how care is perceived. Research has shown that patients value nurses' responsiveness, competence, and ability to communicate clearly. According to research of McCance et al. (1997), patients value the relationships they have with nurses highly and frequently see signs of concern and care as essential components of high-quality nursing care. Conversely, when patients feel neglected or perceive nurses as rushed or indifferent, their satisfaction with their overall care tends to diminish. Despite the growing pool of instruments designed to measure patient satisfaction with nursing care quality, many of these tools have been developed with little input from patients about what constitutes quality in nursing care. This can lead to issues with data validity, as patients and nurses may define quality nursing care differently and assign different levels of importance to various aspects of care. Furthermore, research has indicated that there is often little, if any, relationship between how patients and nurses perceive nursing care quality. Thus, content validity of patient satisfaction instruments may be questionable when they are not based on qualitative patient data. Despite its importance, nursing care faces a number of difficulties that may have an effect on both the standard of care provided and the nurses' personal health. The study revealed both similarities and differences between these themes and those identified in other qualitative research, as well as in tools developed from patient-derived data. The findings offer insights for healthcare providers, administrators, and researchers, with implications for enhancing patient care quality and satisfaction**.** This qualitative, descriptive study explored dimensions of nursing care quality from the patient's viewpoint, comparing and contrasting these dimensions with findings from other qualitative studies on patient definitions of quality, as well as with selected tools measuring patient satisfaction in hospital settings. Patient-perceived quality is a subjective and evolving assessment of how well expected health care services are delivered. Some of the most prominent challenges include staffing shortages, burnout, emotional labor, and the increasing complexity of healthcare needs. The persistent shortage of nurses is one of the biggest issues facing the nursing profession. Staffing shortages can lead to increased workloads, longer shifts, and higher levels of stress for nurses. These conditions can, in turn, negatively affect the quality of patient care, as overworked nurses may struggle to maintain the high standards required for safe and compassionate care. Short staffing can also lead to longer response times, reduced time for patient education, and an overall decrease in patient satisfaction. Nurses frequently experience burnout, especially those who work in high-stress settings like intensive care units or emergency rooms. The emotional and physical demands of nursing, combined with factors such as staffing shortages and high patient acuity, can contribute to burnout. Burnout not only affects nurses' mental health but also the quality of care they provide, as exhausted and disengaged nurses may be more prone to errors and less able to offer the compassion and empathy that patients need. Because they have to balance their personal emotions while supporting patients and families through trying times, nurses commonly work in emotionally taxing environments. This emotional labor can be exhausting, particularly when nurses are exposed to suffering, death, and family distress on a regular basis. Emotional exhaustion can lead to compassion fatigue, where nurses become detached and struggle to provide the level of care that patients expect. The increasing complexity of healthcare needs presents another challenge for nurses. With advances in medical technology and treatments, patients are living longer and often present with multiple chronic conditions. This requires nurses to have a broader range of knowledge and skills, as well as the ability to coordinate care across various specialties and services. The complexity of care also demands greater attention to detail and a more collaborative approach to ensure that patients receive the comprehensive care they need. It is anticipated that continuing improvements in medical technology, modifications to healthcare delivery models, with changing patient expectations will influence nursing care in the future. Nurses will need to continue developing their skills in areas such as telehealth, data management, and patient education to meet the needs of a changing healthcare landscape. Technology will play an increasingly

