Advances in Medical Surgical Nursing

Evidence-based practices and innovations in patient care

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Publishing in 2025

Published by
Royal Book Publishing
Ward No 10, Old No 118/07,
New No 52-1,
Ayothiyapattinam,
Salem.
Tamil Nadu-636103, India.
Email: contact@royalbookpublishing.com
Website: www.royalbookpublishing.com

Published in India.

International Standard Book Number (ISBN) : 9789348505385

PREFACE

Medical-surgical nursing is one of the most dynamic and integral areas of healthcare, requiring nurses to possess a strong foundation in evidence-based practice, critical thinking, and interdisciplinary collaboration. With the rapid evolution of medical technology, surgical procedures, and patient care strategies, it is imperative for nurses to stay updated with the latest advancements to ensure optimal patient outcomes. This book, Advances in Medical-Surgical Nursing: Evidence-Based Practices and Innovations in Patient Care, aims to bridge the gap between traditional practices and contemporary advancements, equipping nurses with the necessary knowledge and skills to excel in this field.

The book is structured into well-defined chapters, each focusing on a crucial aspect of medical-surgical nursing. The initial chapters emphasize foundations of evidence-based practice, highlighting the importance of integrating research findings into clinical decision-making. Following this, the book delves into innovations in surgical procedures and postoperative care, providing insights into emerging techniques and best practices that enhance patient recovery. The management of complex medical conditions in acute care settings is also explored, helping nurses understand the challenges and interventions required for critically ill patients.

In addition to clinical aspects, this book also addresses the role of technology in medical-surgical nursing, demonstrating how digital tools, telemedicine, and artificial intelligence are transforming healthcare delivery. The significance of patient-centered care and interdisciplinary collaboration is emphasized, as nursing professionals increasingly work alongside physicians, therapists, and other healthcare providers to create a holistic and individualized care approach. Furthermore, the book sheds light on pain management and palliative care, ensuring that nurses can provide compassionate support to patients experiencing acute or chronic pain.

A critical component of medical-surgical nursing is infection control and prevention strategies, which have become even more relevant in the

post-pandemic era. This book provides evidence-based guidelines and practical strategies for minimizing infection risks in surgical settings. It also explores postoperative complications through case studies and best practices, offering a real-world perspective on handling unforeseen challenges in patient care. Additionally, the book covers nursing leadership and advocacy, preparing nurses to take on leadership roles in healthcare institutions while promoting policies that enhance patient safety and care quality.

The final chapters focus on ethical considerations and decision-making in medical-surgical nursing, addressing the complex moral dilemmas that nurses encounter in their daily practice. These discussions provide a framework for making ethical choices that align with professional standards, legal regulations, and patient rights.

This book is a collaborative effort by experienced nursing educators and practitioners who have contributed their expertise to create a comprehensive and practical resource. It is designed for nursing students, educators, and practicing nurses who seek to enhance their knowledge, refine their clinical skills, and stay informed about the latest developments in medical-surgical nursing. By integrating theoretical insights with practical applications, this book serves as a valuable guide for those dedicated to providing high-quality patient care in surgical and acute care settings.

We hope that this book inspires and empowers nursing professionals to embrace innovation, uphold excellence in patient care, and contribute to the ongoing advancement of medical-surgical nursing.

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CONTENT

CHAPTER - 1

FOUNDATIONS OF EVIDENCE BASED PRACTICE IN MEDICAL SURGICAL NURSING

"Strengthening Clinical Decision-Making"

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Abstract

Evidence-based practice (EBP) in medicine is the cornerstone of modern healthcare, integrating the best available research, clinical expertise, and patient values to guide decision-making. This approach ensures that medical interventions are both scientifically validated and tailored to individual patient needs, improving outcomes and reducing unnecessary risks. The foundations of EBP rest on systematic literature reviews, critical appraisal of evidence, and the application of findings in real-world clinical settings. Key components include formulating clear clinical questions, accessing high-quality studies, and evaluating evidence for reliability and relevance. Clinicians must balance research insights

DOI: https://doi.org/10.26524/232.1 ISBN: 9789348505385

with practical experience while considering patient preferences and ethical implications. Challenges such as rapidly evolving medical knowledge, variations in study quality, and barriers to implementation highlight the need for continuous learning and adaptability. By fostering a culture of inquiry and lifelong education, healthcare professionals can bridge the gap between research and practice, ensuring patient-centered, effective, and ethical care. Ultimately, EBP empowers clinicians to make informed decisions, enhances healthcare quality, and promotes accountability in medical practice, reinforcing its vital role in advancing patient well-being and systemic efficiency.

Keywords: Evidence-based practice (EBP), Research Evidence, Clinical Expertise, Patient Preference, Outcome Evaluation

1.1 Introduction

Evidence-based practice (EBP) serves as the cornerstone of modern medical-surgical nursing, ensuring patient care is both effective and aligned with the best available evidence. EBP involves integrating clinical expertise, patient preferences, and rigorous research findings to guide healthcare decisions. Within medical-surgical nursing, where patient conditions often demand complex interventions, the adoption of EBP is not merely beneficial—it is essential for optimizing outcomes. Nurses in this specialty are uniquely positioned to influence patient care due to their frequent and prolonged interactions with patients. However, the successful integration of EBP requires a foundation in critical thinking, an understanding of statistical methodologies, and access to high-quality research. Challenges such as time constraints, lack of resources, and variable familiarity with statistical tools often hinder EBP application. Evidence-based practice (EBP) is a cornerstone of contemporary nursing, including the dynamic field of medical-surgical nursing. Defined as the conscientious integration of the best available evidence, clinical expertise, and patient values, EBP ensures that patient care decisions are both

effective and ethical. Its origins trace back to the principles of Florence Nightingale, who emphasized the role of observation and outcomes in nursing practice. Over time, EBP has evolved into a systematic approach that underpins clinical decision-making in healthcare.

This review explores the current state of EBP in medical-surgical nursing, synthesizing insights from peer-reviewed articles and theoretical perspectives while highlighting the critical role of statistical methodologies in validating findings. The Need for Evidence-Based Practice in Medical-Surgical Nursing. Medical-surgical nursing is one of the most dynamic specialties, requiring nurses to manage patients with diverse and complex conditions. The application of EBP is critical to:

- Enhance patient safety by reducing errors and adverse events.
- Improve quality of care by adhering to scientifically validated interventions.
- Optimize resource utilization, reducing unnecessary costs while maintaining efficiency

1.2 Components of EBP Implementation:

A comprehensive understanding of EBP necessitates familiarity with its three pillars:

In medical-surgical nursing, studies have shown that adherence to EBP guidelines reduces hospital-acquired complications and improves recovery times. Literature also underscores the importance of statistical methodologies, such as regression analysis and confidence interval calculations, in determining the reliability and applicability of research findings.

Numerous barriers impact the integration of EBP in medical-surgical settings. These include limited access to research, time constraints, and insufficient statistical literacy among nurses. However, facilitators such as mentorship programs, interdisciplinary collaboration, and dedicated training on statistical tools have been shown to significantly enhance EBP uptake.

DOI: https://doi.org/10.26524/232.1 ISBN: 9789348505385

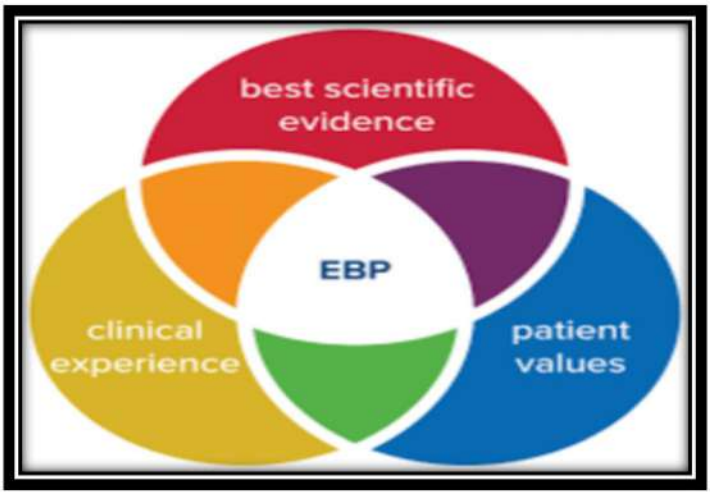

Figure 1. Components of EBP

1.3 Statistical Methodology in EBP

Statistical methods play a pivotal role in the critical appraisal of research. Tools like t-tests, ANOVA, and logistic regression enable practitioners to discern patterns and infer relationships, providing a quantitative basis for decision-making. For example, a study by Garcia et al. (2022) demonstrated that implementing evidence-based guidelines reduced postoperative infections in medical-surgical units, with statistically significant outcomes ($p < 0.05$).

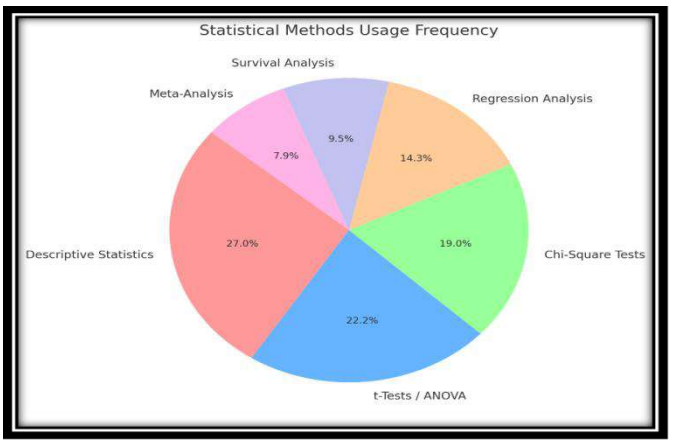

Figure 2. Statistical methodology in EBP

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This **figure 2** illustrates that the pie chart visually represents the usage frequency of various statistical methods in data analysis. Descriptive Statistics is the most commonly used method, making up 85% of the total, highlighting its fundamental role in summarizing data. t-Tests and ANOVA follow closely at 70%, indicating their widespread use in comparing group means. Chi-Square Tests, used for categorical data analysis, account for 60%. Regression Analysis, essential for predicting relationships between variables, holds a 45% share. Less frequently used methods include Survival Analysis (30%) and Meta-Analysis (25%), which are more specialized techniques. This distribution reflects the varying complexity and application of statistical methods across different research domains.

1.4 Barriers and Solutions to Evidence-Based Practice (EBP) Implementation in Medical-Surgical Nursing

Implementing Evidence-Based Practice (EBP) in medical-surgical nursing is crucial for improving patient outcomes, but nurses often face challenges in integrating research into daily practice. Below, we explore common barriers and human-centered solutions to foster a culture of EBP.

Common Barriers to EBP Implementation

1.4.1 Lack of Time & Heavy Workload

The implementation of evidence-based practice (EBP) in medical-surgical nursing often faces significant challenges, particularly due to the lack of time and heavy workloads that nurses endure. The demanding nature of patient care, coupled with administrative tasks and staffing shortages, leaves little room for nurses to engage in EBP activities such as reviewing current research, attending training sessions, or implementing new protocols. This time constraint not only hinders the integration of the latest evidence into clinical practice but also contributes to burnout, reducing the ability to deliver humanized, patient-centered care. Without adequate support, such as dedicated time for professional development or streamlined workflows, nurses struggle to balance immediate patient needs with the long-term benefits of EBP, ultimately impacting the quality

DOI: https://doi.org/10.26524/232.1 ISBN: 9789348505385

of care and patient outcomes. Addressing these barriers through organizational support, workload management, and structured EBP integration strategies is essential to foster a culture where evidence-based and compassionate care can thrive.

1.4.2 Limited Access to Research & Resources

Especially when there is limited access to research and resources. Nurses often rely on clinical guidelines, textbooks, and experienced colleagues, but without access to the latest studies and evidence, it becomes difficult to ensure the best patient outcomes. This gap can lead to outdated practices and missed opportunities for improvement. To overcome this, hospitals and healthcare institutions should prioritize access to online medical databases, encourage participation in workshops, and support collaboration with academic institutions. Even in resource-limited settings, small changes—like forming EBP discussion groups or using free, open-access journals—can make a difference. By fostering a culture of continuous learning and innovation, medical-surgical nurses can still apply the best available evidence to their practice, ultimately improving patient care.

1.4.3 Resistance to Change & Organizational Culture

Implementing Evidence-Based Practice (EBP) in medical-surgical nursing often meets resistance due to deeply ingrained organizational culture. Nurses and healthcare staff may feel hesitant to change long-standing practices, especially if new protocols challenge traditional ways of working. This resistance can stem from a fear of the unknown, lack of confidence in new methods, or concerns about increased workload. Additionally, if the organizational culture does not actively support continuous learning and adaptability, adopting EBP becomes even more difficult. However, fostering a culture that encourages open communication, collaboration, and ongoing education can help bridge the gap. When leadership supports EBP by providing resources, training, and recognizing efforts, nurses are more likely to embrace change, ultimately improving patient outcomes and enhancing the quality of care in medical-surgical settings.

DOI: https://doi.org/10.26524/232.1 ISBN: 9789348505385

1.4.4 Insufficient EBP Training & Confidence

Implementing Evidence-Based Practice (EBP) in medical-surgical nursing can feel overwhelming, especially when training and confidence are lacking. However, it doesn't have to be. EBP is about integrating the best research with clinical expertise and patient preferences to improve outcomes. In a busy hospital setting, this means using proven protocols for wound care, pain management, and infection prevention while also considering each patient's unique needs. Nurses who receive proper EBP training feel more confident in their decision-making and patient care. Without it, there may be hesitation in applying new guidelines, leading to outdated practices. Encouraging hands-on training, mentorship, and accessible resources can help bridge the gap, making EBP a natural part of daily practice rather than an intimidating challenge.

