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Research Article

The Role of Nursing Care in Enhancing Clinical Outcomes and Treatment Effectiveness

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Abstract:

Nursing care plays a central role in translating medical treatments into real-world patient benefits by providing continuous assessment, timely interventions, and individualized support that optimize physiological recovery and reduce complication rates. Through systematic monitoring, early detection of deterioration, and prompt implementation of evidence-based nursing interventions, nurses help prevent avoidable adverse events such as infections, pressure injuries, and medication errors—directly improving morbidity and mortality statistics. Moreover, nurses act as care coordinators who bridge gaps among multidisciplinary teams, ensuring that treatment plans are communicated clearly, adjusted based on patient response, and implemented consistently across settings, which enhances treatment fidelity and overall effectiveness. Beyond direct clinical tasks, nursing

Nurse Staffing

contributes substantially to patient-centered outcomes by delivering education, psychosocial support, and self-management coaching that promote adherence to treatment regimens and lifestyle modifications. Effective patient education and engagement foster understanding of therapeutic goals, medication schedules, and warning signs, which reduces readmissions and improves long-term disease control. Additionally, nursing workforce factors—such as staffing levels, skill mix, and continuing professional development—shape the quality and consistency of care; investments in these areas strengthen nurses' capacity to apply best practices and innovate in care delivery, ultimately amplifying the impact of treatments on patient outcomes and health system performance.

1. Introduction

The contemporary healthcare landscape is a complex and dynamic ecosystem, characterized by rapid technological advancements, sophisticated pharmacological interventions, and cutting-edge diagnostic tools. At the heart of this system, however, lies a constant and irreplaceable human element: nursing care. While the brilliance of medical science often captures the spotlight, it is the vigilant, compassionate, and skilled presence of the nurse that forms the bedrock upon which positive patient outcomes are built. The research question central to this paper is to critically examine and elucidate the multifaceted role of nursing care in directly enhancing clinical outcomes and overall treatment effectiveness across diverse healthcare settings. This paper posits that nursing is not merely a supportive or ancillary service but is, in fact, a primary driver of patient safety, recovery, and long-term health success.

The definition of nursing, as articulated by the American Nurses Association, describes it as "the protection, promotion, and optimization of health and abilities, prevention of illness and injury, alleviation of suffering through the diagnosis and treatment of human response, and advocacy in the care of individuals, families, communities, and populations" [1]. This broad definition underscores the profession's holistic scope, which extends far beyond the simple administration of physician-prescribed treatments. Nursing care is an integrative force, weaving together the technical aspects of medicine with the psychological, emotional, and social needs of the patient. In an era where healthcare is increasingly fragmented into specializations, the nurse often serves as the patient's primary point of continuity, the coordinator of care, and the most consistent advocate throughout the healthcare journey [2].

The importance of investigating this role has never been more critical. Healthcare systems worldwide are grappling with challenges such as rising costs, an increasing prevalence of chronic diseases, aging populations, and concerns about patient safety and quality of care. Within this context, demonstrating the tangible value of nursing is essential for strategic planning, resource allocation, and policy development. A robust body of evidence has begun to quantify this value, linking specific nursing interventions and better nurse staffing ratios to reduced rates of hospital-acquired infections, lower patient mortality, decreased medication errors, and shorter lengths of hospital stay [3, 4]. This paper will synthesize this evidence, arguing that investing in high-quality nursing care is not only an ethical imperative but also a strategic one, leading to more efficient, effective, and sustainable healthcare delivery.

To fully appreciate the role of nursing, one must first understand the evolution of its professional identity. From the foundational work of Florence Nightingale, who demonstrated through empirical observation that environmental factors and dedicated care significantly reduced mortality rates during the Crimean War, nursing has steadily progressed towards a recognized, evidence-based profession [5]. The 20th and 21st centuries have seen the development of specialized nursing roles, advanced practice degrees (e.g., Nurse Practitioners, Clinical Nurse Specialists), and the formal integration of nursing theories and models into practice. This professional evolution has empowered nurses to move from a task-oriented role to one that is knowledge-based, autonomous, and central to clinical decision-making processes [6].

The concept of "clinical outcomes" itself is multidimensional. Traditionally, outcomes were measured in narrow, biomedical terms such as mortality, morbidity, or readmission rates. While these remain crucial indicators, the modern understanding of outcomes has expanded to include patient-centric measures. These include patient satisfaction, health-related quality of life (HRQoL), functional status, adherence to treatment plans, and the patient's experience of care [7]. It is within this broader spectrum that nursing's impact is most profoundly felt. For instance, a nurse's skillful patient education can dramatically improve a diabetic patient's self-management and adherence to medication, thereby preventing complications (a clinical outcome) and improving their daily quality of life (a patient-reported outcome) [8]. Similarly, a

nurse's therapeutic communication can alleviate anxiety and build trust, which in turn can positively influence a patient's perception of their care and their willingness to engage in treatment.

Furthermore, the mechanism through which nursing enhances treatment effectiveness is multifaceted. It can be conceptualized through several key functions:

1. Surveillance and Prevention of Complications: Nurses are the frontline guardians of patient safety. Through continuous assessment and monitoring, they are often the first to detect subtle signs of clinical deterioration, such as sepsis or respiratory distress, enabling early intervention that can prevent catastrophic outcomes [9]. Their meticulous adherence to protocols for hygiene, wound care, and central line management is the single most important factor in preventing hospital-acquired infections [10].

2. Medication Management and Safety: Nurses are responsible for the safe administration of medications, a complex process involving right patient, right drug, right dose, right route, and right time. Their role includes double-checking orders, assessing for potential adverse reactions and drug interactions, and educating patients on their medication regimen, thereby ensuring that the intended therapeutic effect is achieved while minimizing harm [11].

3. Patient Education and Empowerment: A treatment plan can only be effective if the patient understands and is able to follow it. Nurses translate complex medical jargon into understandable language, teach self-care skills, and provide the motivational support necessary for patients to adopt behavioral changes. This is particularly vital in the management of chronic diseases like heart failure, COPD, and hypertension, where effective daily management determines long-term success [12].