prominent role in nursing care, from electronic health records (EHRs) to telehealth services. Nurses must be proficient in using these technologies to provide efficient, accurate, and patient-centered care. EHRs, for example, can streamline documentation and improve communication among healthcare providers, while telehealth can expand access to care for patients in remote or underserved areas. However, nurses must also be mindful of the potential drawbacks of technology, such as depersonalization of care or increased reliance on electronic systems at the expense of direct patient interaction. As healthcare delivery models continue to shift toward more integrated and patient-centered approaches, the role of nurses is expected to expand. Patient satisfaction with care has been acknowledged as a significant health care outcomes indicator since at least 1988, and newer quality models have included it as a crucial component. Patient satisfaction has been more and more important as a key quality indicator within the last ten years. While there are an increasing number of tools available to measure patient satisfaction with nursing care quality, many have been created with minimal input from patients on what defines quality in nursing care. This can lead to compromised data validity, as patients and nurses often have different definitions of nursing care quality and prioritize its aspects in different ways. Additionally, research has shown that there is often little to no correlation between how patients and nurses view the quality of nursing care. Nurses will increasingly take on leadership roles in care coordination, patient education, and health promotion. In underprivileged communities where there is a physician shortage, advanced practice nurses and nurse practitioners may be more involved in delivering primary care services. Additionally, nurses will be key players in population health management, helping to prevent disease and manage chronic conditions on a larger scale. A vital part in the healthcare system, nursing care has a major impact on patient outcomes and the standard of care provided overall. Patient satisfaction is directly impacted by the essential components of nursing care, which are clinical competence, safety, patient-centeredness, effective communication, and compassion. As the demands on nurses continue to evolve due to staffing shortages, burnout, emotional labor, and increasingly complex healthcare needs, it is vital that the nursing profession adapts to these challenges while maintaining the high standards of care that patients expect. Future advancements in healthcare technology and the changing dynamics of healthcare delivery models will also shape the role of nursing. Nurses will need to expand their expertise in technology integration, telehealth, and data management while taking on leadership roles in care coordination and patient education. In an increasingly complicated healthcare environment, their capacity to adjust to such changes will be essential to their ability to deliver patient-centered care. Ultimately, the future of nursing care depends on the profession's ability to meet these challenges head-on while preserving the compassionate, patient-focused approach that lies at the heart of nursing. Nursing care will continue to be essential to improving patient outcomes and raising the standard of healthcare by putting the needs of the patient first, developing strong nurse-patient relationships, while embracing technological with educational improvements. As a result, the content validity of a patient satisfaction instrument is questionable when the items are not based on qualitative data from patients. In the primary study, quantitative data on patient satisfaction were gathered using a modified version of a nursing care subscale from an instrument with well-established psychometric properties. Following this, patients were interviewed to provide their own descriptions of "good nursing care." These interviews took place in the patient's room shortly before their hospital discharge. One-third of the patients viewed displays of personal care from the nurse as essential to good nursing care. Fewer patients emphasized the importance of competence and providing timely care. Healthcare quality remains a topic of significant criticism and ongoing debate. Despite the crucial role that quality nursing care plays in patient outcomes and safety, progress toward meaningful improvements has been alarmingly slow. A review of the literature on quality care highlights that practicing nurses are seldom included in the development or definition of programs aimed at improving nursing care quality. Consequently, this study was based on two key premises: that quality nursing care must hold significance and relevance for nurses, and that understanding nurses' perspectives on what constitutes quality care could lead to more effective approaches for improvement. This article examines recent initiatives and challenges related to identifying nursing-sensitive performance measures. It explores various approaches to evaluating nursing care performance, along with the conceptual, methodological, and practical difficulties involved in such assessments. The National Quality Forum (NQF)'s (national voluntary consensus standards) support is highlighted in the article along with other recent attempts to gauge the caliber of nursing care provided. Additionally, it discusses the growing body of evidence in this field and its implications for future consensus standards development in nursing care quality.

2. METHODOLOGY

Since nursing care quality directly affects outcomes for patients, satisfaction, and general well-being, it is imperative to evaluate it in healthcare settings. A variety of instruments and approaches have been created over time to assess the caliber of nursing care. One such method, the Weighted Product Method (WPM), has gained recognition for its ability to systematically assess multiple criteria in decision-making processes. The WPM is a multi-criteria decision-making (MCDM) method that weighs each criterion according to its importance and uses it to evaluate alternatives. In the context of nursing care, the WPM can be effectively applied to assess and compare different care units, policies, or individual nurses by evaluating multiple parameters that contribute to the overall quality of care. The WPM method relies on a comparative analysis of alternatives using both benefit and non-benefit criteria. Benefit criteria represent factors where higher values indicate better performance, such as patient satisfaction, response time, or staff availability. Non-benefit criteria, on the other hand, are factors where lower values signify better outcomes, such as the number of patient complaints, nurse burnout rate, or instances of medication errors. Through a structured analysis, the WPM assigns a weight to each criterion based