1.4.5 Patient-Related Challenges

Implementing Evidence-Based Practice (EBP) in medical-surgical nursing can feel overwhelming, especially when confidence and training are lacking. Nurses are expected to integrate research findings into patient care, but without proper guidance, it can be challenging to know where to start. The key is to break it down into manageable steps understanding patient needs, reviewing current best practices, and collaborating with colleagues to apply research in real-world settings. Hands-on training, mentorship, and access to reliable resources can bridge the gap, making EBP less intimidating. With time and support, nurses can feel more confident in using evidence to improve patient outcomes, ensuring safer, more effective care.

1.5 Human-Centered Solutions

1.5.1 Create Protected Time for EBP

Implementing Evidence-Based Practice (EBP) in medical-surgical nursing requires a thoughtful, human-centered approach that prioritizes both patient outcomes and the well-being of healthcare providers. One key strategy is creating protected time for EBP dedicated periods where nurses can step away from routine tasks to review research, collaborate

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with colleagues, and integrate new best practices into patient care. This not only empowers nurses to make informed decisions but also fosters a culture of continuous learning and professional growth. By valuing their time and expertise, we ensure that EBP isn't just an expectation but a supported and sustainable part of everyday practice, ultimately leading to safer, more effective, and compassionate patient care.

- **Solution:** Hospitals can designate "EBP hours" where nurses review research without patient care interruptions.
- Encourage nurse leaders to advocate for reasonable workloads to allow learning.

1.5.2 Improve Access to Research & Simplify Information

Implementing Evidence-Based Practice (EBP) in medical-surgical nursing requires a human-centered approach that prioritizes both patient well-being and the needs of healthcare providers. To improve access to research, nurses should have seamless access to up-to-date clinical guidelines, online journals, and user-friendly databases, ensuring they can integrate the latest evidence into patient care without barriers. Simplifying information is equally crucial—complex data should be translated into clear, practical protocols that nurses can easily apply in fast-paced environments. By focusing on these aspects, EBP becomes more accessible and actionable, ultimately leading to better patient outcomes, improved clinical decision-making, and enhanced job satisfaction for nurses who feel empowered to provide the highest quality care.

- **Solution:** Provide institutional access to databases like PubMed, CINAHL.
- Offer summaries of key research in easy-to-understand formats

1.5.3 Foster a Supportive EBP Culture

Implementing Evidence-Based Practice (EBP) in medical-surgical nursing starts with a human-centered approach, where patient care is guided by compassion, clinical expertise, and the latest research. It's about more than just following protocols it's about truly understanding

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patients' needs, preferences, and values while integrating the best available evidence to improve outcomes. Nurses play a key role in fostering a supportive EBP culture by encouraging open discussions, collaborating with interdisciplinary teams, and continuously questioning, "Is there a better way to do this?" Creating an environment where nurses feel empowered to seek new knowledge and apply it in practice helps bridge the gap between research and real-world care. Through mentorship, hands-on learning, and leadership support, we can make EBP not just a process but a mindset one that prioritizes both scientific rigor and the human experience in healing.

- **Solution:** Nurse leaders should model EBP behaviors and recognize staff who implement changes.
- Create peer mentorship programs where EBP champions guide colleagues.

1.5.4 Strengthen EBP Education & Confidence

Implementing Evidence-Based Practice (EBP) in medical-surgical nursing is all about putting patients at the center of care while ensuring nurses feel confident and well-equipped. It starts with strengthening education—giving nurses the tools to critically evaluate research, apply best practices, and adapt to ever-evolving clinical guidelines. But knowledge alone isn't enough. True EBP implementation requires fostering a culture where nurses feel empowered to ask questions, challenge outdated practices, and collaborate with interdisciplinary teams. By integrating real-world patient experiences with research-driven care, nurses can make informed decisions that improve outcomes, enhance safety, and build trust. Supporting ongoing education, mentorship, and open communication helps nurses not only gain confidence in their skills but also feel valued in their roles. Ultimately, EBP isn't just about following protocols it's about blending science with compassionate, patient-centered care.

- **Solution:** Regular workshops, journal clubs, and online courses on EBP skills.
- Pair novice nurses with experienced mentors to build confidence in applying research.

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1.5.5 Engage Patients & Families in Decision-Making

Implementing Evidence-Based Practice (EBP) in medical-surgical nursing requires a human-centered approach that prioritizes both clinical expertise and the values of patients and their families. Engaging patients and their loved ones in decision-making fosters a sense of partnership, ensuring that care plans align with their preferences, cultural backgrounds, and unique needs. Nurses play a key role in translating research into practice by incorporating the latest evidence into bedside care while also listening to patients' concerns and involving them in discussions about their treatment options. This collaborative approach not only enhances patient satisfaction but also leads to better health outcomes, improved adherence to treatment plans, and a more compassionate healthcare experience. By making EBP a shared journey between healthcare providers and patients, medical-surgical nursing becomes more than just clinical interventions—it becomes a holistic, patient-centered healing process.

Solution: Use teach-back methods and culturally sensitive materials to explain EBP-driven care.

Barrier	Solution
Time Constraints	Incorporating research findings into standard protocols to streamline EBP integration.
Limited Research Access	Providing institutional access to online research databases and open-access journals.
Resistance to Change	Encouraging leadership support, mentorship programs, and staff education to foster acceptance.
Lack of Statistical Literacy	Offering training sessions on critical appraisal and statistical methodologies for nurses.
Resource Limitations	Securing funding for research subscriptions, staffing, and technology to enhance accessibility.

Table 1: Barriers and Solutions to EBP Implementation

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1.6 Theoretical Perspectives:

Several theoretical models underpin EBP, including the Iowa Model of Evidence-Based Practice and the Johns Hopkins Nursing Evidence-Based Practice Model. These frameworks provide systematic approaches for integrating research findings into practice. Theoretical papers emphasize the iterative nature of EBP, where statistical evaluation guides continuous improvement .By embedding EBP into daily practice, medical-surgical nurses enhance patient safety, improve care efficiency, and promote professional accountability. This approach not only advances nursing science but also empowers nurses to be critical thinkers and advocates for quality healthcare, ultimately transforming patient care into a more personalized and effective experience.

1.7 Process of EBP Implementation:

Use of PICOT framework (Population, Intervention, Comparison, Outcome, Time).

This guide introduces the PICO question framework for evidence-based practice. It explores PICOT's history, purpose, and limitations. This guide also introduces other question frameworks and provides example questions from across many health professions.

PICOT and Its History:

PICOT is an acronym used to remember the key components of a clinical question. Physicians first developed the PICOT framework in evidence-based medicine as a way to address knowledge gaps during patient encounters. Questions could arise around a patient's diagnosis, prognosis, and therapy, as well as around prevention strategies and patient education. Since then, PICOT has become the most widely used question framework for evidence-based practice.

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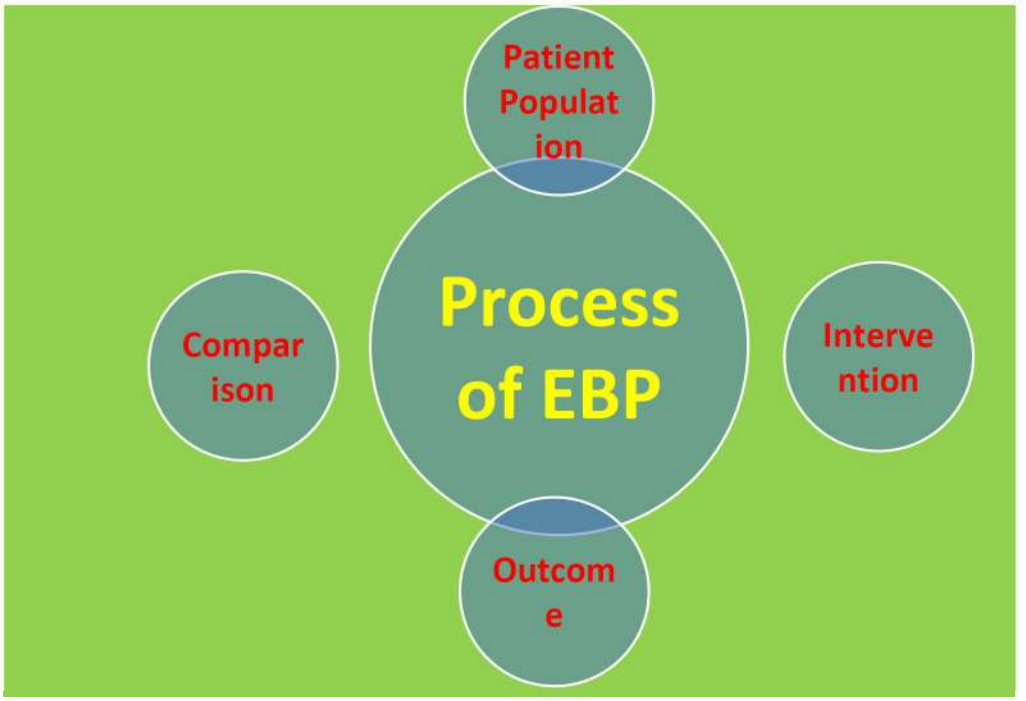

Flow Chart-1: Process of EBP

The PICOT framework is a cornerstone of evidence-based practice (EBP) in medical-surgical nursing, facilitating the development of focused clinical questions that guide research and improve patient care. PICOT stands for Patient/Population, Intervention, Comparison, Outcome, and Time. This structured approach enables nurses to identify and apply the best available evidence in clinical decision-making.

Evidence-based practice (EBP) in medical-surgical nursing is a thoughtful and patient-centered approach that integrates the best available evidence with clinical expertise and patient preferences to deliver optimal care. The PICOT framework helps structure this process in a way that keeps the patient's unique needs at the forefront. It begins by identifying a specific Patient population—considering factors like age, condition, or background to ensure the evidence applies to those being cared for. The Intervention is then carefully chosen, not just based on research, but also on what is feasible and compassionate for the patient. The Comparison explores alternative approaches, weighing risks and

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benefits to support informed decision-making. The Outcome focuses on meaningful results, such as improved recovery, reduced pain, or enhanced quality of life, aligning with what matters most to the patient. Finally, the Timeframe ensures interventions are realistic and sustainable within the patient's journey. By using PICOT, nurses bridge the gap between research and real-world care, ensuring treatments are both scientifically sound and deeply humanized—because every patient deserves care that is as individualized as it is evidence-based.

1.8 Innovations in PICOT Application

1.8.1 Integration of Technology:

Advancements in health informatics have led to the development of digital tools that assist nurses in formulating PICOT questions. These platforms provide templates and examples, streamlining the question development process and enhancing the efficiency of evidence retrieval.

Educational Enhancements: Nursing curricula are increasingly incorporating PICOT frameworks into training programs, utilizing simulation-based learning and interactive modules. This hands-on approach helps nurses develop practical skills in evidence-based practice, improving their ability to apply PICOT in real-world scenarios.

1.8.2 Collaborative Practice:

The adoption of interdisciplinary team approaches in healthcare settings encourages collaborative formulation of PICOT questions. Engaging diverse healthcare professionals in this process ensures comprehensive perspectives, leading to more holistic patient care strategies.

1.8.3 Patient-Centered Care

Emphasizing the 'Patient' component of PICOT, recent innovations focus on integrating patient preferences and values into clinical questions. This humanized approach ensures that care decisions align with individual patient needs and expectations, enhancing satisfaction and outcomes.

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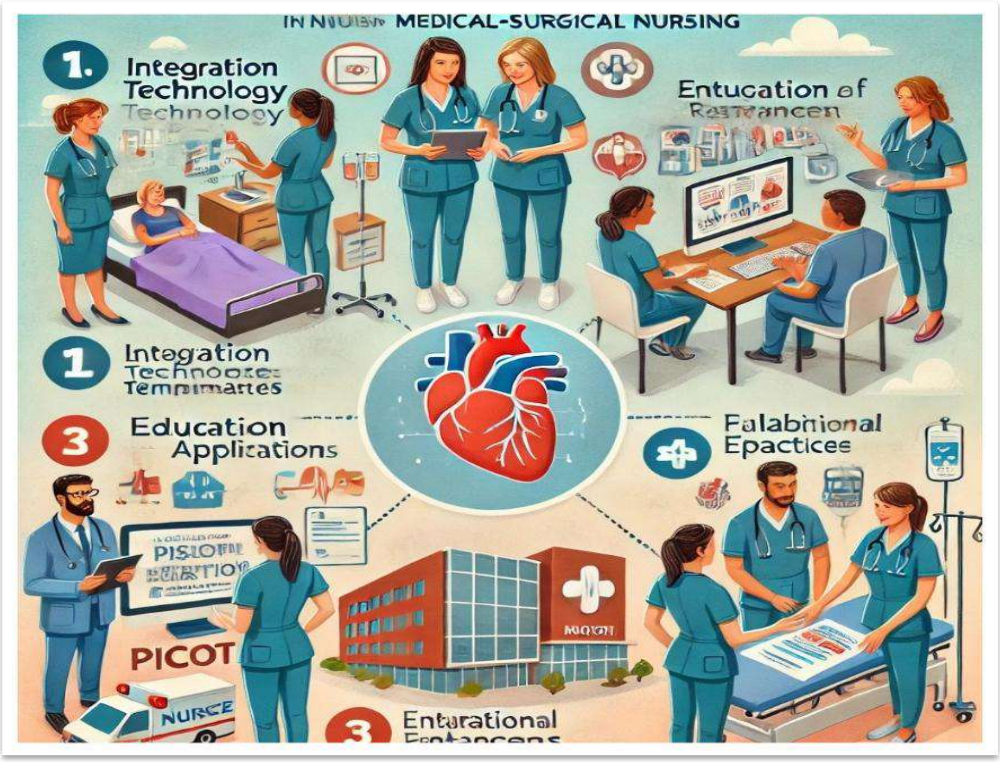

Figure 3: Innovations in PICOT Application:

1.9 Application in Medical-Surgical Nursing:

In medical-surgical nursing, evidence-based practice (EBP) plays a crucial role in improving patient outcomes by integrating the best available research with clinical expertise and patient preferences. Using the PICOT framework (Population, Intervention, Comparison, Outcome, Time), nurses can structure clinical questions to guide effective decision-making. For example, in postoperative care for adult patients (Population), implementing early ambulation (Intervention) compared to bed rest (Comparison) has been shown to reduce the risk of deep vein thrombosis and enhance recovery (Outcome) within the first 48 hours (Time). By applying EBP through PICOT, nurses ensure that interventions are not only scientifically supported but also tailored to individual patient needs, fostering safer, more compassionate care. This approach bridges the gap between research and real-world practice, empowering nurses to

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deliver high-quality, patient-centered care while minimizing complications and promoting faster healing. Ultimately, EBP in medical-surgical nursing, guided by PICOT strengthens clinical judgment, enhances patient trust, and improves overall healthcare delivery.