4. Care Coordination and Advocacy: Nurses act as the communication hub between physicians, pharmacists, physical therapists, social workers, and the patient and their family. They ensure that all members of the healthcare team are working from a unified plan and that the patient's voice is heard. This coordination prevents errors, reduces duplication of services, and ensures a seamless transition between care settings [13].

5. Provision of Psychosocial and Emotional Support: Illness is a profoundly human experience fraught with fear, uncertainty, and vulnerability. The compassionate presence of a nurse provides comfort, reduces stress, and fosters a healing environment. This psychosocial support is not a mere luxury; evidence suggests that reduced anxiety and depression can positively influence physiological parameters like immune function and pain perception, thereby directly contributing to recovery [14].

This paper will delve into these mechanisms, providing a detailed analysis of the empirical evidence that supports the critical nexus between nursing interventions and improved patient outcomes. It will explore these themes across various clinical contexts, including acute hospital care, primary care, and chronic disease management. By synthesizing findings from recent scholarly literature, this research aims to provide a comprehensive and unequivocal argument for recognizing nursing care as a fundamental, non-negotiable component of effective healthcare delivery. The ultimate conclusion is that any strategy aimed at enhancing clinical outcomes and treatment effectiveness must necessarily include a foundational investment in the nursing workforce—their education, their working conditions, and their empowerment as full partners in the healthcare team.

Nursing Interventions to Treatment Effectiveness:

To comprehend how nursing care translates into enhanced treatment effectiveness and superior clinical outcomes, it is essential to move beyond observational studies and establish a robust conceptual framework. This framework delineates the primary mechanisms through which nursing actions directly and indirectly influence the patient's journey toward health. The model posits that nursing interventions are not a monolithic entity but rather a synergistic combination of distinct yet interconnected processes. These processes function through both clinical/technical pathways and psychosocial/humanistic pathways, ultimately converging to ensure that a prescribed medical treatment achieves its maximum potential efficacy. This conceptualization is crucial for validating nursing's contribution as a science and for designing targeted interventions that can be measured and optimized [14].

The first and most direct mechanism is the Execution and Safety Assurance of the Treatment Plan. This is the foundational pillar linking nursing to treatment effectiveness. A physician's diagnostic and therapeutic plan remains an abstract concept until it is accurately and safely implemented at the patient's bedside. This execution is the core responsibility of the nursing profession.

It encompasses the precise administration of medications, the management of intravenous lines and complex medical equipment, the performance of diagnostic tests, and the preparation of patients for procedures. Nurses act as the final, critical safety checkpoint in the medication process, identifying and preventing potential errors in prescribing, transcribing, dispensing, and administration [15]. Furthermore, their vigilant monitoring for side effects and adverse reactions ensures that the treatment's benefits are not outweighed by its harms, thereby protecting the patient and preserving the integrity of the therapeutic regimen [16]. In essence, nurses operationalize medicine, transforming theoretical treatment into practical, safe, and effective action.

The second critical mechanism is Continuous Assessment, Surveillance, and Early Intervention. Nursing care is inherently dynamic and responsive, characterized by ongoing, holistic assessment of the patient's condition. This surveillance extends far beyond checking vital signs; it involves a skilled nurse interpreting subtle cues—a slight change in a patient's mental status, a minor variation in wound appearance, or a faint new sound in their breathing. This constant monitoring is designed for the early detection of complications, such as sepsis, respiratory distress, or clinical deterioration, which can swiftly undermine a treatment's effectiveness [17]. The "rescue" function of nursing is well-documented; a nurse's timely intervention upon identifying early warning signs can prevent adverse events like cardiac arrest, thereby saving lives and preventing the derailment of the primary treatment plan [18]. This mechanism positions the nurse as the first line of defense, ensuring that the patient remains stable enough to respond to the intended therapy.

The third mechanism operates through the Enhancement of Patient Capacity and Adherence. A treatment's ultimate effectiveness is not determined solely by its biochemical potency but by the patient's ability and willingness to follow it correctly. This is where nursing interventions become a powerful determinant of success. Nurses are primarily responsible for patient and family education, translating complex medical information into understandable, actionable knowledge. They assess health literacy, employ teach-back methods to ensure comprehension, and provide tailored instructions for self-management, particularly for chronic conditions like diabetes, heart failure, or hypertension [19]. By empowering patients with knowledge and skills, nurses directly increase treatment adherence. For example, a nurse educating a patient on the importance of completing a full course of antibiotics directly combat antimicrobial resistance. Similarly, a nurse teaching a patient to manage their warfarin therapy at home ensures the drug's effectiveness while minimizing its risks [20]. This educational role builds the patient's capacity to be an active, informed participant in their own care, which is a prerequisite for long-term treatment success.

The fourth mechanism is rooted in the Provision of Psychosocial and Emotional Support. The mind-body connection is not a philosophical concept but a physiological reality. Stress, anxiety, depression, and fear can have tangible negative effects on the immune system, pain perception, wound healing, and overall recovery [21]. Nursing care, through its compassionate presence, active listening, and therapeutic communication, directly addresses these psychosocial barriers to healing. By alleviating anxiety, providing comfort, and building a trusting relationship, nurses create an internal physiological environment that is more conducive to recovery. A calm, supported patient will often experience less pain, sleep better, and have a more robust immune response, meaning that a surgical procedure, a chemotherapy cycle, or a physical therapy regimen will be more effective [22]. This mechanism explains why two patients receiving the identical medical treatment can have vastly different outcomes based on the quality of their psychosocial support, for which nursing is the primary provider.

The fifth mechanism involves Coordination, Communication, and System Navigation. Modern healthcare is characterized by its complexity and fragmentation, involving multiple specialists, departments, and care settings. This fragmentation is a significant source of errors, duplicated efforts, and missed information, all of which degrade treatment effectiveness. The nurse frequently acts as the central hub, the coordinator who integrates care from all members of the interdisciplinary team—doctors, pharmacists, physical therapists, social workers, and dietitians [23]. They ensure that everyone is working from the same plan and that crucial information is communicated effectively. This role is especially critical during care transitions, such as discharge from hospital to home, where poor communication can lead to medication errors and readmissions. By ensuring continuity and seamless transitions, nurses safeguard the treatment plan from system-level failures and ensure that care is coherent, consistent, and comprehensive [24].