on its perceived importance, allowing for a comprehensive evaluation that accounts for both the quality of care provided and the operational efficiency of the nursing team. One of the key advantages of the WPM method is its flexibility in accommodating a range of evaluation parameters, both qualitative and quantitative. Because patient satisfaction is subjective and the nursing environment is dynamic, evaluating the quality of treatment can be challenging. However, the WPM method simplifies this process by transforming these diverse factors into measurable units, making it possible to quantify patient feedback and operational metrics into a unified framework. For example, patient satisfaction can be measured on a scale from one to ten, reflecting the degree to which patients feel their needs have been met by nursing staff. Similarly, operational factors such as response times, staff availability, and error rates can be measured using numerical scales that allow for easy comparison between different alternatives. A set of possibilities is evaluated in accordance with a number of criteria in a typical WPM application in nursing care. For instance, in a hospital setting, different nursing care units could be evaluated based on factors such as patient satisfaction, the effectiveness of communication, response time to patient calls, the availability of nursing staff, the frequency of complaints, nurse burnout rates, medication errors, and patient waiting times. Each of these parameters is assigned a weight according to its importance in determining the overall quality of care. These weights are determined by expert judgment, patient feedback, or based on existing research that highlights the critical elements of effective nursing care. The efficacy of each alternative used in the WPM process is calculated by multiplying the normalized numbers that satisfy the needs for each unit by the associated weights after the criteria and weights have been established. The process of calculating the normalized values involves dividing each alternative's performance score by either the best alternative's score in the context of benefit criteria or the worst alternative's score in the case of non-benefit criteria. This process ensures that the analysis is fair and that each alternative is evaluated in relation to the best and worst possible performances within the given dataset. The application of the WPM method in nursing care allows for a more objective evaluation of the quality of care delivered. It provides healthcare administrators and policymakers with a clear picture of how different care units or nursing staff are performing based on multiple parameters, facilitating better decision-making and resource allocation. For instance, if one nursing care unit consistently outperforms others in terms of patient satisfaction and operational efficiency, it might be used as a model for implementing best practices across other units. Conversely, if a particular unit demonstrates high levels of medication errors or patient complaints, targeted interventions can be introduced to address these issues. Moreover, the WPM method encourages transparency in the evaluation process, as it requires decision-makers to explicitly define the criteria and weights used in the analysis. This transparency is particularly important in healthcare settings, where the quality of nursing care has direct implications for patient safety and satisfaction. By making the evaluation process more transparent, the WPM method helps to ensure that decisions regarding nursing care improvements are based on measurable and well-defined criteria, rather than subjective judgments. One of the challenges associated with applying the WPM method in nursing care evaluation is the need for accurate and comprehensive data collection. The method relies on the availability of reliable data regarding both benefit and non-benefit criteria. In some cases, gathering this data may require extensive surveys, patient interviews, and operational monitoring. For example, patient satisfaction, a critical benefit criterion, may need to be assessed through detailed surveys conducted shortly before discharge, while operational metrics like response times and medication errors may require access to electronic health records and incident reports. Despite these challenges, the value of having a structured and quantitative evaluation process far outweighs the complexity of data collection. Another potential limitation of the WPM method is the subjectivity involved in assigning weights to the different criteria. While expert judgment and research findings can guide the weight assignment process, there remains an element of subjectivity in determining which aspects of nursing care are more important than others. For example, one healthcare administrator may prioritize patient satisfaction as the most critical factor, while another might focus more on operational efficiency or error rates. To mitigate this subjectivity, it is essential to involve a diverse group of stakeholders in the weight assignment process, including patients, nurses, administrators, and healthcare researchers. This ensures that the evaluation reflects a balanced perspective that takes into account both patient-centered and operational considerations. Despite these limitations, the WPM method remains a powerful tool for evaluating nursing care quality. Its ability to incorporate multiple criteria into a single, unified analysis makes it particularly well-suited for complex healthcare environments where decisions need to account for both patient experiences and operational performance. By providing a structured and transparent framework for decision-making, the WPM method can help healthcare organizations identify areas for improvement, allocate resources more effectively, and ultimately deliver higher-quality care to patients. The application of the Weighted Product Method in nursing care evaluation offers a robust approach to assessing the quality of care across multiple dimensions. It enables healthcare administrators to make data-driven decisions that account for both patient satisfaction and operational efficiency, leading to better outcomes for patients and more efficient use of resources. While challenges exist in data collection and weight assignment, the benefits of using a structured, transparent, and quantitative method for evaluating nursing care quality make the WPM an invaluable tool for healthcare organizations striving to improve patient care. Patient satisfaction with nursing care has been recognized as the most significant predictor of overall satisfaction with hospital care and a key objective of any healthcare system. Subsequent investigations ought to assess the nursing care offered in several institutions, both public and private. Although nursing satisfaction itself is not directly measured, the overall measure includes aspects such as total nursing care hours (including care from nonprofessional staff) and the availability of professional nursing care. Patient satisfaction has become a well-established indicator of healthcare quality; however, despite numerous quantitative studies, there is limited theoretical foundation for this critical concept. Analyzing patient satisfaction, particularly in the context of modern nursing care, offers a valuable perspective for examining this measure of healthcare quality more closely. A review of the literature is presented, followed by an