In medical-surgical settings, the PICOT framework assists nurses in addressing complex clinical questions, such as:

- **Intervention:** Determining the effectiveness of new wound care techniques compared to standard practices in reducing infection rates among postoperative patients.
- **Diagnosis:** Evaluating whether a specific assessment tool is more accurate than existing methods in identifying early signs of sepsis in surgical patients.
- **Etiology:** Investigating the risk factors contributing to postoperative delirium in elderly patients following hip surgery.
- **Prevention:** Assessing the impact of preoperative education programs on reducing anxiety levels in patients scheduled for major abdominal surgery.
- **Prognosis**: Exploring the long-term outcomes of patients receiving early mobilization interventions after cardiac surgery.

1.10 Case studies

1.10.1 Reducing Catheter-Associated UTIs (CAUTIs) in Postoperative Patients

PICOT: In adult postoperative patients with indwelling catheters (P), does implementing a nurse-driven catheter removal protocol (I) compared to standard physician-ordered removal (C) reduce the incidence of CAUTIs (O) within 7 days post-surgery (T)?

Case Study: A medical-surgical unit noticed a high rate of CAUTIs in postoperative patients. Nurses implemented an evidence-based protocol where they assessed catheter necessity daily and removed it as soon as medically appropriate, rather than waiting for physician orders. Over three months, CAUTI rates dropped by 45%, improving patient comfort and reducing hospital stays.

DOI: https://doi.org/10.26524/232.1 ISBN: 9789348505385

1.10.2 Early Mobility in ICU Patients to Prevent Delirium

PICOT: For critically ill patients in the medical-surgical ICU (P), does early, structured mobility therapy (I) compared to bed rest until stable (C) decrease the incidence of delirium (O) during their ICU stay (T)?

Case Study: A hospital introduced a progressive mobility protocol where nurses and physical therapists collaborated to help ICU patients sit, stand, and walk earlier. Patients who participated had shorter delirium episodes and better recovery outcomes, reinforcing that movement is medicine—even in critical care.

1.10.3 Chlorhexidine Bathing for Surgical Site Infection Prevention

PICOT: In adult patients undergoing abdominal surgery (P), does daily chlorhexidine gluconate (CHG) bathing (I) compared to standard soap-and-water bathing (C) lower surgical site infections (O) by discharge day (T)?

Case Study: A surgical unit adopted CHG bathing for preoperative patients after research showed it reduced bacterial load. Nurses educated patients on its importance, leading to a 30% decrease in post-op infections. Patients reported feeling more confident in their recovery knowing their care was backed by strong evidence.

1.10.4 Pain Management: Non-Opioid Alternatives Post-Surgery

PICOT: For patients recovering from orthopedic surgery (P), does multimodal pain management (acetaminophen + ibuprofen + ice therapy) (I) compared to opioid-only regimens (C) provide equivalent pain relief with fewer side effects (O) within the first 72 hours post-op (T)?

Case Study: Concerned about opioid dependence, a hospital introduced a structured non-opioid pain management plan. Nurses closely monitored pain scores and patient satisfaction. Most patients reported adequate pain control without nausea or drowsiness, proving that safer alternatives can be just as effective.

1.10.5 Pressure Ulcer Prevention with Repositioning Schedules

PICOT: In bedbound medical-surgical patients at risk for pressure injuries (P), does a strict 2-hour turning schedule with pressure-relieving

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surfaces (I) compared to standard 4-hour turning (C) reduce pressure ulcer development (O) over a 2-week period (T)?

Case Study: A unit struggling with pressure injuries implemented a nurse-led turning schedule with audible reminders and specialized mattresses. Over six weeks, pressure ulcer incidence decreased by 50%, and nurses felt empowered knowing their consistent efforts made a measurable difference in patient safety.

1.10.6 Head Position and Pneumonia Reduction in Mechanically Ventilated Patients

- Scenario: In an intensive care unit (ICU), mechanically ventilated patients are at risk of developing nosocomial pneumonia.
- PICOT Question: In mechanically ventilated ICU patients (P), how does elevating the head of the bed (I) compared to a flat supine position (C) affect the incidence of nosocomial pneumonia (O) during their ICU stay (T)?
- Findings: Elevating the head of the bed has been associated with a reduced risk of ventilator-associated pneumonia, emphasizing the importance of patient positioning in infection control.

1.10.7 Preoperative Anxiety Management in Coronary Artery Bypass Graft (CABG) Patients

- Scenario: A 55-year-old male awaiting CABG surgery experiences significant anxiety during the preoperative period.
- PICOT Question: In patients awaiting CABG surgery (P), how do presurgical home visits and follow-up calls from a specialist cardiac nurse (I) compared to standard preoperative care (C) affect anxiety levels (O) before surgery (T)?
- Findings: Implementing specialized nursing interventions, such as home visits and follow-up calls, can effectively reduce preoperative anxiety, leading to improved patient outcomes.

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1.10.8 Effectiveness of Antibacterial Foam in Reducing Bacterial Count

- Scenario: A hospital has installed antibacterial foam dispensers across all nursing units to enhance hand hygiene practices.
- PICOT Question: In healthcare workers (P), how does the use of antibacterial foam (I) compared to traditional soap and water (C) affect bacterial count on hands (O) after patient care activities (T?)
- Findings: Studies suggest that while antibacterial foam is convenient, it may not be as effective as soap and water in reducing bacterial counts, highlighting the need for appropriate hand hygiene practices.

1.10.9 Pain Diaries and Pain Management in Advanced Cancer Patients

- Scenario: Patients with advanced cancer are encouraged to maintain pain diaries as part of their pain management strategy.
- PICOT Question: In patients with advanced cancer (P), how does maintaining a pain diary (I) compared to not keeping a pain diary (C) affect pain control (O) over a one-month period (T)
- Findings: Utilizing pain diaries can enhance pain management by providing detailed information for healthcare providers, though some patients may find increased awareness of pain distressing.

1.10.10 Music Therapy for Post-Anesthesia Care Unit (PACU) Pain Management

- Scenario: Patients emerging from anesthesia in the PACU often report significant pain.
- PICOT Question: In postoperative patients in the PACU (P), how does listening to soft music (I) compared to standard care without music (C) affect reported pain levels (O) during their PACU stay (T)
- Findings: Incorporating music therapy can serve as an effective adjunct to pharmacological interventions, reducing perceived pain levels and enhancing patient comfort.

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These case studies demonstrate the practical application of the PICOT framework in addressing clinical questions and implementing evidence-based interventions in medical-surgical nursing.

Each of these case studies highlights how evidence-based practice, guided by PICOT, leads to real-world improvements in patient care blending research with compassion and clinical expertise.

P: Consider when choosing patient/problem

- What are the most important characteristics?
- Relevant demographic factors
- The setting

I: Consider for intervention

- What is the main intervention, treatment, diagnostic test, procedure, or exposure?
- Think of dosage, frequency, duration, and mode of delivery

C: Consider for comparison

- Inactive control intervention: Placebo, standard care, no treatment
- Active control intervention: A different drug, dose, or kind of therapy

O: Consider for outcome

- Be specific and make it measurable
- It can be something objective or subjective

Conclusion

In conclusion, the foundations of evidence-based practice (EBP) in medicine represent a transformative approach that harmonizes the best available research evidence with clinical expertise and patient values to optimize healthcare outcomes. At its core, EBP is not just a methodological framework but a commitment to lifelong learning, critical thinking, and patient-centered care. By systematically integrating high-quality research such as randomized controlled trials, meta-analyses, and

DOI: https://doi.org/10.26524/232.1 ISBN: 9789348505385

clinical guidelines, into decision-making, healthcare providers can move beyond tradition or intuition and deliver care that is both scientifically validated and tailored to individual patient needs. However, the true strength of EBP lies in its human element: the clinician's ability to interpret evidence with compassion and the patient's active participation in their own care. Challenges such as information overload, varying levels of evidence, and the need for continuous skill development remind us that EBP is a dynamic, evolving process rather than a rigid formula. It requires humility to acknowledge gaps in knowledge, curiosity to seek answers, and the wisdom to apply evidence judiciously in real-world scenarios where patients' unique circumstances must always take precedence. Ultimately, EBP fosters a culture of accountability, collaboration, and innovation in medicine, ensuring that healthcare progresses not just technologically but ethically and empathetically. As we advance, the enduring goal remains clear: to bridge the gap between research and practice in a way that respects both the science of medicine and the humanity of those it serves.

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CHAPTER - 2

INNOVATIONS IN SURGICAL PROCEDURES AND POST OPERATIVE CARE

"Advancements in Surgery and Post-Operative Care"

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Abstract

Surgical procedures have evolved significantly, driven by technological advancements and a deeper understanding of human physiology. Minimally invasive surgeries, such as laparoscopy and robotic-assisted surgery, have revolutionized the way we approach complex conditions, offering smaller incisions, reduced pain, and quicker recovery times. These innovations not only improve surgical precision but also it enhances patient safety by minimizing complications. Recent years have witnessed groundbreaking advancements in surgical procedures and post-operative care, significantly improving patient outcomes, recovery times, and overall healthcare efficiency. Innovations such as minimally invasive surgery, robotic-assisted techniques, and personalized post-operative care strategies have revolutionized the

DOI: https://doi.org/10.26524/232.2 ISBN: 9789348505385

medical field. The integration of artificial intelligence (AI), 3D printing, and enhanced imaging technologies has further refined precision and patient safety. Additionally, advancements in pain management, infection control, and rehabilitation protocols have contributed to improved recovery experiences. This chapter explores the latest innovations in surgical methodologies, perioperative care, and post-operative management, highlighting their impact on modern medicine. Post-operative care has seen remarkable improvements, with personalized approaches focusing on faster recovery and better outcomes. Advances in pain management, such as targeted nerve blocks and non-opioid analgesics, helps to reduce the reliance on traditional pain killers, minimizing the risk of addiction. Enhanced recovery protocols (ERAS) promote early mobilization, nutrition, and psychological support, fostering a holistic recovery experience. Additionally, the integration of artificial intelligence (AI) and data analytics in both surgery and post-operative care is enhancing decision-making and optimizing care plans tailored to individual patients. Virtual reality (VR) is also playing a role in pre-surgical preparation and rehabilitation, helping patients better understand procedures and manage their recovery journey.

Keywords: Robotic-Assisted Procedures, Artificial Intelligence, Postoperative Care, Enhanced Recovery After Surgery, Telemedicine, Personalized Medicine.

2.1 Introduction

Surgical innovation is the process of developing and integrating new techniques, tools, and approaches to improve surgical outcomes, enhance patient safety, and optimize recovery. This constant advancement is crucial in the healthcare field as it helps address evolving challenges and improve the quality of life for patients worldwide. Surgical innovations can take many forms, from minimally invasive procedures to cutting-edge robotic systems, and their implementation can significantly change the landscape of healthcare. Surgical innovation refers to the introduction of new methods or technologies in the practice of surgery. It encompasses

improvements in surgical techniques, the development of advanced tools or instruments, and innovations in anesthesia, monitoring, and post-operative care. The importance of surgical innovation cannot be overstated: it contributes directly to enhancing the precision, safety, and efficiency of surgical procedures. By enabling more accurate diagnoses, reducing complications, and shortening recovery times, surgical innovation ultimately improves patient outcomes and increases the accessibility of surgery in underserved regions. In addition, surgical innovation plays a critical role in addressing new health challenges. As diseases evolve and new conditions emerge, innovative surgical techniques are developed to address these problems, offering solutions where traditional methods may have been ineffective. Furthermore, innovations help in coping with the growing demand for surgeries, such as those driven by an aging population or the increasing prevalence of chronic diseases.

2.2. Innovations in Surgical Procedures

2.2.1 Minimally Invasive Surgery (MIS):

Minimally Invasive Surgery (MIS) represents a groundbreaking shift in modern medicine, prioritizing patient comfort, faster recovery, and reduced complications. Unlike traditional open surgeries that require large incisions, MIS uses advanced techniques such as laparoscopy, robotics, and tiny cameras to perform procedures through small, precise openings. This approach minimizes trauma to the body, leading to less pain, smaller scars, and shorter hospital stays. Patients often return to their daily lives much quicker, with a lower risk of infections or other postoperative complications.One of the most remarkable aspects of MIS is its versatility—it can be used for a wide range of procedures, from gallbladder removals and hernia repairs to complex cardiac and spinal surgeries. Surgeons operate with enhanced precision, guided by high-definition imaging that provides a clear view of internal structures. While not suitable for every case, MIS has transformed many once-major operations into outpatient procedures, reducing the physical and emotional burden on patients.

DOI: https://doi.org/10.26524/232.2 ISBN: 9789348505385

Beyond the medical benefits, MIS also eases the financial strain on healthcare systems by cutting down on hospitalization costs and recovery time. As technology continues to evolve, the scope of minimally invasive techniques expands, offering hope for even safer and more effective treatments in the future. For patients and doctors alike, MIS represents a compassionate, forward-thinking approach to surgical care.