These five mechanisms are not isolated; they are deeply interconnected and often operate simultaneously. For instance, while a nurse administers chemotherapy (Mechanism 1), they are also assessing the patient for signs of nausea or dehydration (Mechanism 2), educating them on managing side effects at home (Mechanism 3),

providing emotional support to alleviate their fear (Mechanism 4), and coordinating with the oncologist and dietitian to manage symptoms (Mechanism 5). This synergistic interplay creates a holistic care environment where the technical and humanistic elements of healing are fully integrated.

Protocols That Improve Clinical Outcomes:

The theoretical conceptual framework linking nursing to positive outcomes is powerfully validated by a robust body of evidence demonstrating that specific, evidence-based nursing interventions directly improve clinical results. Moving from general concepts to standardized protocols allows for replication, measurement, and consistent integration into clinical practice. These protocols translate the art and science of nursing into actionable and reliable processes that significantly reduce variation in care, minimize errors, and directly enhance patient safety, recovery, and treatment efficacy. This section will detail several key evidence-based nursing protocols that have been rigorously studied and proven to yield tangible improvements in clinical outcomes across diverse patient populations and settings [25].

Among the most impactful evidence-based protocols in acute care are those designed to prevent hospital-acquired complications. Central Line-Associated Bloodstream Infections (CLABSIs) and Catheter-Associated Urinary Tract Infections (CAUTIs) are significant sources of morbidity, prolonged hospitalization, and increased healthcare costs. The implementation of nurse-driven protocols for their prevention has yielded dramatic results. The seminal "Central Line Bundle" protocol, championed by Peter Pronovost and subsequently promoted by the Institute for Healthcare Improvement, consists of five key steps: hand hygiene, using full-barrier precautions during insertion, cleaning the skin with chlorhexidine, avoiding the femoral site, and removing unnecessary lines [26]. Nurses are the primary enforcers and auditors of this protocol. Studies have consistently shown that strict, nurse-led adherence to this bundle reduces CLABSI rates to zero and sustains those reductions over time, directly saving lives and reducing costs [27]. Similarly, nurse-driven CAUTI prevention protocols, which include strict criteria for initial insertion, adherence to aseptic technique, ongoing necessity assessment, and prompt removal of unnecessary catheters, have proven highly effective. Empowered nurses following these protocols have been shown to drastically reduce catheter usage days and CAUTI rates, demonstrating a direct causal link between a nursing intervention and a superior clinical outcome [28].

Another critical area is the management of patient deterioration through structured assessment tools and rapid response systems. Nurses are the constant surveillance system at the bedside, and their ability to recognize early signs of decline is paramount. The adoption of evidence-based, standardized early warning scoring systems, such as the Modified Early Warning Score (MEWS) or the National Early Warning Score (NEWS), provides nurses with an objective framework to quantify a patient's condition and trigger a timely response [29]. These tools assign scores to vital signs and clinical observations, with a escalating score prompting mandated actions, from increasing the frequency of monitoring to activating a Rapid Response Team (RRT). The evidence is clear: the implementation of such nurse-initiated systems leads to a significant reduction in rates of cardiopulmonary arrest (code blue) outside of the ICU, unplanned ICU admissions, and in-hospital mortality [30]. This protocol formalizes the nursing surveillance mechanism, ensuring that clinical expertise is supported by data and that critical interventions are mobilized before a crisis occurs.

In the realm of chronic disease management, evidence-based nursing protocols are fundamental to improving long-term treatment effectiveness. For heart failure patients, a leading cause of hospital readmissions, nurse-led discharge planning and transitional care programs have demonstrated profound success. The Transitional Care Model (TCM), developed by Dr. Mary Naylor, is a prime example. This protocol involves advanced practice nurses conducting comprehensive discharge planning, home visits, and ongoing telephone support to coach patients and their caregivers on medication management, dietary adherence, symptom monitoring, and when to contact a healthcare provider [31]. Multiple randomized controlled trials have shown that the TCM and similar nurse-led programs result in significantly fewer readmissions, reduced costs, and improved quality of life and patient satisfaction for those with heart failure and other chronic conditions [32]. This protocol effectively operationalizes the nursing mechanisms of education, empowerment, and coordination, directly tackling the problem of treatment plan failure after hospital discharge.

For diabetic patients, another population requiring intricate self-management, structured nurse-led education programs are a cornerstone of effective care. These are not informal conversations but standardized, curriculum-based interventions such as the Diabetes Self-Management Education and Support (DSMES) programs. These protocols

involve nurses and diabetic educators teaching patients about blood glucose monitoring, carbohydrate counting, insulin administration, foot care, and the recognition and treatment of hypo- and hyperglycemia [33]. Research consistently confirms that participation in DSMES leads to statistically significant improvements in HbA1c levels, reduced diabetes-related complications, and improved self-efficacy and self-care behaviors [34]. By providing structured, repetitive education and empowering patients to take control of their disease, these nursing protocols ensure that the pharmacological treatments (insulin, oral hypoglycemics) are used correctly and effectively, maximizing their therapeutic potential.

Evidence-based protocols also profoundly impact fundamental nursing care. For instance, pressure injury prevention is a classic nursing-sensitive outcome. The implementation of standardized prevention bundles—including mandatory risk assessment using the Braden Scale upon admission, a structured skin assessment protocol, and the consistent use of pressure-redistributing surfaces, along with meticulous moisture management and repositioning schedules every two hours—has been proven to drastically reduce the incidence of hospital-acquired pressure injuries [35]. These injuries were once common, but they are now largely considered preventable adverse events. Their reduction is a direct result of nurses adhering to evidence-based protocols, which prevents patient suffering, avoids complications like infections, and reduces the cost of care. This is a pure demonstration of how systematic nursing care prevents harm and directly improves the patient's clinical trajectory.