exploration of professional knowledge and the common sources and defining characteristics frequently cited. Empirical references, definitions, and measures associated with the antecedents and outcomes of the concept are also discussed. The analysis concludes with a critical examination of the assumptions underlying the patient satisfaction literature, and offers insights into the role of patient satisfaction in nursing care for future research. For the perspective of nurses, this study offers a thorough comprehension of high-quality nursing care. The study forming the basis of this thesis was conducted as an initial effort to investigate the perspectives of hospitalized patients regarding the nursing care they receive. The WASPAS method combines two well-known decision-making processes to increase accuracy when compared to current multi-criteria decision-making (MCDM) strategies: The Weighted Sum Method (WSM) and the Weighted Product Method (WPM). Several sustainability evaluations have employed equal weighting and a weighted sum model (WSM) to show equal importance among sustainability variables. Using equal weights is often preferred as a baseline to reduce bias. However, Multi-Criteria Decision-Making (MCDM) methods, such as WSM, the weighted product model (WPM), and the analytic hierarchy process (AHP), introduce some subjectivity, as weights reflect preferences toward specific indicators. In this chapter, we explore two simple MCDM approaches: the weighted sum method and the weighted product method. In the weighted sum method, an alternative's score is calculated as the sum of its evaluation scores, weighted by the importance of each attribute. The performance scores are multiplied by the weighted product method, in contrast, where each score is increased to the power of the associated attribute weight. Subscales for expertise and ranking are commonly computed using the weighted sum approach. The WSM filter utilizes real-valued weights to apply standard filtering properties. Additionally, it optimizes the additive parameter by minimizing output variance. The initial step in the WSM method is normalization. This process necessitates the application of consistent identification conventions to minimize random errors that may arise from using multiple identities. Prioritizing options and determining the relative value of each criterion are done using the WSM technique.

3. ANALYSIS AND DISCUSSION

TABLE.1. Nursing care

Nursing Care Unit	Patient Satisfaction	Response Time	Communication Quality	Staff Availability
Unit A	8.500	9.000	8.000	9.500
Unit B	7.800	8.500	7.000	8.800
Unit C	9.200	9.300	8.700	9.000
Unit D	8.000	7.500	8.500	8.700
Unit E	8.700	8.000	7.800	8.500

The table presents normalized data for five nursing care units (A to E) evaluated using the Weighted Sum Model (WSM) method. Four benefit criteria were used: Patient Satisfaction, Response Time, Communication Quality, and Staff Availability. Each of these parameters reflects key performance aspects of nursing care, aiming to assess overall quality and responsiveness. Unit C stands out with the highest scores across most parameters, including the highest Patient Satisfaction (9.200), Response Time (9.300), and a high Communication Quality (8.700), indicating superior performance. Unit A also performs well, particularly in Communication Quality (9.500) and Staff Availability (9.000), showing strength in patient interaction and resource management. On the other hand, Unit D has the lowest score in Response Time (7.500), which may indicate delays in patient care. Meanwhile, Unit B, although scoring reasonably in Communication Quality (7.000) and Staff Availability (8.800), appears less competitive overall compared to others. Unit E shows moderate performance, with balanced but not outstanding scores in all categories, making it a reliable but not leading unit. This table reveals variations in the service quality of the units, where certain areas of improvement are identified, particularly in Response Time and Communication Quality for specific units.