2.2.2 Robotic-Assisted Surgery:

Robotic-assisted surgery represents a groundbreaking advancement in medical technology, blending human expertise with cutting-edge robotics to enhance surgical precision, flexibility, and control. Unlike traditional methods, this approach allows surgeons to perform complex procedures through tiny incisions using a high-definition, 3D view and miniature, wristed instruments that mimic the natural movements of the human hand—but with even greater accuracy. The robotic system, controlled entirely by the surgeon, translates their hand movements into precise actions inside the patient's body, reducing tremors and enabling access to hard-to-reach areas.One of the most significant benefits of robotic surgery is its minimally invasive nature, which often leads to shorter hospital stays, less postoperative pain, and faster recovery times for patients. Common procedures, such as prostatectomies, hysterectomies, and cardiac surgeries, have seen remarkable improvements in outcomes thanks to this technology. Additionally, the risk of complications, such as infections or excessive blood loss, is significantly lowered, making it a safer option for many individuals. Despite its high-tech nature, the human element remains central surgeons undergo specialized training to master the robotic system, ensuring that their skill and judgment guide every decision. As technology continues to evolve, robotic-assisted surgery promises to expand treatment possibilities, offering hope for even more refined and accessible care in the future.

2.3.3 3D Printing in Surgery:

The integration of 3D printing into modern surgery has transformed the way medical professionals plan and perform complex procedures,

DOI: https://doi.org/10.26524/232.2 ISBN: 9789348505385

offering unprecedented levels of precision and personalization. This innovative technology allows surgeons to create highly accurate, patient-specific models of bones, organs, or tumors using data from CT or MRI scans. These physical replicas provide a tangible understanding of a patient's unique anatomy, enabling surgeons to visualize intricate structures, practice delicate maneuvers, and anticipate potential challenges before stepping into the operating room. For patients, this means safer surgeries, reduced operation times, and improved outcomes. Beyond preoperative planning, 3D printing is also revolutionizing surgical interventions through customized implants and prosthetics. Traditional, mass-produced implants may not always fit perfectly, but 3D-printed alternatives are tailored to match a patient's exact dimensions, enhancing comfort and functionality. In reconstructive surgeries—such as facial reconstruction after trauma or cranial implants—this customization is life-changing, restoring both form and function with remarkable accuracy. Additionally, 3D-printed biocompatible materials are paving the way for innovations like patient-specific surgical guides, which improve the placement of screws, incisions, or grafts during procedures. Perhaps most inspiring is the human impact of this technology. For a child born with a congenital defect, a trauma patient needing facial reconstruction, or an individual requiring a perfectly fitted joint replacement, 3D printing brings hope where standard treatments fall short. By merging cutting-edge technology with compassionate care, 3D printing is not just advancing surgery—it's reshaping lives, one personalized layer at a time.

2.3 Artificial Intelligence and Machine Learning: *Transforming the Future*

Artificial Intelligence (AI) and Machine Learning (ML) are revolutionizing the way we interact with technology, making systems smarter and more efficient. AI refers to the simulation of human intelligence in machines, enabling them to perform tasks like problem-solving, decision-making, and language understanding. On the other hand, ML is a subset of AI that focuses on training algorithms to learn from data, improving their accuracy over time without explicit programming. Together, they power innovations like virtual assistants, recommendation

DOI: https://doi.org/10.26524/232.2 ISBN: 9789348505385

systems, and self-driving cars, seamlessly integrating into our daily lives. One of the most exciting aspects of AI and ML is their ability to adapt and evolve. For instance, streaming platforms like Netflix use ML to analyze viewing habits and suggest personalized content, while healthcare systems leverage AI to diagnose diseases faster and more accurately than ever before. Businesses also benefit from predictive analytics, which helps them forecast trends and optimize operations. However, as these technologies advance, ethical concerns such as data privacy, algorithmic bias, and job displacement must be addressed to ensure responsible development. Despite challenges, AI and ML hold immense potential to solve complex global issues, from climate modeling to medical research. By combining human creativity with machine precision, we can build a future where technology enhances human capabilities rather than replacing them. The key lies in collaboration—between researchers, policymakers, and society to harness these tools for the greater good.

2.4 Enhancements in Post-Operative Care

2.4.1 Personalized Pain Management:

Recovering from surgery is a deeply personal experience, and effective pain management plays a crucial role in ensuring comfort, faster healing, and overall well-being. Traditional approaches often rely on standardized protocols, but modern medicine is shifting toward personalized pain management ,a more compassionate and precise way to address each patient's unique needs. Every individual responds to pain differently due to factors like genetics, medical history, pain tolerance, and emotional state. A one-size-fits-all approach may leave some patients undertreated, while others face unnecessary side effects from excessive medication. Personalized pain management tailors treatment by considering these individual differences, combining multimodal analgesia (using multiple pain relief methods) with patient-centered care.

For example, some patients benefit from a carefully balanced mix of medications, such as non-opioid alternatives (e.g., NSAIDs or nerve blocks) alongside minimal opioids to reduce dependency risks. Others may find relief through non-pharmacological therapies, such as physical therapy,

DOI: https://doi.org/10.26524/232.2 ISBN: 9789348505385

mindfulness techniques, or acupuncture. Advanced tools like pain assessment scales, genetic testing, and AI-driven predictive models help clinicians fine-tune treatment plans in real time. Beyond physical pain, emotional support is equally vital. Open communication between patients and healthcare providers ensures concerns are heard, adjustments are made promptly, and recovery feels less daunting. By embracing personalized, humanized care, we can transform postoperative recovery into a smoother, more empowering journey—one where pain is managed with both precision and compassion.

2.4.2 Enhanced Recovery After Surgery (ERAS) Protocols:

The journey to recovery after surgery can be challenging, but Enhanced Recovery After Surgery (ERAS) protocols have transformed postoperative care by prioritizing patient comfort, safety, and faster healing. These evidence-based guidelines focus on minimizing surgical stress, reducing complications, and helping patients regain their strength sooner. By combining preoperative education, optimized pain management, early mobilization, and personalized nutrition, ERAS ensures a smoother and more compassionate recovery experience. One of the key aspects of ERAS is empowering patients before surgery through clear communication, setting realistic expectations, and reducing anxiety. After the procedure, pain is managed proactively using a combination of medications and non-drug therapies, ensuring comfort without over-reliance on opioids. Early movement is encouraged—patients are gently guided to sit up, stand, and walk as soon as possible, which helps prevent complications like blood clots and lung infections. Nutrition also plays a vital role; patients receive balanced meals tailored to their needs, promoting healing and restoring energy. Beyond physical recovery, ERAS emphasizes emotional and psychological support, recognizing that a positive mindset aids healing. Hospitals implementing these protocols report shorter hospital stays, fewer readmissions, and higher patient satisfaction. Ultimately, ERAS humanizes postoperative care by putting the patient at the center, ensuring they recover not just quickly, but with dignity and confidence. This approach represents a significant step forward in making surgical recovery safer, kinder, and more efficient.

DOI: https://doi.org/10.26524/232.2 ISBN: 9789348505385

2.4.3 Infection Control Measures:

Postoperative care is a critical phase in a patient's recovery journey, and ensuring robust infection control measures is essential to promoting healing and preventing complications. Surgical site infections (SSIs) and other healthcare-associated infections (HAIs) can significantly delay recovery, increase hospital stays, and even lead to life-threatening conditions. To minimize these risks, healthcare facilities must adopt a comprehensive, patient-centered approach to infection prevention. One of the most effective strategies is strict adherence to hand hygiene protocols. Healthcare providers should consistently wash their hands with soap and water or use alcohol-based sanitizers before and after interacting with patients, changing dressings, or handling medical devices. Additionally, maintaining a sterile environment in wound care is crucial. This includes using aseptic techniques during dressing changes, properly disinfecting incision sites, and ensuring all surgical tools and surfaces are sterilized. Another key aspect is patient education. Patients should be informed about proper wound care at home, recognizing early signs of infection (such as redness, swelling, or unusual discharge), and the importance of keeping their surgical site clean and dry. Encouraging patients to follow prescribed antibiotic regimens (if applicable) and attend follow-up appointments helps in early detection and management of potential infections.Furthermore, hospitals should implement strict environmental cleaning protocols, including frequent disinfection of high-touch surfaces and proper disposal of contaminated materials. Proper use of personal protective equipment (PPE) by medical staff, such as gloves, masks, and gowns, further reduces cross-contamination risks. By integrating these infection control measures with compassionate, patient-focused care, healthcare teams can significantly reduce postoperative infections, ensuring safer and faster recoveries for their patients. A culture of vigilance, education, and empathy in postoperative care not only protects patients but also enhances trust and confidence in the healthcare system.

DOI: https://doi.org/10.26524/232.2 ISBN: 9789348505385

2.4.4 Telemedicine and Remote Monitoring:

Telemedicine and remote monitoring have revolutionized post-operative care, offering patients a safer, more convenient recovery experience while ensuring continuous medical support. After surgery, the traditional follow-up process often involves frequent hospital visits, which can be exhausting and stressful for patients, especially those with mobility challenges or living in remote areas. With telemedicine, patients can now consult their doctors through video calls, reducing the need for travel and minimizing exposure to hospital-acquired infections. This not only saves time and effort but also provides peace of mind, knowing that professional help is just a click away.

Remote monitoring takes this a step further by using wearable devices and smart technology to track vital signs such as heart rate, blood pressure, and oxygen levels in real time. These devices alert healthcare providers if any abnormalities are detected, allowing for early intervention before complications escalate. For patients, this means fewer surprises and a more personalized recovery plan tailored to their progress. The emotional reassurance of being monitored remotely can significantly reduce anxiety, as they feel supported even when at home. Moreover, telemedicine fosters better communication between patients and healthcare teams, enabling timely adjustments to medications, wound care instructions, or physical therapy routines. This human-centered approach ensures that recovery is not just medically effective but also emotionally comforting, putting patients at the heart of their healing journey. By blending technology with compassionate care, telemedicine and remote monitoring are transforming post-operative recovery into a smoother, more patient-friendly experience.

2.5 Minimally Invasive and Robotic-Assisted Surgeries

2.5.1 Minimally Invasive Techniques

Minimally invasive surgery (MIS) involves performing operations through small incisions, resulting in reduced trauma, faster recovery, and decreased hospital stays. Techniques such as laparoscopy and endoscopy have become standard in various surgical disciplines.

DOI: https://doi.org/10.26524/232.2 ISBN: 9789348505385

Table 1: Comparison Between Open Surgery and Minimally Invasive Surgery

Aspect	Open Surgery	Minimally Invasive Surgery
Incision Size	Large	Small
Recovery Time	Longer	Shorter
Hospital Stay	Extended	Reduced
Post-Operative Pain	Higher	Lower
Infection Risk	Increased	Decreased

Table: 1 Illustrates about the when comparing open surgery and minimally invasive surgery, the differences in patient experience and outcomes become quite clear. Open surgery involves a large incision, which allows surgeons direct access to the area being treated, but this comes with significant drawbacks. Patients undergoing open surgery often face a longer and more challenging recovery period, with extended hospital stays due to the body needing more time to heal. Post-operative pain is typically higher because of the larger wound, and the risk of infection increases due to greater exposure of internal tissues. On the other hand, minimally invasive surgery uses small incisions, specialized tools, and advanced imaging techniques to perform procedures with far less trauma to the body. This approach leads to a much smoother recovery—patients experience less pain after surgery, spend fewer days in the hospital, and return to their daily activities much sooner. Additionally, the smaller incisions reduce the likelihood of infections, making it a safer option for many patients. The choice between these two methods depends on the patient's condition, the complexity of the procedure, and the surgeon's expertise. However, minimally invasive techniques are often preferred when possible, as they offer a gentler experience with fewer complications. For patients, this means less physical strain, quicker healing, and an overall smoother journey back to health. Advances in medical technology continue to make minimally invasive surgery an increasingly viable and beneficial option for many types of procedures.

DOI: https://doi.org/10.26524/232.2 ISBN: 9789348505385

2.5.2 Robotic-Assisted Surgeries

Robotic-assisted surgery enhances the capabilities of surgeons by providing greater precision, flexibility, and control. Systems like the da Vinci Surgical System have been widely adopted for procedures such as prostatectomies and hysterectomies. In October 2024, a pioneering fully robotic double lung transplant was performed at NYU Langone Health using the da Vinci Xi system. This minimally invasive approach required smaller incisions and offered quicker recovery, marking a significant milestone in transplant surgery. Robotic-assisted surgeries have revolutionized both pre- and post-operative care, offering patients and surgeons greater precision, faster recovery times, and improved outcomes. Before surgery, advanced robotic systems enable highly detailed pre-operative planning through 3D imaging and virtual simulations. Surgeons can study a patient's anatomy in depth, identifying potential challenges and tailoring the procedure to minimize risks. This level of preparation reduces uncertainties, easing patient anxiety and setting realistic expectations. Additionally, robotic systems allow for smaller, more precise incisions, which means less trauma to surrounding tissues, a key factor in reducing pain and speeding up healing after surgery. In the post-operative phase, patients benefit from reduced complications such as infections, blood loss, and prolonged hospital stays. The minimally invasive nature of robotic surgery means less scarring, fewer post-surgical restrictions, and a quicker return to daily activities. Pain management is also more effective, as smaller incisions require fewer opioids, lowering the risk of dependency. Furthermore, robotic precision minimizes damage to nerves and muscles, preserving functionality—especially important in delicate procedures like prostatectomies or gynecological surgeries. Patients often report higher satisfaction due to these advantages, feeling reassured by the blend of cutting-edge technology and personalized care.

Overall, robotic-assisted surgeries enhance every stage of treatment, combining human expertise with technological innovation to deliver safer, more efficient, and compassionate healthcare. Patients not only experience better medical results but also a smoother, more comfortable journey from preparation to recovery.