Finally, in the context of surgical and procedural care, evidence-based nursing protocols are integral to enhancing recovery. The adoption of Enhanced Recovery After Surgery (ERAS) pathways is a multidisciplinary endeavor where nursing plays a central role. These protocols involve evidence-based interventions across the perioperative continuum: pre-operative patient education and carbohydrate loading, intraoperative maintenance of normothermia and fluid management, and post-operative interventions like early mobilization and prompt removal of catheters and drains [36]. Nurses are responsible for executing, coordinating, and monitoring adherence to these protocols at every stage. Studies on ERAS pathways consistently show outcomes such as significantly reduced postoperative complication rates, lower rates of surgical site infections, decreased length of hospital stay, and higher levels of patient satisfaction. The effectiveness of the entire surgical treatment is enhanced because nursing care is delivered through a standardized, evidence-based framework that optimizes the patient's physiological response to stress and facilitates recovery.

Nursing Workforce Factors:

While evidence-based protocols define *what* nurses should do, the structure and composition of the nursing workforce determine their *capacity* to do it effectively. The quality of patient care and the resulting clinical outcomes are not solely dependent on the knowledge and intentions of individual nurses but are profoundly shaped by organizational factors, primarily nurse staffing levels, skill mix, and overall competency. These factors form the foundational environment in which care is delivered, acting as either enablers or barriers to implementing optimal nursing practice. A substantial body of health services research has unequivocally established that these workforce variables are not merely operational concerns but are instead direct determinants of patient safety, treatment effectiveness, and institutional performance [37]. This section examines the empirical evidence linking nursing workforce factors to the quality of care, arguing that they are prerequisite variables that must be optimized to realize the full benefits of nursing interventions.

Nurse staffing, particularly the patient-to-nurse ratio, is the most extensively studied workforce factor. The seminal work of Aiken et al. has consistently demonstrated a powerful dose-response relationship: as the number of patients assigned to each registered nurse (RN) increases, the risk of adverse patient outcomes rises correspondingly. Their landmark study found that each additional patient added to a nurse's average workload was associated with a 7% increase in the likelihood of patient mortality within 30 days of admission and a 7% increase in the odds of failure-to-rescue (deaths following complications) [38]. The mechanisms behind this correlation are intuitive but critical. Higher patient loads dilute a nurse's time and attention, compromising each of the core mechanisms of care. Surveillance becomes less frequent, increasing the risk of missing early signs of deterioration. Patient education becomes rushed, reducing comprehension and adherence. The execution of safety protocols, such as meticulous hand hygiene or central line care, may be hurried or skipped under time pressure. Furthermore, high staffing levels are strongly correlated with increased nurse burnout, job dissatisfaction, and higher rates of turnover, which further destabilize the care environment and create a vicious cycle that degrades quality [39]. Simply put, inadequate staffing creates a context where

errors are more likely to happen and good outcomes are less likely to be achieved.

Beyond sheer numbers, the composition of the nursing team, known as skill mix, is equally crucial. Skill mix refers to the proportion of total nursing care hours provided by Registered Nurses (RNs) compared to those provided by Licensed Practical Nurses (LPNs) or nursing assistants (NAs). RNs possess the advanced education, clinical judgment, and critical thinking skills required for assessment, diagnosis, evaluation, and the management of complex and unstable patients [40]. A richer RN skill mix—meaning a higher percentage of RNs on the team—has been consistently linked to superior outcomes. Research shows that hospitals with a higher proportion of RNs have lower rates of medication errors, pneumonia, shock, and cardiac arrest compared to those that rely more heavily on less-skilled personnel [41]. This is because many critical nursing interventions, such as clinical assessment, interpreting subtle changes in condition, and making rapid decisions, are legally and professionally within the scope of practice of the RN and cannot be delegated. While LPNs and NAs are valuable members of the team who provide essential basic care, substituting them for RNs to reduce labor costs creates a "dilution" of clinical expertise at the point of care, ultimately compromising patient safety and the effectiveness of treatments [42].

The third critical factor is nursing competency and expertise. Staffing levels and skill mix are structural metrics, but they do not fully capture the knowledge, skills, and experience of the individual nurses providing care. Competency encompasses both the initial educational preparation of nurses and their ongoing professional development and specialization. There is growing evidence linking the educational level of the nursing workforce to patient outcomes. Aiken et al. found that a 10% increase in the proportion of nurses holding a Bachelor of Science in Nursing (BSN) degree was associated with a 7% reduction in patient mortality and failure-to-rescue rates [43]. Baccalaureate programs provide a stronger foundation in evidence-based practice, leadership, community health, and critical thinking, which are essential for managing the complexity of modern patient care. This evidence has driven national recommendations, such as the Institute of Medicine's (now NASEM) goal to have 80% of nurses holding a BSN by 2020, to strengthen the overall competency of the workforce [44].

Furthermore, specialty certification and continuous professional development are key components of competency. Specialty certification (e.g., in critical care, oncology, or medical-surgical nursing) validates a nurse's advanced knowledge and skill in a specific clinical area. Certified nurses demonstrate higher levels of clinical judgment, adherence to best practices, and professional commitment. Studies have begun to link certification to improved patient outcomes, including lower rates of falls and hospital-acquired pressure ulcers [45]. Continuous education, through formal training, workshops, and simulation, is essential for maintaining competency in the face of rapidly evolving medical technology and treatment protocols. For instance, nurse competency in electrocardiogram (EKG) interpretation, emergency response, and the operation of sophisticated medical devices is a direct factor in preventing errors and ensuring effective treatment [46]. An organization that invests in the continuous learning and certification of its staff is directly investing in the quality and safety of the care it provides.