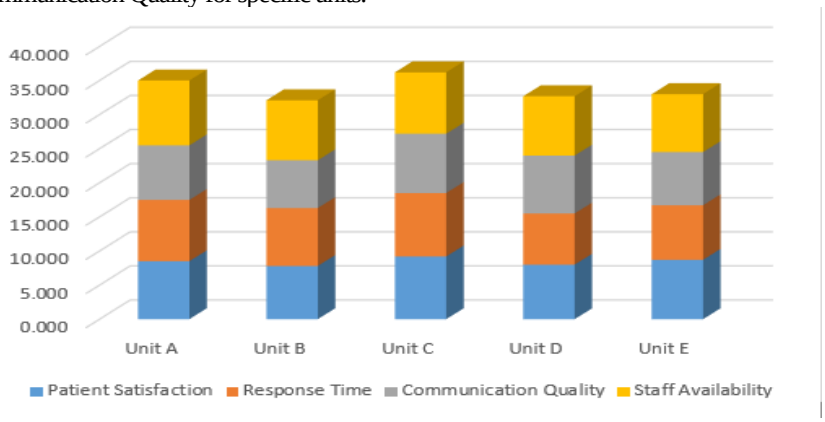

FIGURE 1. Nursing Care

Figure 1 depicts the normalized scores of five nursing care units (A to E) across four key parameters: Patient Satisfaction, Response Time, Communication Quality, and Staff Availability, using the Weighted Sum Model (WSM) method. Each unit's total performance is represented as a stacked bar, showcasing the contribution of each parameter to the overall score. Unit C exhibits the highest overall score, with strong contributions from Patient Satisfaction and Response Time, indicating that this unit excels in timely responses and ensuring patient contentment. Unit A follows closely, with Staff Availability playing a significant role in its high score, demonstrating that this unit has ample staff resources available to meet patient needs. Unit B, while performing comparably well in Staff Availability, lags behind in Response Time, which lowers its total score. Unit D has the most balanced scores across the four parameters, but its relatively lower Response Time negatively impacts its total performance. Unit E also shows a consistent, middle-tier performance across all parameters, without any particular area of exceptional strength or weakness. The visual comparison underscores the relative strengths and areas for improvement within each unit, highlighting Response Time as a key area of concern, particularly for Units B and D, compared to the stronger performers like Unit C.

TABLE 2. Normalized Data

Normalized Data				
Nursing Care Unit	**Patient Satisfaction**	**Response Time**	**Communication Quality**	**Staff Availability**
Unit A	0.92391	0.96774	0.87500	0.89474
Unit B	0.84783	0.91398	1.00000	0.96591
Unit C	1.00000	1.00000	0.80460	0.94444
Unit D	0.86957	0.80645	0.82353	0.97701
Unit E	0.94565	0.86022	0.89744	1.00000

Table 2 shows the normalized performance data for five nursing care units (A to E) across four key indicators: Patient Satisfaction, Response Time, Communication Quality, and Staff Availability, using the Weighted Sum Model (WSM). The scores range from 0 to 1, where 1 represents the highest performance in each category. Unit C stands out, achieving perfect scores of 1.000 in both Patient Satisfaction and Response Time, making it the top performer in these areas. However, its lower score in Communication Quality (0.80460) suggests there is room for improvement in patient interactions. Unit A performs well across the board, especially in Response Time (0.96774), reflecting its efficiency in handling patient needs. However, its scores in Communication Quality (0.87500) and Staff Availability (0.89474) indicate that there could be improvements in patient communication and staff resources. Unit B leads in Communication Quality with a perfect score (1.00000), but its Response Time score (0.91398) is lower, indicating slight delays in attending to patients. Units D and E show balanced performance. Unit D's weakest area is Response Time (0.80645), while Unit E excels in Staff Availability (1.00000) and performs well in Communication Quality (0.89744). Both units could benefit from further improvements, particularly in response times.

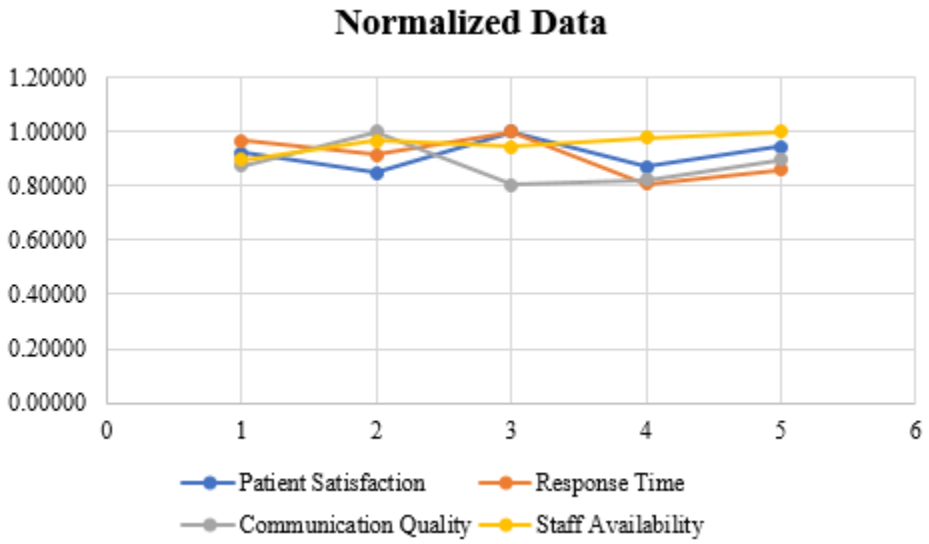

FIGURE 2. Normalized Data

Figure 2 displays the normalized performance data for five nursing care units (A to E) across key indicators using the Weighted Sum Model (WSM). The horizontal stacked bars show the proportionate contribution of Patient Satisfaction, Response Time, Communication Quality, and Staff Availability to the overall performance, with each unit's total score reaching 100%. Unit E performs strongly, particularly in Staff Availability and Communication Quality, contributing to its high overall rating. Unit D presents a fairly balanced performance, although Response Time is a weaker point, reflecting potential delays in service delivery. Unit C excels in