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Figure 1: Robotic-Assisted Surgical System

2.6 Integration of Artificial Intelligence in Surgery

2.6.1 AI in Surgical Planning and Execution

Artificial intelligence (AI) is revolutionizing surgical planning and execution, enhancing precision, safety, and outcomes in both pre- and post-operative care. Before surgery, AI assists in meticulous planning by analyzing medical imaging—such as CT scans, MRIs, and X-rays—with unparalleled accuracy. Advanced algorithms can create 3D models of a patient's anatomy, allowing surgeons to visualize complex structures, anticipate challenges, and tailor their approach to individual needs. Predictive analytics also help assess surgical risks by evaluating a patient's medical history, genetics, and lifestyle factors, enabling personalized intervention strategies. This not only improves decision-making but also reduces unexpected complications, giving patients greater confidence ahead of their procedures. During surgery, AI-powered tools like robotic-assisted systems enhance a surgeon's precision by minimizing tremors and enabling minimally invasive

DOI: https://doi.org/10.26524/232.2 ISBN: 9789348505385

techniques. Real-time AI analytics can monitor vital signs, blood loss, and tissue responses, alerting the surgical team to potential issues before they escalate. Some systems even provide augmented reality overlays, projecting critical anatomical landmarks onto the surgeon's field of view to avoid damaging vital structures. This synergy between human skill and machine intelligence leads to shorter operation times, smaller incisions, and faster recoveries. Post-operatively, AI continues to play a vital role in recovery monitoring. Wearable devices and smart sensors track wound healing, detect early signs of infection, and predict complications like blood clots or organ dysfunction. AI-driven virtual assistants provide patients with personalized rehabilitation guidance, while remote monitoring ensures timely medical interventions if needed. By streamlining follow-up care, AI reduces hospital readmissions and accelerates recovery, ensuring patients return to their daily lives with minimal disruption. Ultimately, AI in surgery isn't about replacing human expertise—it's about empowering healthcare teams to deliver safer, more efficient, and compassionate care at every stage of a patient's journey.

Case Study: Deep wound - Automated Postoperative Wound Assessment

Researchers developed "Deepwound," a convolutional neural network designed to classify surgical wounds and detect complications, demonstrating AI's potential in postoperative care.

2.6.2 AI in Post-Operative Documentation:

The integration of artificial intelligence (AI) into post-operative documentation is transforming the way healthcare professionals manage patient care before and after surgery. In the pre-operative phase, AI plays a crucial role in streamlining documentation by automating the collection and analysis of patient histories, risk assessments, and consent forms. This not only reduces administrative burdens but also minimizes human error, ensuring that critical information is accurately recorded. AI-powered tools can flag potential complications based on a patient's medical history, allowing surgeons to tailor their approach and optimize

DOI: https://doi.org/10.26524/232.2 ISBN: 9789348505385

outcomes. For example, predictive algorithms can assess the likelihood of post-operative infections or adverse reactions, enabling proactive measures to be taken.

After surgery, AI continues to enhance documentation by generating detailed, real-time reports on a patient's recovery. Natural language processing (NLP) tools can transcribe surgeons' notes, convert voice recordings into structured data, and even summarize key findings for the medical team. This ensures continuity of care and allows clinicians to focus more on patient interaction rather than paperwork. AI can also monitor vital signs and alert staff to any deviations from expected recovery patterns, facilitating early intervention. Additionally, AI-driven analytics help identify trends in post-operative outcomes, contributing to improved surgical protocols and personalized recovery plans. By automating routine tasks, AI empowers healthcare providers to deliver more compassionate, efficient, and precise care—bridging the gap between technology and human touch in the critical phases of surgical treatment.

2.6.3 Augmented Reality in Surgical Procedures:

Augmented Reality (AR) is revolutionizing surgical procedures, enhancing both preoperative planning and postoperative care with remarkable precision and patient-centered benefits. In the preoperative phase, AR allows surgeons to visualize complex anatomical structures in 3D by overlaying digital models onto the patient's body using specialized headsets or screens. This immersive technology helps in meticulously planning incisions, identifying critical blood vessels or nerves, and even simulating the procedure beforehand, reducing uncertainties and improving surgical outcomes. For patients, this means shorter operation times, minimized risks, and personalized surgical strategies tailored to their unique anatomy. Surgeons can also use AR to explain the procedure in an interactive way, easing anxiety and fostering trust by visually demonstrating what will happen during surgery. Postoperatively, AR continues to play a vital role in recovery and follow-up care. By superimposing real-time data, such as healing progress or implant

DOI: https://doi.org/10.26524/232.2 ISBN: 9789348505385

positioning onto the patient's body, healthcare providers can monitor recovery without invasive techniques. Physical therapists can use AR-guided exercises to ensure patients move correctly, preventing complications and speeding up rehabilitation. Additionally, remote specialists can collaborate through AR interfaces, offering expert advice during follow-ups, which is especially valuable for patients in rural areas. The emotional and psychological benefits are equally significant, as patients gain clarity about their recovery process, reducing stress and promoting adherence to postoperative instructions. Ultimately, AR bridges the gap between technology and compassionate care, making surgeries safer, recoveries smoother, and medical communication more transparent. It's not just about cutting-edge tools it's about empowering both surgeons and patients with clarity, confidence, and a human touch in every step of the surgical journey.

Figure 2: Augmented Reality in Surgery

DOI: https://doi.org/10.26524/232.2 ISBN: 9789348505385

2.6.4 Enhanced Recovery After Surgery (ERAS) Protocols

Enhanced Recovery After Surgery (ERAS) protocols represent a transformative approach to surgical care, designed to optimize patient outcomes, accelerate recovery, and minimize complications both before and after surgery. These evidence-based guidelines focus on a holistic, patient-centered model that begins in the preoperative phase and extends through postoperative care. Before surgery, ERAS emphasizes thorough patient education to alleviate anxiety and set realistic expectations. Nutritional optimization, including carbohydrate loading up to two hours before surgery, helps maintain metabolic balance and reduces surgical stress. Additionally, avoiding prolonged fasting and encouraging hydration improve the body's readiness for the procedure. Prehabilitation—incorporating light exercise, smoking cessation, and alcohol moderationstrengthens the patient's resilience, ensuring they enter surgery in the best possible condition. Postoperatively, ERAS protocols prioritize early mobilization to prevent complications like blood clots and muscle weakness. Pain management shifts away from heavy opioid use, favoring multimodal techniques such as regional anesthesia and non-opioid medications to enhance comfort while reducing side effects. Early oral intake is encouraged to restore gut function and promote healing, supported by structured discharge planning to ensure a smooth transition home. By integrating these strategies, ERAS not only shortens hospital stays but also enhances recovery quality, empowering patients to return to their daily lives with confidence. This compassionate, science-backed approach reflects a commitment to treating the whole person—not just the surgical condition—fostering healing, dignity, and well-being at every step.

Table 2: Components of ERAS Protocols

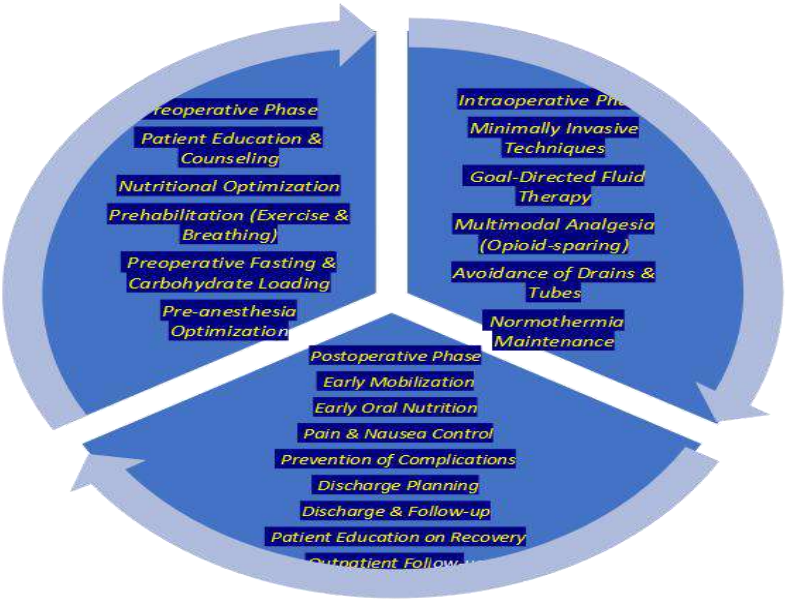
Phase	Strategies
Preoperative	Patient education, nutritional optimization
Intraoperative	Minimally invasive techniques, multimodal analgesia
Postoperative	Early mobilization, early oral feeding

DOI: https://doi.org/10.26524/232.2 ISBN: 9789348505385

Table:2 Illustrates thatThe table highlights essential strategies for optimizing patient outcomes before, during, and after surgery, emphasizing a holistic and patient-centered approach. In the **preoperative phase**, patient education plays a crucial role in alleviating anxiety and setting realistic expectations. When patients understand their procedure, recovery process, and potential risks, they feel more empowered and engaged in their care. Nutritional optimization is equally important, as a well-nourished body heals faster and withstands surgical stress better. For malnourished patients, dietary adjustments or supplements may be recommended to improve immunity, reduce complications, and speed up recovery. These steps ensure that patients enter surgery in the best possible condition, both physically and mentally. During the **intraoperative phase**, minimally invasive techniques—such as laparoscopic or robotic-assisted surgery help reduce tissue damage, blood loss, and postoperative pain. Smaller incisions mean faster healing and fewer complications, allowing patients to return to their daily lives sooner. Multimodal analgesia, which combines different pain relief methods (such as nerve blocks and non-opioid medications), minimizes reliance on opioids and reduces side effects like nausea and drowsiness. This approach ensures patients remain comfortable while lowering the risk of long-term opioid dependence. In the **postoperative phase**, early mobilization encourages patients to move as soon as safely possible, preventing complications like blood clots, muscle weakness, and pneumonia. Gentle movement also boosts circulation and mental well-being. Similarly, early oral feeding resuming liquids and soft foods shortly after surgery supports gut function, maintains energy levels, and accelerates recovery. Together, these strategies promote healing from the inside out, reducing hospital stays and improving overall satisfaction.

By integrating these phases seamlessly, healthcare providers create a compassionate, efficient surgical journey that prioritizes patient comfort, safety, and long-term well-being. Each step is designed to work in harmony, ensuring patients feel supported at every stage—from preparation to recovery.

DOI: https://doi.org/10.26524/232.2 ISBN: 9789348505385



Flowchart 1: ERAS Protocol Implementation

2.6.5 Clinical Trials:

Ongoing clinical trials continue to explore innovative surgical techniques and postoperative care strategies. For instance, Mayo Clinic is conducting studies to develop advanced risk models based on preoperative and intraoperative data to predict postoperative complications.

Table 3: Ongoing Clinical Trials in Postoperative Care:

Study Title	Institution	Objective
Innovative Methods for Real-TimeRisk Modeling	Mayo Clinic	Develop risk models for postoperative complications
AI-Assisted Surgical Workflow Analysis	NYU Langone	Enhance surgical efficiency using AI

DOI: https://doi.org/10.26524/232.2 ISBN: 9789348505385

The table highlights two groundbreaking studies focused on improving surgical outcomes through advanced technology, addressing both pre- and post-operative care. The first study, Innovative Methods for Real-Time Risk Modeling, conducted by the Mayo Clinic, aims to develop sophisticated risk models to predict postoperative complications. This research is pivotal in the preoperative phase, as it equips healthcare teams with actionable insights to assess patient-specific risks before surgery. By analyzing factors like medical history, current health status, and potential surgical challenges, these models can stratify patients into risk categories, enabling personalized care plans. For example, a high-risk patient might receive optimized pre-surgical interventions, such as tailored nutrition or physical therapy, to mitigate complications. Postoperatively, the real-time aspect of these models allows clinicians to monitor recovery dynamically, flagging early signs of infections or other issues, thus enabling timely interventions. This proactive approach not only improves patient safety but also reduces hospital readmissions, easing the emotional and financial burden on patients and families. The second study, AI-Assisted Surgical Workflow Analysis by NYU Langone, targets intraoperative efficiency but has significant pre- and post-operative implications. By using AI to analyze surgical workflows, the study identifies bottlenecks or inefficiencies in procedures, which can inform preoperative planning. For instance, AI might reveal that certain equipment setups or team configurations reduce delays, allowing hospitals to standardize best practices beforehand. Postoperatively, the data can be used to refine recovery protocols—such as optimizing anesthesia use or incision techniques—to minimize pain and accelerate healing. Both studies underscore a shift toward precision surgery, where technology bridges gaps in care continuity. For patients, this means fewer surprises, faster recoveries, and more confidence in their surgical journey. For healthcare providers, it translates to data-driven decisions that enhance both outcomes and operational harmony, ultimately humanizing the often-daunting experience of surgery.Together, these initiatives reflect a growing emphasis on integrating technology to address the holistic surgical experience—from preparation to recovery ensuring that care is not only cutting-edge but also compassionate and patient-centered.

DOI: https://doi.org/10.26524/232.2 ISBN: 9789348505385

Conclusion

Advancements in surgical procedures and postoperative care, including minimally invasive techniques, robotic assistance, AI integration, AR applications, and ERAS protocols, have collectively transformed patient outcomes. Ongoing research and clinical trials continue to push the boundaries, promising a future with even more refined and effective surgical interventions. Surgical innovation is a cornerstone of modern healthcare, playing a pivotal role in improving patient outcomes and expanding the possibilities of surgery. From the earliest surgeries performed in ancient civilizations to today's cutting-edge robotic systems and minimally invasive techniques, the evolution of surgery has been nothing short of remarkable. As surgical technologies continue to evolve, we can expect further breakthroughs that will enhance precision, minimize risks, and shorten recovery times. The integration of these innovations not only transforms the surgical field but also improves quality of life for patients across the globe. These advancements not only enhance surgical precision but also significantly reduce the burden on healthcare systems by shortening hospital stays and improving patient outcomes. In conclusion, the ongoing innovations in surgical procedures and post-operative care are transforming patient experiences, making surgeries safer, less invasive, and fostering quicker and more effective recovery. These advancements mark a new era in healthcare, where patient-centered care is at the forefront.