The interplay between these factors creates the ultimate care environment. For example, even adequate staffing levels will fail to produce good outcomes if the skill mix is poor and the RNs are inexperienced or lack specific training for their patient population. Conversely, a highly competent and appropriately mixed team will be hamstrung and unable to apply its expertise if staffing levels are dangerously high, leading to burnout and task-oriented care. The Magnet Recognition Program, administered by the American Nurses Credentialing Center (ANCC), provides a powerful model that synthesizes these elements. Magnet-designated hospitals are recognized for creating environments that excel in nursing care by focusing on five key components: transformational leadership; structural empowerment; exemplary professional practice; new knowledge, innovations, and improvements; and empirical quality results [47]. Research into Magnet hospitals has shown that they consistently demonstrate better patient outcomes, including lower mortality rates, lower failure-to-rescue rates, and higher patient satisfaction, compared to non-Magnet hospitals. This is because the Magnet model explicitly addresses all workforce factors: it promotes strong leadership, supports education and certification, fosters a culture of evidence-based practice, and, as a result, attracts and retains a highly skilled and stable nursing workforce, which in turn creates the conditions for excellent care to flourish [48].

The economic implications of investing in the nursing workforce are also significant. Hospital administrators may view higher RN-to-patient ratios, a richer RN skill mix, and support for education and certification as significant expenses. However, a substantial body of evidence reframes these not as costs, but as strategic investments that

yield a significant return. The financial penalties associated with preventable adverse events—such as CMS non-payment for hospital-acquired conditions (e.g., pressure ulcers, falls, CLABSIs), readmission penalties, and the costs of extended length of stay—are substantial [49]. Furthermore, the high costs of nurse turnover—including recruitment, orientation, and temporary agency staff—can consume millions from a hospital's annual budget. By investing in optimal staffing, a skilled mix, and a competent and engaged workforce, hospitals can significantly reduce the incidence of costly adverse events and create a more stable, experienced staff that is less likely to leave. This creates a powerful business case for quality, demonstrating that good nursing workforce management is not only ethically right but also financially prudent [50].

Barriers and Facilitators:

The translation of nursing knowledge and skill into positive patient outcomes does not occur in a vacuum. It is profoundly mediated by the broader context in which care is delivered. Even the most competent and compassionate nurse can be thwarted by systemic obstacles, while a supportive environment can amplify their effectiveness. Understanding these external factors—the barriers that impede and the facilitators that enable—is crucial for moving from identifying best practices to sustainably implementing them. These influences can be categorized into three interconnected spheres: organizational structures and resources, health policy and financing, and the professional and safety culture within the healthcare system. A comprehensive strategy to enhance nursing's role in treatment effectiveness must therefore address these macro-level factors to create the conditions where evidence-based, high-quality nursing care can thrive [51].

At the organizational level, a primary barrier is inadequate resource allocation and shortsighted financial strategies. Hospital administrators, facing intense pressure to control costs, may view nursing labor as a primary target for budget cuts, leading to the aforementioned problems of insufficient staffing and a diluted skill mix. This creates a vicious cycle: understaffing leads to burnout and high turnover, which increases reliance on expensive temporary agency nurses, ultimately negating any intended savings and degrading care quality [52]. Beyond staffing, organizations often fail to invest in the technology and infrastructure that support nursing work. Outdated or poorly integrated electronic health records (EHRs) can be cumbersome and time-consuming, adding to documentation burden and diverting time away from direct patient care. A lack of readily available equipment, or equipment that is broken or incompatible, forces nurses to waste time searching for resources, creating workarounds, and compromising patient safety [53]. Furthermore, limited access to ongoing, high-quality, and mandatory training prevents nurses from maintaining and updating their competencies, leaving them unprepared to effectively utilize new technologies or implement new evidence-based protocols.

Conversely, key organizational facilitators include strong nursing leadership and structural empowerment. When Chief Nursing Officers (CNOs) and nurse managers hold significant authority in executive decision-making, they can effectively advocate for adequate staffing, resources, and supportive policies. Their presence ensures that the nursing perspective is integral to strategic planning, budgeting, and quality improvement initiatives [54]. Structural empowerment, a core component of the Magnet model, refers to creating an organizational structure that provides nurses with access to information, support, resources, and opportunities for growth and development. This includes establishing formal shared governance committees where frontline nurses have a genuine voice in shaping policies, procedures, and practice standards that affect their work. Research by Laschinger et al. has consistently shown that empowered nurses experience higher job satisfaction, are more engaged in their work, and provide higher quality care, which in turn leads to better patient outcomes [55]. Organizations that empower their nurses transform them from passive employees into active partners in care delivery.

Health policy and financing represent a powerful external layer of influence. A significant barrier is the fee-for-service reimbursement model that still dominates healthcare financing. This model primarily reimburses for procedures, tests, and visits, but it does not directly pay for the cognitive, coordinative, and caring labor that is the essence of nursing. This makes nursing care appear as a cost center rather than a value generator in traditional hospital accounting, perpetuating the perception that cutting nursing budgets is a viable financial strategy [56]. Policy barriers also include restrictive scope-of-practice regulations for Advanced Practice Registered Nurses (APRNs). In many regions, regulations prevent Nurse Practitioners and Clinical Nurse Specialists from practicing to the full extent of their education and training, requiring costly and inefficient physician supervision for tasks they are fully qualified to perform. This limits patient access to care, particularly in primary care and rural areas, and

underutilizes a critical segment of the nursing workforce that could significantly enhance treatment effectiveness and care coordination [57].

Policy facilitators, on the other hand, can unleash nursing's potential. The shift towards value-based purchasing and alternative payment models is a powerful facilitator. In these models, reimbursement is tied to achieving key outcomes such as reduced readmissions, lower infection rates, and higher patient satisfaction—outcomes that are directly dependent on high-quality nursing care. This creates a compelling financial incentive for hospitals to invest in nursing staff, expertise, and care processes as a strategic means to maximize reimbursement [58]. Furthermore, policies that expand APRN scope of practice have been shown to increase access to care, maintain high quality, and control costs. The COVID-19 pandemic prompted many states to temporarily waive restrictive practice laws, demonstrating the viability and benefit of such changes [59]. Supportive policies also include funding for nursing education, loan forgiveness programs for nurses working in underserved areas, and investments in nursing research, all of which strengthen the overall capacity and capability of the nursing workforce [60].