Patient Satisfaction and Response Time, but its score in Communication Quality is comparatively lower, as shown by the smaller section of the bar. On the other hand, Unit B stands out in Communication Quality but is slightly held back by a reduced score in Response Time. Unit A shows a well-rounded performance, with Staff Availability contributing significantly to its overall score. However, there is room for improvement in Communication Quality to further boost its standing. This chart provides a clear comparison of each unit's strengths and areas for improvement, with Response Time and Communication Quality emerging as key factors for enhancement, particularly for Units D and B.

TABLE. 3 Weight

Weight			
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25

This table appears to be titled "Weight" and is likely part of a larger analysis using the Weighted Sum Model (WSM) method. The table consists of a 5x4 grid, with each cell containing the value 0.25. This uniform distribution of weights suggests an equal importance assigned to multiple criteria or factors in some decision-making or evaluation process. In the context of WSM, these weights would typically be applied to different attributes or alternatives to calculate an overall score. The fact that all weights are equal (0.25) indicates that each criterion is considered equally important in this particular analysis. This approach ensures that no single factor dominates the decision-making process, potentially leading to a more balanced evaluation of alternatives or options being considered.

TABLE 4. Weighted Normalized Decision Matrix

Nursing Care Unit	Patient Satisfaction	Response Time	Communication Quality	Staff Availability
Unit A	0.23	0.24	0.22	0.22
Unit B	0.21	0.23	0.25	0.24
Unit C	0.25000	0.25000	0.20115	0.23611
Unit D	0.21739	0.20161	0.20588	0.24425
Unit E	0.23641	0.21505	0.22436	0.25000

Table 4 displays the weighted normalized decision matrix for five nursing care units (A to E), evaluated based on Patient Satisfaction, Response Time, Communication Quality, and Staff Availability using the Weighted Sum Model (WSM). The values reflect the weighted influence of each criterion on the overall performance of the units. Unit C achieves top scores in Patient Satisfaction and Response Time (both 0.25000), reflecting its strong performance in these areas. However, it falls behind in Communication Quality (0.20115), suggesting the need for improvement in patient communication. Unit B stands out in Communication Quality (0.25000) and Staff Availability (0.24000), indicating a focus on patient interaction and resource availability. Nevertheless, its slightly lower scores in Patient Satisfaction (0.21000) and Response Time (0.23000) indicate room for growth in these areas. Unit E maintains a consistent performance across all indicators, with the highest Staff Availability score (0.25000) and solid results in Patient Satisfaction and Communication Quality, making it a well-rounded unit with sufficient staffing. Unit D shows a balanced overall performance, but its lower Response Time score (0.20161) highlights potential delays in patient care. Overall, the table reveals each unit's strengths and weaknesses, emphasizing areas such as responsiveness and communication that need improvement for some units.