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DOI: https://doi.org/10.26524/232.2 ISBN: 9789348505385

CHAPTER 3

MANAGING COMPLEX MEDICAL CONDITIONS IN ACUTE CARE SETTING

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Abstract

Managing complex medical conditions in an acute care setting presents unique challenges due to the severity and multidimensional nature of patients' health issues. Acute care environments, including emergency departments, intensive care units (ICUs), and acute medical units (AMUs), are often characterized by high-stress situations, rapid decision-making, and the need for multidisciplinary collaboration. Patients with complex medical conditions typically present with multiple coexisting chronic diseases, polypharmacy, acute exacerbations, and unstable physiological conditions that require tailored and dynamic treatment approaches. This abstract explores the key strategies and

DOI: https://doi.org/10.26524/232.3 ISBN: 9789348505385

challenges associated with managing such patients in acute care settings, focusing on assessment, rapid stabilization, decision-making frameworks, interdisciplinary team roles, and patient-centered care. It emphasizes the importance of individualized treatment plans, evidence-based interventions, and timely interventions in preventing further deterioration and improving patient outcomes. The article also addresses the integration of technology, advanced diagnostics, and continuous monitoring in supporting the clinical decision-making process and ensuring the safety and well-being of patients with complex medical conditions. Effective management requires not only clinical expertise but also strong communication skills, adaptability, and a collaborative approach to care.

Key words: Complex, Acute, care, settings, Medical conditions, critical, terrible, severe life threatening, dangerous, vital, serious. emergency, complicated.

3.1 Introduction

Chronic diseases are the major cause of death (59%) and disability worldwide, representing 46% global disease burden. According to future hospital commission of the Royal college of physicians, Medical Division (MD) will be responsible for all hospital medical services, from emergency to specialist wards. The Hospital Acute Care Hub will bring together the clinical areas of the MD that focus on the management of acute medical patients. The Chronic Care Model (CCM) places the patient at the center of the care system enhancing the community's social and health support, pathways and structures to keep chronic, frail, poly-pathological people at home or out of the hospital. The management of such patients in the hospital still needs to be solved. Hereby, we propose an innovative model for the management of the hospital's acute complex patients, which is the hospital counterpart of the CCM.

The target population are acutely ill complex and poly-pathological patients (AICPPs), admitted to hospital and requiring high technology

DOI: https://doi.org/10.26524/232.3 ISBN: 9789348505385

resources. The mission is to improve the management of medical admissions through pre-defined intra-hospital tracks and a global, multidisciplinary, patient-centered approach. The ACCM leader is an internal medicine specialist (IMS) who summarizes health problems, establishes priorities, and restores health balance in AICPPs.

3.2 Research Objectives

- Identify complex medical conditions in acute care setting
- To identify treatment approaches in acute care setting
- To explore various treatment approaches in acute care setting
- Examine case studies on complex medical conditions in acute care nursing

3.3 Research Methodology

In the research study the researcher has used secondary data. The data has been collected from research papers, published materials, online websites, and survey reports published by various research organisations.

3.4 Acute Complex Care Model (ACCM)

The model, object of the present work, is the hospital counterpart of the Chronic Care Model and is similarly aimed to ensure efficacious and effective care of complex and poly-pathological patients when they are hospitalized for acute diseases.The target population are acutely ill complex and poly-pathological patients (AICPPs), admitted to hospital and requiring high technological resources.

The mission is to improve management of medical admissions through pre-defined intra-hospital tracks

3.5 High-dependency areas in internal medicine (HDA)

According to literature, 20% of people admitted to IMWs require more frequent clinical and nursing monitoring than it is provided in ordinary wards, even if less than in ICU, in order to support vital organs

DOI: https://doi.org/10.26524/232.3 ISBN: 9789348505385

and functional recovery . These areas, here called HDAs, but often called intermediate care units (IMCU), have shown to improve the outcome of ICU patients. According to a recent multicenter European cohort study across 17 European countries, patients admitted to ICUs with an IMCU

The role of internal medicine is heterogeneous and the activity of the internists also varies in different areas. For example, the patient care provided by an internist in a local hospital or in a referral hospital is often different. In some circumstances internists act as true subspecialists in their specific areas of interest. In others, they play an important role outside the hospital setting. In addition, the medical problems that an internist faces cannot easily be distinguished from those of other medical specialties. Certainly, the internists have to deal with older adults, in whom comorbidities and drug side effects and interactions are common while evidence based treatments are often lacking.

3.5.1 Role of internists

This highlights the importance of defining the basic knowledge and skills that any European internist must possess, regardless of workplace or personal interests. However, it is difficult to distinguish between essential and advanced competencies. Moreover, there is a tendency to misinterpret what should be acquired during specialised training with professional skills acquired later. These concerns are not unique for Europe. In the U.S. there have been several initiatives to establish what skills should be acquired by competent internists. However, the results in general have been dissimilar and are not very operative .

Internal medicine in southern European countries is essentially considered as an independent specialty and has a great influence within their respective national health care systems, while in other European countries general internists are less common. In Spain, Internal Medicine Departments are responsible for more than 16% of all hospital discharges [5]. The Spanish Society of Internal Medicine (SEMI) has also an important role within the European Federation of Internal Medicine (EFIM) and, therefore, its position has a significant impact at the European level.

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3.5.2 Strategy of SEMI

According to the strategy of SEMI , the development of a "handbook of the competencies of the internist" has been established as a priority, which must be complementary to the Internal Medicine training programme revised in depth in 2007 [7]. In this spirit, the SEMI Board of Directors established a working group whose initial conclusions are reflected in this document and presented as a working document possibly useful to open a debate in this journal among the different Internal Medicine national societies of the European community.

To bridge the educational gap, there is a need to develop a curriculum with 'minimum AI in nursing competencies', a set of domains and concepts that all entry-level nurses should receive as part of their basic nursing education. Some organizations, such as the American Association of Colleges of Nursing (AACN), are moving to a competency-based education with a technology domain crossing over all domains due to the current need for this topic in all levels of nursing education. Similar efforts concurrently need to be made to support the development of these competencies among practising nurses, as well as nurse leaders where this material can be delivered through continuing education initiatives. Graduate nursing education also would benefit from the creation of opportunities for advanced AI education as well as the formation of sub-specializations in AI under health informatics programs. Specific recommendations are outlined in the summary Table 1 towards ensuring that a curriculum with 'minimum AI in nursing competencies' can be met, with the goal of having all nurses hold basic knowledge and competence related to AI use in nursing.

The principal role of internists is to provide medical care for adults. Certain professional attributes are required for the internist to be successful in a rapidly evolving world of medicine. As a member of health care team, the internist has to effectively coordinate the care provided by other professionals for the benefit of the patient. Internists should also facilitate and support the participation of patients in their own care and aid them in making decisions regarding health issues. The internist needs to be an advocate on health issues for both individual patients and the community at large. He or she must be able to communicate clearly with

DOI: https://doi.org/10.26524/232.3 ISBN: 9789348505385

both patients and colleagues alike. Furthermore, the internist will, in certain situations, require managerial and business skills. Finally, internists should be proficient in both teaching and scientific enquiry.

3.5.3 Task of internists

Major task of internists is the diagnosis and management of multiple medical problems that may be complex and are frequently of chronic nature. These disorders may be managed in an outpatient and/or inpatient setting, with or without the contribution of a subspecialist colleague. The internist must be able to recognize and evaluate the symptoms and signs of common diseases. The internist may also be faced with obscure symptoms or features of multisystem disease that require expert diagnostic evaluation. However, most internists will spend the majority of their time managing a relatively limited number of common medical problems.

Internists need to be capable of providing effective and compassionate patient care that focuses on maintaining health, preventing disease, and diagnosing and treating established illness. Internists should practice evidence-based medicine supported by sound clinical judgment. The following are essential tasks involved in the care of patients.

The medical interview is the initial step in the diagnostic process. Despite the ever-increasing technology available to physicians for the evaluation of patients, the medical history remains the most important and cost-effective tool. The internist needs to listen carefully to the patient and to use open-ended questions. He or she must be capable of recognizing the constellation of symptoms associated with different diseases and be familiar with symptoms suggestive of life-threatening or serious illness. Finally, the internist has to respect confidentiality and be sensitive to personal, cultural, and religious issues.

Internists need to have the ability to perform a thorough and skillful physical examination. Usually, this will be a focused examination guided by the patient's history. When examining patients, the internist should be empathetic and treat the patient with dignity. Forming and testing hypotheses is a pivotal component of the diagnostic evaluation carried out

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by internists. In order to establish a diagnosis, the internist has to put together a limited number of unifying hypotheses based on the clinical findings in the case. The internist attempts to either confirm or reject each hypothesis and thereby narrow the list of differential diagnoses. The internist should be familiar with fundamental aspects of clinical decision-making.

Depending on the diagnosis, the internist needs to consider a short-term or long-term management plan based on scientific evidence, clinical judgment, and patient preference. He or she should attempt to ensure that the selected treatment is cost-effective. All medical treatment must be founded on compassion and the best interests of the patient. Whenever possible, the internist should discuss the treatment options with the patient (and family members, when appropriate) and respect their preferences. He or she should emphasize strategies to improve compliance with therapy and encourage self-care. The internist should discuss the prognosis with the patient and consider limitation of therapy when appropriate, including 'do not resuscitate' (DNR) orders. Internists should also be capable of providing palliative care at the end of life. It is important that they recognize the need of acutely and chronically ill patients for nutritional support and physical therapy. Internists should always strive to avoid inflicting injury on patients — 'primum non nocere'.

Figure 1 : Post Acute Care Facility and Team Health

DOI: https://doi.org/10.26524/232.3 ISBN: 9789348505385

Post-acute care refers to a range of healthcare services provided to individuals recovering from illness, surgery, or injury after their discharge from an acute care hospital. The primary goal is to support recovery, promote functional independence, and prevent readmission to hospitals. Services may include physical therapy, occupational therapy, speech therapy, and specialized nursing care.

Types of Post-Acute Care Facilities:

1. **Skilled Nursing Facilities (SNFs):** These facilities offer 24/7 nursing care and rehabilitation services for patients requiring short-term recovery or long-term care.
2. **Inpatient Rehabilitation Facilities (IRFs):** IRFs provide intensive rehabilitation therapies and are suitable for patients needing comprehensive therapy services.
3. **Long-Term Care Hospitals (LTCHs):** LTCHs deliver extended medical care for patients with clinically complex conditions requiring prolonged hospitalization.
4. **Home Health Care:** For patients who prefer recovering at home, healthcare professionals provide services such as nursing care, physical therapy, and assistance with daily activities.
5.

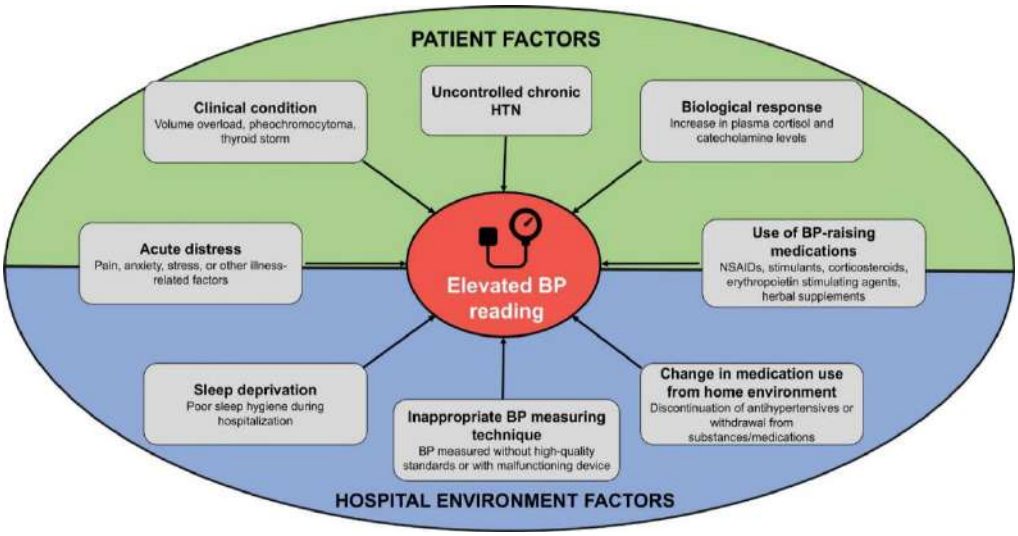

Figure 2 : Hospital and environmental factors

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Managing complex medical conditions in acute care settings necessitates a collaborative approach, involving multidisciplinary teams working together to provide comprehensive care. Visual representations of such teamwork can be insightful. Here are some images that depict this collaborative effort.

- **Doctor Talks to Patient:** An image of a doctor engaging in conversation with a patient, exemplifying patient-centered communication.
- **Emergency Medical Service Team:** A depiction of paramedics assisting a patient, highlighting the role of emergency care teams.
- **Healthcare Coordination:** Visuals illustrating coordinated care among healthcare professionals, emphasizing the importance of teamwork in managing complex cases.

These images underscore the significance of collaborative efforts in delivering effective care to patients with complex medical needs in acute settings.

3.5.4 Multiple roles of internists

Internists must have the ability to perform the diagnostic and therapeutic procedures considered essential for the practice of internal medicine. They should be aware of the utility, indications and contraindications, complications, and cost of commonly applied procedures. The types of procedures performed by internists may vary between individual physicians, institutions, or countries. Examples of procedures usually performed by internists throughout Europe include phlebotomy, collection of arterial blood specimens and analysis of blood gases, electrocardiography, lumbar puncture and thoracentesis. However, with evolving technology, internists in some countries have begun to perform procedures that have belonged to subspecialties of internal medicine, such as cardiac ultrasound.

In addition to the communication skills required for obtaining a medical history, internists should be capable of explaining carefully to patients and their families the results of the diagnostic process and the

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treatment required. Particularly important is a clear description of the appropriate therapeutic measures, including the explanation of the effects of medications, their efficacy, side effects, and interactions. Internists should be able to involve patients in the decision-making process and to offer them rational choices when possible. Internists should also be able to communicate effectively with other physicians and health care professionals using verbal, written, and electronic media.

Internists should be familiar with the principles of professional behavior as outlined by the Charter on Medical Professionalism published jointly by the European Federation of Internal Medicine, the American College of Physicians, and the American Board of Internal Medicine . They should honor the principles of confidentiality, altruism, autonomy, and social justice in the practice of medicine. Internists should put patients' well-being first and exhibit responsible attitudes toward society. They should respect the views of patients and act with honesty, empathy, and sensitivity. They should promptly inform patients (or their relatives) if a medical error occurs. Internists should display sensitivity to diversity in the community with respect to religion, culture, and socioeconomic status.