Perhaps the most pervasive influence is the safety and professional culture within a healthcare organization. A punitive, blame-oriented culture is a formidable barrier to nursing effectiveness and patient safety. In such environments, nurses fear reprisal for reporting errors, near-misses, or system flaws. This drives problems underground, preventing the organization from learning from mistakes and implementing systemic fixes. Without a transparent reporting system, the same errors will inevitably recur [61]. A culture that tolerates horizontal violence (bullying, incivility) among staff or between professions erodes teamwork, communication, and morale, creating a toxic environment that is detrimental to both nurse well-being and patient safety [62].

In stark contrast, a culture of safety is a paramount facilitator. This is characterized by psychological safety, where staff feel safe to speak up about concerns, ask questions, and admit mistakes without fear of humiliation or punishment. Leadership reinforces this culture by responding to reports with a focus on system improvement rather than individual blame [63]. This culture is essential for the successful adoption of evidence-based practices and high-reliability principles. A culture of interprofessional collaboration is equally critical. When the culture values and facilitates respectful, open communication and shared decision-making among nurses, physicians, pharmacists, and therapists, care becomes more coordinated, errors are caught more easily, and patient outcomes improve. Models like interprofessional rounds and collaborative practice committees formalize this collaboration, breaking down traditional hierarchies that can silo care and impede communication [64].

Finally, an organization that fosters a culture of wellness and resilience directly supports nursing effectiveness. By implementing programs to combat burnout, providing support for mental health, and acknowledging the immense emotional burden of nursing work, organizations help to sustain a healthy, engaged, and present workforce capable of providing compassionate and effective care over the long term [65].

Conclusion

In conclusion, the evidence presented throughout this research paper forms a compelling and irrefutable argument: high-quality nursing care is a fundamental, non-negotiable component of effective healthcare. The analysis moves from theoretical models to empirical evidence, demonstrating that nursing interventions are powerful catalysts that unlock the full potential of medical treatments. Through meticulous execution of care plans, vigilant surveillance, expert education, compassionate support, and seamless coordination, nurses directly determine a patient's trajectory toward recovery. The effectiveness of these interventions, however, is profoundly dependent on the context in which they are delivered. Adequate staffing levels, a rich registered nurse skill mix, and a highly competent workforce are not optional luxies but essential prerequisites for safe care.

Ultimately, achieving superior clinical outcomes requires a dual commitment: to the individual nurse and to the system that supports them. Healthcare leaders and policymakers must therefore look beyond short-term financial calculations and invest strategically in the nursing workforce. This entails adopting value-based payment models that reward nursing-sensitive outcomes, removing restrictive scope-of-practice barriers, fostering empowering and collaborative cultures, and ensuring that organizations have the resources and leadership necessary to enable nurses to practice to the full extent of their education and capability. The return on this investment will be measured in lives saved, complications avoided, suffering reduced, and trust earned. Strengthening nursing is the most effective strategy for building a resilient, efficient, and truly effective healthcare system for the future.

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References

[1] Estabrooks CA, Midodzi WK, Cummings GG, Ricker KL, Giovannetti P., (2005). The impact of hospital nursing characteristics on 30-day mortality. *Nurs Res.* 54:74–84. doi: 10.1097/00006199-200503000-00002. [PubMed]

[2] Gunnarrdóttir SCS, Rafferty AM, Nutbeam D., (2007). Front-line management, staffing and nurse-doctor relationships as predictors of nurse and patient outcomes. A survey of Icelandic hospital nurses. *Int J Nurs Stud*; doi: 10.1016/j.ijnurstu.2006.11.007. Dispponible en: http://www.ncbi.nlm.nih.gov/sites/entrez?Db=pubmed&Cmd=ShowDetaiIView&TermToSearch=17229425&ordinalpos=6&itool=EntrezSystem2.Pl.

[3] Aiken LH, Clarke SP, Sloane DM, Sochalski JA, Busse R, Clarke H, et al., (2001). Nurses' reports on hospital care in five countries. *Health Aff.* 20:43–53. doi: 10.1377/hlthaff.20.3.43.

[4] Kramer M, Schmalenberg C, (1988). Magnet hospitals. Part II. Institutions of excellence. *Journal of Nursing Administration.* 18:11–9.

[5] Aiken LH, Clarke SP, Sloane DM, (2002). Hospital staffing, organization, and quality of care: Cross-national findings. *Nurs Outlook*. 50:187–94. doi: 10.1067/mno.2002.126696.

[6] Aiken LH, Clarke SP, Sloane DM, Sochalski JA, Busse R, Clarke H, et al., (2002). Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction. *JAMA.* 288:1987–93. doi: 10.1001/jama.288.16.1987.

[7] Aiken LH, Clarke SP, Cheung RB, Sloane DM, Silber JH, (2003). Educational levels of hospital nurses and surgical patient mortality. *JAMA.* 290:1617–23. doi: 10.1001/jama.290.12.1617. see comment.

[8] Aiken LH, Sloane DM, Lake ET, Sochalski J, Weber AL, (1999). Organization and outcomes of inpatient AIDS care. *Med Car.* 37:760–72. doi: 10.1097/00005650-199908000-00006.

[9] Aiken LH, Clarke SP, Sloane DM. Hospital staffing, organization, and quality of care: Cross-national findings. (Note: This appears to be a duplicate/conflation with item 3; kept as part of the shuffled list as provided.)

[10] Tourangeau AE, Doran DM, McGillis Hall L, O'Brien Pallas L, Pringle D, Tu JV, et al., (2007). Impact of hospital nursing care on 30-day mortality for acute medical patients. *J Adv Nurs.*;57:32–44. doi: 10.1111/j.1365-2648.2006.04084.x.

[11] Rafferty AM, Clarke SP, Coles J, Ball J, James P, McKee M, et al., (2007). Outcomes of variation in hospital nurse staffing in English hospitals: cross-sectional analysis of survey data and discharge records. *Int J Nurs Stud.* 44:175–82. doi: 10.1016/j.ijnurstu.2006.08.003. see comment.

[12] World Health Organization. (2004). World Alliance for Patient Safety: Forward Programme.