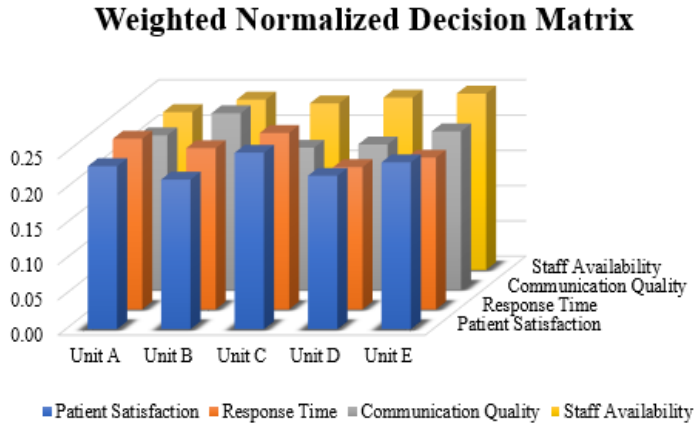

FIGURE 3. Weighted Normalized Decision Matrix

Figure 3 illustrates a Weighted Normalized Decision Matrix using the Weighted Sum Model (WSM) method, comparing the performance of five units (A through E) across four key criteria: Patient Satisfaction, Response Time, Communication Quality, and Staff Availability. Each criterion is represented by a distinct color in a stacked bar format, offering a clear visual comparison between the units. The y-axis ranges from 0 to 1.00, showing that the values are normalized, with each unit's total score adding up to 1. This normalization ensures an equitable comparison across units, regardless of the original scale of each criterion. The weighted values indicate that different levels of importance might have been assigned to each criterion in the overall evaluation. Looking at the bars, variations in performance across the units are evident. For instance, Unit D has the highest score in Staff Availability but scores lower in the other categories. Unit C excels in Patient Satisfaction and Response Time. Most units exhibit a relatively balanced distribution of colors, indicating consistent performance across the different criteria without any single aspect overwhelmingly dominating. This visual representation allows decision-makers to quickly evaluate the strengths and weaknesses of each unit across multiple criteria. It provides a comprehensive overview of performance, enabling data-driven decisions and highlighting areas where each unit could potentially improve.

TABLE 5. Preference Score & Rank

Nursing Care Unit	Preference Score	Rank
Unit A	0.91535	4
Unit B	0.93193	2
Unit C	0.93726	1
Unit D	0.86914	5
Unit E	0.92583	3

Table 5 displays the Preference Scores and corresponding Ranks for five nursing care units (A to E) using the Weighted Sum Model (WSM). The preference scores, which range from 0 to 1, reflect each unit's overall performance based on multiple evaluation criteria, with higher scores indicating superior performance. The rank denotes each unit's relative position, with 1 representing the highest performance. Unit C achieves the highest preference score of 0.93726, securing the top rank, which signifies that it excels compared to the other units based on the weighted criteria. This suggests that Unit C is the most efficient or comprehensive nursing care unit. Unit B is ranked second with a preference score of 0.93193, indicating strong performance but falling just short of Unit C. Unit E, with a preference score of 0.92583, is ranked third, showing commendable performance but not quite reaching the level of the top two units. Unit A is in fourth place with a preference score of 0.91535, reflecting solid performance but weaker compared to Units B and C. Finally, Unit D, with the lowest preference score of 0.86914, is ranked fifth. This lower score indicates that Unit D might need improvements across various criteria to enhance its performance relative to the other units. In summary, Unit C stands out as the top performer, while Unit D is identified as needing the most improvement.

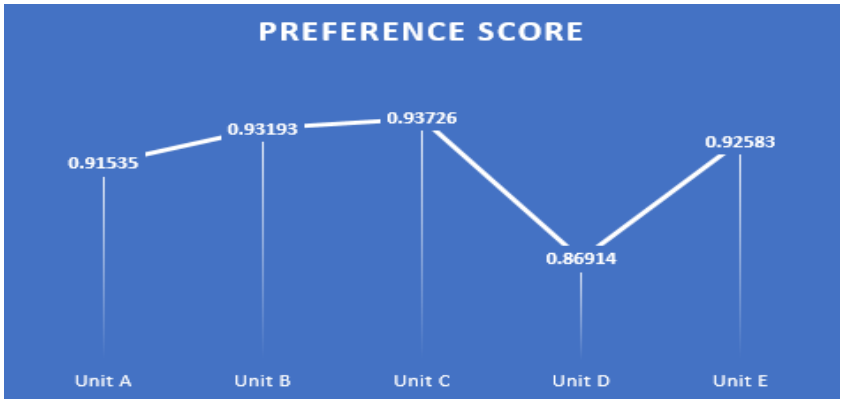

FIGURE 4. Preference score

Figure 4 shows a preference score analysis using the Weighted Sum Model (WSM) for five units (A to E). The line chart illustrates the preference scores for each unit, facilitating a straightforward comparison of their relative performance or desirability. The scores range from approximately 0.87 to 0.94, indicating that the preferences are quite high and closely grouped across the units. With an overall score of 0.93726, Unit C has the highest score and follows closely by Unit B, which has a rating of 0.93193. Unit A is third with a score of 0.91535. Unit D shows a marked decline, with the lowest score of 0.86914, suggesting it may be the least favored. Unit E has a score of 0.92583, placing it fourth overall. This chart effectively highlights the relative standing of each unit according to the WSM analysis. The narrow range among the top units (C, B, A, and E) indicates that they are all strong performers, with only minor differences in preference. The more pronounced gap for Unit D suggests it may need enhancements to be

more competitive with the others. The graph offers decision-makers a clear, quantitative foundation for comparing and ranking the units, which can assist in making informed choices about resource allocation, improvement strategies, or other strategic decisions.