They should practice medicine according to methods of best practice guidelines. They should be conscientious and recognize the importance of attention to detail. Internists need to understand the importance of lifelong learning. They should recognize their personal limitations and be open to constructive criticism. They should respect colleagues and be willing to consult them when needed. Internists should maintain comprehensive, timely, and legible medical records.

Internists should apply evidence-based and cost-effective strategies to the prevention, diagnosis, and treatment of disease. They should be capable of utilizing the resources, providers, and systems necessary to provide optimal patient care. Internists should be familiar with the essence of collaboration and teamwork in medicine. They need to know how a team works effectively and how to be a team leader. In addition, internists should be familiar with the relevance and benefit of clinical governance and be willing to accept professional regulations and assessment of performance. Internists should be aware of time-

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management strategies. They should make effective use of available resources and search for ways to cope with bureaucracy. Internists should facilitate the implementation of quality programs in the clinical practice setting.

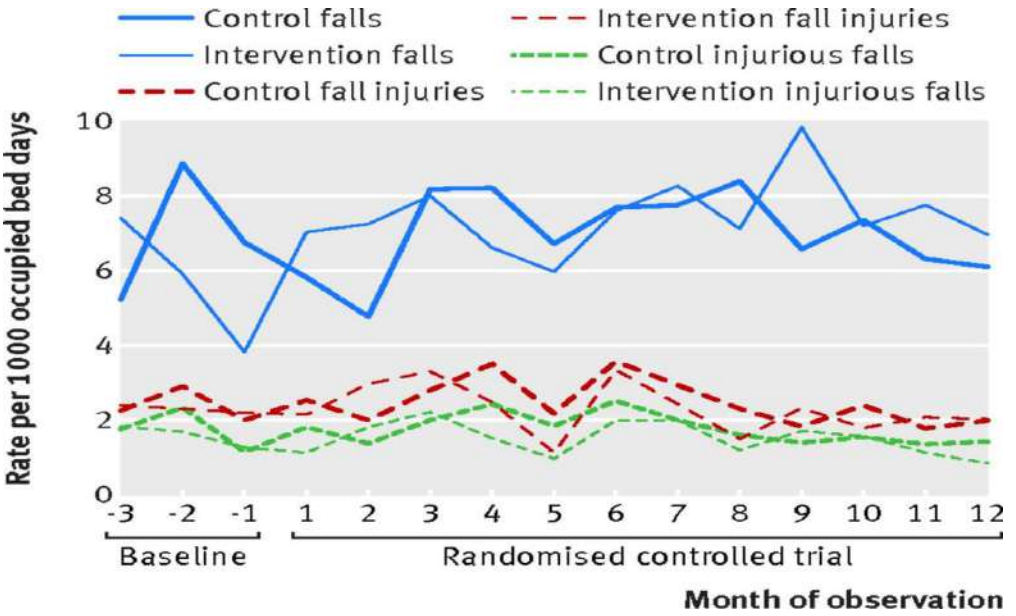

Figure 3: Rate per 1000 occupational beds

Acute care settings are specialized environments within healthcare facilities, such as emergency departments (EDs) and intensive care units (ICUs), designed to provide immediate and intensive treatment for patients experiencing severe or life-threatening conditions. Understanding the utilization and performance metrics of these settings is crucial for healthcare planning and resource allocation.

3.5.5 Key Statistics and Trends in Acute Care Utilization:

- **Emergency Department Visits:** In 2019, there were approximately 139.8 million ED visits in the United States, equating to about 42.7 visits per 100 persons. Notably, 13.1% of these visits resulted in hospital admissions.

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- **Hospitalization Rates:** The age-adjusted percentage of individuals aged 1–64 with a hospital stay in the past year decreased from 5.9% in 2009 to 5.1% in 2014, with a slight increase to 5.9% in 2019.
- **ICU Costs:** Between 2000 and 2010, annual costs for critical care medicine escalated by 92%, from $56.6 billion to $108 billion, representing 13.2% of hospital costs and 4.1% of national health expenditures in 2010.
- **Emergency Department Wait Times:** In South Australia, only 38% of "urgent" (category three) patients were seen within the recommended 30 minutes in 2023-24, significantly below the national average of 60%.
- **Patient Age Distribution:** In 2018, approximately 63.8% of inpatient cases treated for acute conditions in U.S. acute-care hospitals were among patients aged 65 years and older.

3.5.6 Visualizing Acute Care Data:

For graphical representations and more detailed statistics on acute care settings, consider exploring the following resources:

- **HCUP Fast Stats:** Provides interactive graphs and tables on topics like trends in inpatient stays and emergency department visits.
- **CDC FastStats:** Offers data visualizations on emergency department visits, including the number of visits and percentages resulting in hospital admissions.
- **SCCM Critical Care Statistics:** Presents statistics on critical care medicine, including ICU costs and utilization trends.

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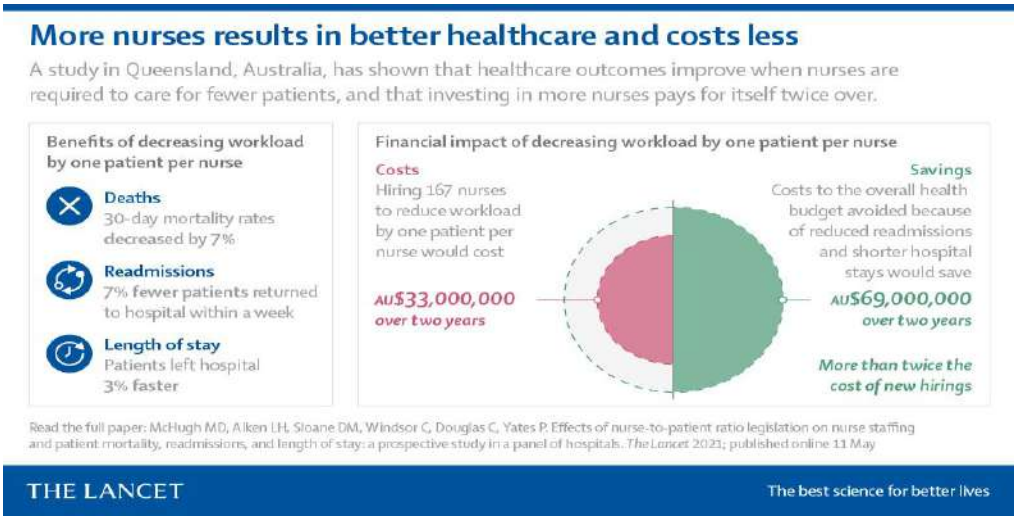

Figure 4: More nurses results healthcare and costsless

Nurses play a pivotal role in improving healthcare outcomes and reducing overall healthcare costs. Numerous studies have shown that investing in nursing staff and their roles in patient care can lead to significant reductions in healthcare costs, improved patient outcomes, and increased efficiency within healthcare settings. Here are some key points showing how nurses help in achieving better healthcare results while reducing costs.

3.6 Reduced Hospital Readmissions:

Nurses contribute significantly to reducing hospital readmissions, a major driver of healthcare costs. Effective nursing interventions such as discharge planning, patient education, and follow-up care (particularly for chronic conditions like heart failure and diabetes) can significantly reduce the risk of patients being readmitted within a short period. Research indicates that hospitals with higher nurse staffing levels tend to have lower readmission rates.

Example: A study published in the *American Journal of Managed Care* found that increased nurse staffing was associated with reduced readmission rates for patients with heart failure. This leads to cost savings by preventing unnecessary readmissions and reducing the burden on healthcare resources.

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3.6.1 Prevention of Hospital-Acquired Conditions (HACs):

Nurses are essential in preventing hospital-acquired infections, pressure ulcers, and other preventable conditions that increase patient length of stay and treatment costs. Nurses' involvement in early detection and monitoring can reduce complications, thereby minimizing the need for more costly interventions and extended stays.

Example: The *Institute of Medicine* has emphasized that improving nurse staffing levels can reduce adverse events such as infections, which are costly to treat and prolong hospital stays. By providing more vigilant care, nurses reduce the need for expensive treatments and hospitalizations.

3.6.2 Improved Patient Outcomes:

Well-staffed nursing teams lead to better patient outcomes, such as quicker recovery times, fewer complications, and higher satisfaction. Improved outcomes, in turn, reduce the need for costly interventions and re-hospitalizations.

Example: A study in the *Journal of Nursing Administration* found that hospitals with better nurse staffing had improved patient outcomes, including lower mortality rates and fewer complications. This directly correlates with reduced overall healthcare costs.

3.6.3 More Efficient Use of Resources:

Nurses, particularly advanced practice nurses (such as nurse practitioners and clinical nurse specialists), can take on many roles traditionaly performed by physicians, such as conducting assessments, providing treatment, and managing care for less complicated cases. This can free up physician time and reduce costs associated with unnecessary tests or consultations.

Example: Nurse practitioners have been shown to provide high-quality care in primary care settings, which helps reduce the burden on emergency departments and specialists, cutting healthcare costs by improving access to care and reducing unnecessary procedures.

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3.6.4 Effective Chronic Disease Management:

Nurses play a key role in the management of chronic diseases, including diabetes, hypertension, and chronic obstructive pulmonary disease (COPD). By engaging in patient education, regular monitoring, and coordination of care, nurses help patients manage their conditions, leading to better long-term outcomes and fewer acute exacerbations that result in costly emergency care.

Example: The *American Nurses Association* has highlighted that nurses' involvement in chronic disease management programs reduces emergency visits and hospital admissions, helping lower overall healthcare costs.

3.6.5 Patient Education and Empowerment:

By educating patients about their conditions, medications, and lifestyle changes, nurses empower patients to manage their health more effectively. This reduces unnecessary healthcare visits, decreases the likelihood of complications, and ensures patients are better prepared to handle their health challenges.

Example: Studies have shown that patient education on medication adherence, dietary changes, and self-care leads to lower overall healthcare utilization and a reduction in costly interventions.

3.6.6 Nurse-Led Clinics and Primary Care:

Nurse-led clinics, where nurses provide primary and preventive care, have been shown to reduce healthcare costs by offering more accessible and less expensive care options compared to traditional physician-led care.

Example: In the U.K., nurse-led clinics have demonstrated a reduction in healthcare spending while maintaining or improving care quality, particularly in managing minor ailments, chronic diseases, and preventive care.

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3.6.7 Reducing Emergency Department Overcrowding:

Nurses in urgent care settings and emergency departments can assess, triage, and treat less complex cases, ensuring that emergency services are used more efficiently. This reduces unnecessary emergency visits, which are expensive and often avoidable.

Example: Studies in *Nursing Economics* show that nurses involved in triage in emergency departments help reduce overcrowding and the unnecessary use of emergency services, leading to cost savings and more efficient patient flow.

Investing in nursing care and having adequate nursing staff in healthcare facilities leads to reduced healthcare costs, improved patient outcomes, and more efficient use of resources. Nurses' contributions directly impact reducing hospital readmissions, preventing adverse events, enhancing patient education, and managing chronic conditions effectively—all of which contribute to long-term savings in healthcare. Therefore, supporting nurses and optimizing their role in the healthcare system is a cost-effective strategy that leads to both better patient care and significant cost reductions in the healthcare system.

Teaching medical students and postgraduate trainees in internal medicine is a fundamental task of internists. They have to be familiar with advances in education, including problem-based learning as well as assessment and feedback. Internists need to serve as mentors and role models for students and physicians in training. They should also possess skills to deliver an effective presentation when teaching in a lecture format. Internists should demonstrate commitment to continuous professional development. The internist should always recognize personal errors and attempt to learn from them. He or she should become familiar with the use of information technology to access information and facilitate educational activities. The internist should identify areas for improvement and implement strategies, based on scientific evidence, to enhance patient care.AI algorithms can automate administrative tasks , prioritize patient needs and facilitate seamless communication in healthcare team (Stokes &palmer 2020).This enable nurses to focus more on direct patient care and ensures the efficient and coordinated delivery of health care services .

DOI: https://doi.org/10.26524/232.3 ISBN: 9789348505385

In order to meet the health care needs of individual patients and society at large throughout Europe, it is important that these competencies become part of medical school and postgraduate training curricula, as well as of continuing professional development programs in all European countries. The EBIM Working Group hopes this paper will stimulate constructive discussion and thoughtful debate, and that it will be followed by a collaborative effort to develop and endorse a European consensus.

As current residents in internal medicine we are quite interested in the direction of accreditation for internal medicine programs. In fact, at a recent ACP-Council of Associates meeting in Philadelphia, PA, residency reform was discussed in great detail. The recent proposal from the RRC-IM to change residency program accreditation from a process-based evaluation to outcomes-based is a welcomed idea (1). From our perspective, there are several benefits to be realized by the proposed changes. Judging the clinical competence of residency program graduates is a clear, objective measure of whether the training program is doing its intended goal of providing the community with well-trained physicians. Using the existing six clinical competencies as a background for further accreditation allows programs to establish a base by which they can proceed under the new model.

A more active, continually updated quality improvement process will mimic what is happening in other areas of medicine. The changes proposed by the RRC-IM will allow flexibility for program directors to be innovative and creative with residency education and prevent stagnation of graduate medical education. With ongoing internal assessments, residency programs will be able to change with the demands of society and adapt to problems more quickly. Over the years, these ideas can be shared among programs as evidence shows which educational aspects are effective and which ones are not. Also, by combining the requirements of the RRC with other rigorous site visits, i.e. JCAHO, this new model will eliminate the numerous redundancies faced by residency programs and their hospitals.

While we agree with most of the aspects of the RRC's proposed model, there are areas that need to be more adequately addressed. If we are

DOI: https://doi.org/10.26524/232.3 ISBN: 9789348505385

going to continue to use clinical competencies as the basis for judging the effectiveness of training programs, then there needs to be validated clinical competency measures in place before the proposed accreditation system is started. Even by using current exceptional programs as the model, if there is no benchmark, what is it that is being measured? The RRC could propose that these "˜exceptional' training programs do more controlled studies to prove the effectiveness of the clinical competencies and provide a true quality by which other programs can follow.