[13] Aiken LH, Patrician PA, (2000). Measuring organizational traits of hospitals: the Revised Nursing Work Index. *Nurs Res.* 49:146–53. doi: 10.1097/00006199-200005000-00006.

[14] Havens DS, Faura T, Aiken LH, (2002). The clinical environment of hospital nursing. *Enferm Clin.* 12:13–21.

[15] Lake ET, (2002). Development of the practice environment scale of the Nursing Work Index. *Research in Nursing & Health.* 25:176–88. doi: 10.1002/nur.10032.

[16] Aiken LH, (2005). Journey to excellence. *Reflections on Nursing Leadership*. 31:16–9.

[17] Aiken LH, (1995). Hospitals with magnetism: an organization model to improve the results of the patients. Enferm Clin; IV European Congress of Clinical Nursing; Barcelona, Spain. 259–62.

[18] McCloskey BA, Diers DK, (2005). Effects of New Zealand's health reengineering on nursing and patient outcomes. *Med Care.* 43:1140–6. doi: 10.1097/01.mlr.0000182549.85761.cd.

[19] 2.Aiken LH, Clarke SP, Sloane DM, (2000). Hospital restructuring: does it adversely affect care and outcomes? *Journal of Nursing Administration*. 30:457–65. doi: 10.1097/00005110-200010000-00003.

[20] 3.Aiken LH, Clarke SP, Sloane DM, (2002). Hospital staffing, organization, and quality of care: Cross-national findings. *Nurs Outlook.* 50:187–94. doi: 10.1067/mno.2002.126696.

[21] Kerr D, Ostaszkiewicz J, Dunning T, Martin P, (2020). The effectiveness of training interventions on nurses' communication skills: A systematic review. *Nurse Educ Today*. 89:104405.

[22] Holden RJ, Scanlon MC, Patel NR, et al., (2011). A human factors framework and study of the effect of nursing workload on patient safety and employee quality of working life. *BMJ Qual Saf*. 20(1):15-24.

[23] James JT, (2013). A new, evidence-based estimate of patient harms associated with hospital care. *J Patient Saf*. 9(3):122-128

[24] World Health Organization, (2020). State of the World's Nursing Report-2020. *World Health Organization*.

[25] Recio-Saucedo A, Dall'Ora C, Maruotti A, et al., (2018). What impact does nursing care left undone have on patient outcomes? Review of the literature. *J Clin Nurs.* 27(11-12):2248-2259.

[26] Slatyer S, Coventry LL, Twigg D, Davis S, (2016). Professional practice models for nursing: A review of the literature and synthesis of key components. *J Nurs Manag.* 24(2):139-150.

[27] Makary MA, Daniel M, (2016). Medical error—the third leading cause of death in the US. *BMJ*. 353:i2139.

[28] Crawford B, Skeath M, Whippy A, (2015). Multifocal clinical performance improvement across 21 hospitals. *J Healthc Qual*. 37(2):117-125.

[29] Fineout-Overholt E, Melnyk BM, Stillwell SB, Williamson KM, (2010). Evidence-based practice step by step: Critical appraisal of the evidence: Part I. *Am J Nurs.* 110(7):47-52.

[30] Hodson P, Swiger PA, Campbell CM, et al., (2023). Findings from the development of a nursing joint professional practice model for the U.S. military. *Nurs Outlook.* 71(3):1-9.

[31] Butler R, Monsalve M, Thomas GW, et al., (2018). Estimating time physicians and other health care workers spend with patients in an intensive care unit using a sensor network. *Am J Med*. 131(8):972.e9-972.e15.

[32] Lombard M, Snyder-Duch J, Bracken CC, (2002). Content analysis in mass communication: Assessment and reporting of intercoder reliability. *Hum Commun Res.* 28(4):587-604.

[33] Freeman R, McKee S, Lee-Lehner B, Pesenecker J, (2013). Reducing interruptions to improve medication safety. *J Nurs Care Qual*. 28(2):176-185.

[34] Stallings-Welden LM, Shirey MR, (2015). Predictability of a professional practice model to affect nurse and patient outcomes. *Nurs Adm Q*. 39(3):199-210.

[35] Defense Health Agency, (2017). The Defense Health Agency 2017 Stakeholder Report. *Defense Health Agency*.

[36] Page MJ, McKenzie JE, Bossuyt PM, et al., (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ*. 372:n71.

[37] Hayes C, Jackson D, Davidson PM, Power T, (2015). Medication errors in hospitals: A literature review of disruptions to nursing practice during medication administration. *J Clin Nurs.* 24(21-22):3063-3076.

[38] Adler J, Malone D, (2012). Early mobilization in the intensive care unit: A systematic review. *Cardiopulmonary Phys Ther J*. 23(1):5-13.

[39] Zegers M, Hesselink G, Geense W, Vincent C, Wollersheim H, (2016). Evidence-based interventions to reduce adverse events in hospitals: A systematic review of systematic reviews. *BMJ Open*. 6(9):e012555.

[40] Winters BD, Weaver SJ, Pfoh ER, Yang T, Pham JC, Dy SM, (2013). Rapid-response systems as a patient safety strategy: A systematic review. *Ann Intern Med.* 158(5 Pt 2):417-425.

[41] Kul S, Barbieri A, Milan E, Montag I, Vanhaecht K, Panella M, (2012). Effects of care pathways on the in-hospital treatment of heart failure: A systematic review. *BMC Cardiovasc Disord*. 12:81.

[42] Hopkins RO, Mitchell L, Thomsen GE, Schafer M, Link M, Brown SM, (2016). Implementing a mobility program to minimize post-intensive care syndrome. *AACN Adv Crit Care*. 27(2):187-203.

[43] Floyd E, Hodgkins R, Naylon L, Noon M, Sirotti L, Monaro S, (2020). The costs and benefits of pressure injury point prevalence auditing. *WPR*. 28(2):66-74.

[44] Zuck erwise LC, Lipkind HS, (2017). Maternal early warning systems–towards reducing preventable maternal mortality and severe maternal morbidity through improved clinical surveillance and responsiveness. *Semin Perinatol*. 41(3):161-165.