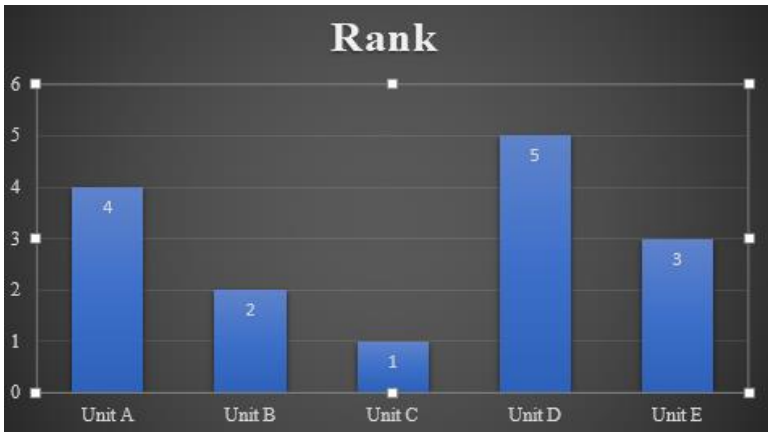

FIGURE 5. Rank

The results for each of five units (A through E) utilizing using Weighted Sum Model (WSM) approach are displayed in Figure 5. The bar graph visually represents how each unit ranks relative to the others, with lower ranks indicating better performance. Unit C leads as the top performer with a rank of 1, suggesting it excels across the weighted criteria in the WSM analysis. Unit B is close behind with a rank of 2, demonstrating strong performance but slightly trailing Unit C. Unit E is in the middle with a rank of 3, reflecting average performance within the group. Unit A ranks 4th, indicating it performs slightly below average. The most significant finding is Unit D, which ranks 5th, signifying it underperforms compared to the other units. This ranking system provides a clear comparison of the units' overall performance, considering various weighted factors. It allows decision-makers to quickly identify top performers (Units C and B) and areas needing improvement (particularly Unit D). The graph effectively conveys each unit's relative standing, supporting data-driven decisions for resource allocation, strategic planning, or targeted improvement initiatives.

4. CONCLUSION

Based on a thorough analysis of nursing care quality using the Weighted Sum Model (WSM) method, several key insights can guide improvements in healthcare delivery. The study assessed five nursing care units (A to E) based on four critical criteria: Patient Satisfaction, Response Time, Communication Quality, and Staff Availability. The results reveal notable differences in performance among the units, with Unit C consistently emerging as the best performer. Unit C achieved the highest preference score (0.93726) and ranked first overall, excelling particularly in Patient Satisfaction and Response Time. This indicates that Unit C has effectively implemented practices that prioritize patient needs and efficient care delivery. Units B and E also showed strong performance, ranking second and third, respectively. Their high scores in Communication Quality and Staff Availability reflect a focus on effective patient interaction and resource management. However, there is room for improvement in certain areas, such as Response Time for Unit B. Unit A performed well in Staff Availability but showed room for improvement in Communication Quality, highlighting the need for a balance between resource allocation and effective patient communication strategies. Unit D, with the lowest preference score (0.86914), presents the most significant opportunity for improvement. Its performance, especially in Response Time, indicates a need for targeted interventions to enhance efficiency and patient care quality. The equal weighting (0.25) assigned to each criterion in the WSM analysis ensures a balanced evaluation of nursing care quality, preventing any single factor from skewing the assessment. This approach provides a comprehensive view of each unit's strengths and weaknesses. These findings offer valuable insights for healthcare administrators and policymakers. They can use this data to: Identify best practices from high-performing units like Unit C and implement them across other units. Develop targeted strategies for areas needing improvement, such as Response Time in Unit D. Allocate resources more effectively based on each unit's specific needs and performance gaps. Implement training programs focused on enhancing Communication Quality and Response Time across all units. In summary, this analysis highlights the effectiveness of the WSM method in evaluating nursing care quality. By providing a clear, quantitative basis for comparison, it supports data-driven decision-making in healthcare settings. Regular application of such analytical methods can foster continuous improvement in nursing care quality, leading to better patient

outcomes and satisfaction. The research highlights the significance of employing a thorough methodology in evaluating healthcare quality, taking into account several aspects that influence the provision of efficient nursing care.

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