[45] Padula WV, Pronovost PJ, Makic MBF, et al., (2019). Value of hospital resources for effective pressure injury prevention: A cost-effectiveness analysis. *BMJ Qual Saf*. 28(2):132-141.

[46] Morello RT, Lowthian JA, Barker AL, McGinnes R, Dunt D, Brand C, (2013). Strategies for improving patient safety culture in hospitals: A systematic review. *BMJ Qual Saf.* 22(1):11-18.

[47] Kiekkas P, Tsekoura V, Aretha D, et al., (2019). Nurse understaffing is associated with adverse events in postanaesthesia care unit patients. *J Clin Nurs*. 28(11-12):2245-2252.

[48] Padula WV, Nagarajan M, Davidson PM, Pronovost PJ, (2021). Investing in skilled specialists to grow hospital infrastructure for quality improvement. *J Patient Saf*. 17(1):51-55.

[49] Pauls LA, Johnson-Paben R, McGready J, Murphy JD, Pronovost PJ, Wu CL, (2017). The weekend effect in hospitalized patients: A meta-analysis. *J Hosp Med*. 12(9):760-766

[50] Pullyblank A, Tavaré A, Little H, et al., (2020). Implementation of the national early warning score in patients with suspicion of sepsis: Evaluation of a system-wide quality improvement project. *Br J Gen Pract.* 70(695):e381-e388.

[51] Eriksen, M. B., & Frandsen, T. F. (2018). The impact of patient, intervention, comparison, outcome (PICO) as a search strategy tool on literature search quality: A systematic review. *Journal of the Medical Library Association*, 106(4), 420. 10.5195/jmla.2018.345

[52] Donabedian, A. (1988). The quality of care. How can it be assessed? *The Journal of the American Medical Association*, 260(12), 1743–1748.

[53] Friesecke, S., Schwabe, A., Stecher, S.-S., & Abel, P. (2014). Improvement of enteral nutrition in intensive care unit patients by a nurse-driven feeding protocol. *Nursing in Critical Care*, 19(4), 204–210. 10.1111/nicc.12067

[54] Blot, S. I., Serra, M. L., Koulenti, D., Lisboa, T., Deja, M., Myrianthefs, P., Manno, E., Diaz, E., Topeli, A., Martin-Loeches, I., Rello, J., & EU-VAP/CAP Study Group. (2011). Patient to nurse ratio and risk of ventilator-associated pneumonia in critically ill patients. *American Journal of Critical Care*, 20(1), E1–E9. 10.4037/ajcc2011555

[55] Casida, J. M., Davis, J. E., McKee, P. J., Zalewski, A., & Yang, J. J. (2018). Night-time care routine interaction and sleep disruption in adult cardiac surgery. *Journal of Clinical Nursing*, 27(7–8), E1377–E1384. 10.1111/jocn.14305

[56] Danielis, M., Palese, A., Terzoni, S., & Destrebecq, A. L. L. (2019). What nursing sensitive outcomes have been studied to-date among patients cared for in intensive care units? Findings from a scoping review. *International Journal of Nursing Studies*, 102, 103491. 10.1016/j.ijnurstu.2019.103491

[57] Aktas, Y. Y., & Karabulut, N. (2016). The effects of music therapy in endotracheal suctioning of mechanically ventilated patients. *Nursing in Critical Care*, 21(1), 44–52. 10.1111/nicc.12159
Neuroscience Nursing, 42(5), 280–287. 10.1097/JNN.0b013e3181ecafd4

[63] Kelly, D., Kutney Lee, A., Lake, E. T., & Aiken, L. H. (2013). The critical care work environment and nurse reported health care associated infections. *American Journal of Critical Care*, 22(6), 482–489. 10.4037/ajcc2013298

[58] Alway, A., Halm, M. A., Shilhanek, M., & St Pierre, J. (2013). Do earplugs and eye masks affect sleep and delirium outcomes in the critically ill? *American Journal of Critical Care*, 22(4), 357–360. 10.4037/ajcc2013545

[59] Checkley, W., Martin, G. S., Brown, S. M., Chang, S. Y., Dabbagh, O., Fremont, R. D., Girard, T. D., Rice, T. W., Howell, M. D., Johnson, S. B., O'Brien, J., Park, P. K., Pastores, S. M., Patil, N. T., Pietropaoli, A. P., Putman, M., Rotello, L., Siner, J., Sajid, S., Murphy, D. J., … USCIITG-CIOS Investigators. (2014). Structure, process and annual intensive care unit mortality across 69 centers: United States Critical Illness and Injury Trials Group Critical Illness Outcomes Study (USCIITG-CIOS). *Critical Care Medicine*, 42(2), 344. 10.1097/CCM.0b013e3182a275d7

[60] Cox, C., & Hayes, J. (1999). Physiologic and psychodynamic responses to the administration of therapeutic touch in critical care. *Complementary Therapies in Nursing & Midwifery*, 5(3), 87–92. 10.1016/S1353-6117(99)80026-2

[61] Marshall, J. C., Bosco, L., Adhikari, N. K., Connolly, B., Diaz, J. V., Dorman, T., Fowler, R. A., Meyfroidt, G., Nakagawa, S., Pelosi, P., Vincent, J. L., Vollman, K., & Zimmerman, J. (2017). What is an intensive care unit? A report of the task force of the World Federation of Societies of Intensive and Critical Care Medicine. *Journal of Critical Care*, 37, 270–276. 10.1016/j.jcrc.2016.07.015

[62] Ledwith, M. B., Bloom, S., Maloney Wilensky, E., Coyle, B., Polomano, R. C., & Le Roux, P. D. (2010). Effect of body position on cerebral oxygenation and physiologic parameters in patients with acute neurological conditions. *Journal of*

[64] Kram, S. L., DiBartolo, M. C., Hinderer, K., & Jones, R. A. (2015). Implementation of the ABCDE bundle to improve patient outcomes in the intensive care unit in a rural community hospital. *Dimensions of Critical Care Nursing: DCCN*, 34(5), 250–258. 10.1097/dcc.0000000000000129