The proposed internal evaluation coordinator has great potential to improve the training program more quickly and responsively than the current framework. However, even with proposed external salary support and/or ACGME certification, there may still be the appearance of a conflict-of-interest if a faculty member at an institution is primarily responsible for that institution's accreditation. There may be no perfect answer to this dilemma but perhaps one solution could be having the RRC allow a representative from one local hospital serve as the overseer for another hospital's residency development.

Results

One hundred and twenty four articles were included that reported observational studies (n = 78), interventions (n = 34), tool development (n = 7), expert consensus (n = 2),quality improvement (n = 2), and reflection (n = 1). Most studies were conducted in developed countries and reported the perspective of patients (n = 33), nurses (n = 29), healthcare organisations (n = 7) or multiple perspectives (n = 50). Key words, key authors and organisations for patient-centred care were commonly recognised and provided a basis for the research. Fifty instruments measuring patient-centred care or its aspects were identified. Of the 34 interventions, most were implemented at the micro (clinical) level (n = 25) and appeared to improve care (n = 30). Four articles did not report outcomes. Analysis of the interventions identified three main types: i) staff-related, ii) patient and family-related, and iii) environment-related. Analysis of key findings identified five meta-narratives: i) facilitators of patient-centred care, ii) threats to patient-centred care, iii) outcomes of patient-centred care, iv) elements of patient-centred care, and v) expanding our understanding of patient-centred care.

DOI: https://doi.org/10.26524/232.3 ISBN: 9789348505385

Conclusion

Patient-centred care has become recognised as a central component of health care quality and delivery, with organisational support and integration into health policy globally. The burgeoning body of literature for patient-centred care is testament to conceptual growth over the past decade and the shift to operationalising patient-centred care. This review highlighted that patient-centred interventions have been successfully implemented in acute care contexts with positive clinical outcomes. Interventions appeared to improve patient care and staff and health service performance, which is a shift from previously reported mixed outcomes. This shift may reflect better understanding and more effective integration of patient-centred frameworks into health care over time. The longevity of patient-centred interventions needs further exploration, and future research should consider implementing interventions at the meso and macro levels to help sustain patient-centred processes. In addition, health services should consider staff, patient and organisational factors that may facilitate or threaten patient-centred care when planning interventions. Organisations should create a patient-centred culture supported by policies and systems, and equip staff with the personal skills, resources, and workforce needed to deliver patient-centred care effectively. Future research for patient-centred care should include specialised care settings, multi-disciplinary groups, families, and carers, and explore patient-related factors that influence patient-centred care. It is recommended that conceptual frameworks and healthcare policy are regularly updated to reflect current literature on the topic.

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CHAPTER - 4

TECHNOLOGY INTEGRATION IN MEDICAL SURGICAL NURSING

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Abstract

The integration of technology into med-surg nursing practices has ushered in a new era of efficiency, accuracy, and patient-centered care. From electronic health records to telehealth solutions, simulation training, and smart devices, technology is reshaping the way med-surg nurses approach their roles. Technologies like small wearable sensors that collect patient data and electronic management system that streamline process can alleviate time-consuming responsibilities. These efficiencies let

DOI: https://doi.org/10.26524/232.4 ISBN: 9789348505385

nurses focus on more critical tasks and quality patient time while reducing the risk of nurse burnout. Nursing integration is the capstone immersion experience designed to provide the student with knowledge synthesis and skills acquired during previous work .Artificial intelligence (AI) technologies like automated data analysis and have helped providers streamline diagnoses, improve accuracy, and forecast patient outcomes. All of these contribute positively to overall patient outcomes and general quality of care. What is Integrated Health Care? Integrated health care, often referred to as interprofessional health care, is an approach characterized by a high degree of collaboration and communication among health professionals .AI can enhance patient monitoring and support predictive analytics. Moreover, through AI-enabled technologies, nurses have the capability to continuously monitor patients' vital signs, detect early warning signs of deterioration and receive real-time alerts .

Key words: Technology, integration, case studies, best practices, evidenced based practices, surgical care, innovations, Artifical intelligence, Robotics . Human applications, accuracy, analysis

4.1 Introduction

The integration of technology into med-surg nursing practices has ushered in a new era of efficiency, accuracy, and patient-centered care. From electronic health records to telehealth solutions, simulation training, and smart devices, technology is reshaping the way med-surg nurses approach their roles. alleviate time-consuming responsibilities. These efficiencies let nurses focus on more critical tasks and quality patient time while reducing the risk of nurse burnout. Nursing integration is the capstone immersion experience designed to provide the student with an opportunity to synthesize the knowledge and skills acquired during previous coursework .Artificial intelligence (AI) technologies like automated data analysis and predictive analysis have helped providers streamline diagnosis, improve accuracy and forecast patient outcomes. Integrated health care , often referred to as interprofessional health care, is an approach characterized by a high degree of collaboration and communication among health professionals. AI can enhance patient

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monitoring and support predictive analytics. All of these contribute positively to overall patient outcomes and general quality of care. What is Integrated Health Care? Moreover, through AI-enabled technologies, nurses have the capability to continuously monitor patients' vital signs, detect early warning signs of deterioration and receive real-time alerts. AI can enhance monitoring patient status continuously and support all patient analytics.

Moreover, through AI-enabled technologies, nurses have the capability to continuously monitor patients' vital signs, detect early warning signs of deterioration and receive real-time alerts. We established the Nursing and Artificial Intelligence Leadership (NAIL) Collaborative, comprising interdisciplinary experts in AI development, biomedical ethics, AI in primary care, AI legal aspects, philosophy of AI in health, nursing practice, implementation science, leaders in health informatics practice and international health informatics groups, a representative of patients and the public, and the Chair of the ITU/WHO Focus Group on Artificial Intelligence for Health. The NAIL Collaborative convened at a 3-day invitational think tank in autumn 2019. Activities included a pre-event survey, expert presentations and working sessions to identify priority areas for action, opportunities and recommendations to address these. In this paper, we summarize the key discussion points and notes from the aforementioned activities.

4.2 Research Objectives

- Identify common technology in Nursing
- Recognize development of technology in nursing
- Implement effective monitoring and assessment of technology in nursing
- Examine case studies on technology implementations in nursing
- Apply Evidence- based best practices in technology in nursing

4.3 Research Methodology

In the research study the researcher has used secondary data. The data has been collected from research papers, published materials, online websites, and survey reports published by various research organisations.

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4.4 Current discourse about AI impact in Nursing :

AI technologies have the potential to propel nursing capabilities and enable nurses to provide more evidence-based and personalized care to their patients. AI technologies have the potential to support responsive and evidence-based nursing practice through the provision of cognitive insights and decision support, for example, through visualization of patient trends that can provide insights for both immediate patient care as well as long-term planning and management. Proponents of AI also point to the potential for AI to free-up time for healthcare professionals to dedicate in improving the relationships with patients

Indeed, the time that can be freed up for nurses can be spent on fostering relational care, supporting nurses' ability to develop broader insights into the contexts of patients' health. Moreover, time that is freed up for nurses can be spent on engaging with recent research and supporting up-to-date knowledge of the evidence to support practice, activities that are among the most common to be put aside for lack of time and opportunity

Along with the potential or positive outcomes, AI technologies can have unintended consequences that can have a potential negative impact on the nursing profession and on the main aims of nursing practice. For example, there exists the risk for AI to perpetuate or systematically embed existing human biases into systems such as a recent case where a clinical decision algorithm introduced racial bias by prioritizing care for less sick white patients over sicker Black patients in the United States . Beyond impacts on clinical and health outcomes, AI in nursing could also exacerbate the push towards market-driven goals of efficiency. There exists a very real potential to instead reallocate newly freed-up time towards increasing the volume of patients and tasks assigned to nurses. Hence efficiency goals (i.e. quantity of care) run the risk of eclipsing the opportunities that the use of AI in health systems are meant to create (i.e. quality of care).

Such negative impacts are not inevitable. For instance, AI also has the potential to make visible and remove human bias and improve decision making , for example by discovering and quantifying the impact of taken

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for granted variables such as sex, gender, ethnicity, or race (while we recognize that race has no scientific meaning, experiences of racism have clear links to health outcomes), for which our understanding of impacts are emergent . Ensuring the best possible consequences from AI for nursing will depend on which values and priorities end up guiding the development of AI tools, and whether they implemented with an adequate understanding of both their potentials and limitations. on can occur for several reasons, including severe pain disturbed sleeping pattern due to pain, infection, constipation and fluid and electrolyte imbalance.

Placed in nurses' hands, unintended consequences of using AI tools can be direct and serious, reflecting the same concerns discussed by O'Keefe-Mccarthy in their classical discussion of the mediating role of technology in the nurse-patient encounter and the subsequent effects on the moral agency of nurses. Given the potential magnitude of the impact of AI tools, there is an ethical imperative for nurses to have a minimum basic understanding of how these tools come to be developed, what informs them, and the implications of using such tools on their clinical judgement and practice. The responsibility of having a minimum understanding of AI that all nurses must develop is arguably no different from the requirement of nurses to have a basic understanding and competency in the use of any type of new technology or tool that they use in their practice.

Notwithstanding these important implications of AI for the nursing profession, there is a growing, but still a limited critical discourse in the nursing literature (Brennan & Bakken, 2015; Linnen et al., 2019). In the sphere of nursing education, addressing AI remains, largely, absent. Nursing curricula continue to struggle with incorporating basic nursing informatics competencies as part of basic nursing education (Ronquillo et al., 2017; Topaz et al., 2016), which will become more worrisome given the growing interest in using AI tools in health systems. In other words, there is the potential that the challenges that nurses currently face regarding the effective use of and potential for leading innovations in health information technologies can be further compounded if a gap in AI knowledge is added to existing gaps in basic health informatics knowledge.

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Nurses are the group of healthcare professionals who generate the most data in health systems, as they complete the most documentation . Nurses play an important role in collecting data that might be eventually used by AI tools, as evidenced by work that has linked the nature and patterns of nursing documentation practices with patients' mortality. There nevertheless appears to be limited understanding of the link between nursing documentation and how these documents may be used for purposes beyond immediate clinical decision making, administrative reporting and keeping a legal record as taught in basic nursing education. While understanding these aspects of documentation has been sufficient to inform nursing practice in the past, we argue that nurses should also understand the relationship between their clinical documentation and AI. For one, understanding the nature and quality of data that are collected and documented as part of the nursing practice, can and do, directly inform AI tools. Also, AI-based clinical decision support has various levels of uncertainty that requires clinician interpretation . When deciding to follow an AI-based recommendation, nurses serve as the last line of evaluation for the appropriateness of an intervention . Moreover, a significant current challenge is that many nursing educational programmes both in entry-level nursing education and continuing education of professional nurses do not have enough expertise in teaching health informatics and AI technologies to effectively address this gap in AI understanding.

To bridge the educational gap, there is a need to develop a curriculum with 'minimum AI in nursing competencies', a set of domains and concepts that all entry-level nurses should receive as part of their basic nursing education . Some organizations, such as the American Association of Colleges of Nursing (AACN), are moving to a competency-based education with a technology domain crossing over all domains due to the current need for this topic in all levels of nursing education. Similar efforts concurrently need to be made to support the development of these competencies among practising nurses, as well as nurse leaders, where this material can be delivered through continuing education initiatives.

DOI: https://doi.org/10.26524/232.4 ISBN: 9789348505385

Graduate nursing education also would benefit from the creation of opportunities for advanced AI education as well as the formation of sub-specializations in AI under health informatics programs. Specific recommendations are outlined in the summary Table 1 towards ensuring that a curriculum with 'minimum AI in nursing competencies' can be met, with the goal of having all nurses hold basic knowledge and competence related to AI use in nursing.

4.5 Nurses role in all stages of AI:

4.5.1 From development to implementation

Currently, nurses are often end-users of technologies that incorporate AI (e.g. advanced clinical decision support) rather than collaborators in development. As such, there are other calls for nursing: to take the driver's seat in determining which aspects of nursing care can be delegated and to be key actors in introducing AI technologies in health systems In a clinical context, the AI development lifecycle must start with a thorough understanding of the clinical question and clinical workflows, as these ultimately shape the successful use and subsequent impact of these technologies on patient and organizational outcomes. AI development teams should be interdisciplinary, including nurses, to ensure that contributions of computer science and engineering members of teams are grounded in clinical realities of the provision of patient care.

Nurses' contributions to all stages of the AI development lifecycle become crucial when recognizing the intertwining of the consequences accompanying the use of AI in nursing (both positive and negative) with the foundational underpinning of the nursing profession as being concerned with beneficence towards patients, communities, and populations, and advocacy for social justice. Patient, family, and community advocacy and the promotion of person-centred care comprise foundational functions of the nurse. As such, nurses are uniquely positioned to propose how the impact of AI should be measured in terms of nursing and patient outcomes. It is through active participation in all aspects of the AI development lifecycle that unique insights from nursing can contribute to the thoughtful development and use of AI that optimize

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potential benefits and minimize potential negative consequences for patients, communities, populations, healthcare systems and the nursing profession.

4.6 Strategies and opportunities AI in Nursing:

AI algorithms can automate administrative tasks , prioritize patient needs and facilitate seamless communication in healthcare team (Stokes &palmer 2020).This enable nurses to focus more on direct patient care and ensures the efficient and coordinated delivery of health care services

Nurses need to be meaningfully (rather than tokenistically) involved and contribute as key members of AI development and implementation teams in health systems. While nursing can contribute in many ways across the AI development lifecycle, we have identified three potential distinct and important informant/communicator roles that can be contributed by nursing. These include: (a) delineating clinical problems; (b) serving as intermediaries between the clinical and technical spheres; and (c) incorporating features of relational practice (Dykes & Chu,). Nurses' expertise and deep familiarity with working closely with patients should be tapped into, to better delineate clinical problems that AI technologies aim to address. For example, when predictive algorithms are being developed from clinical data, nurses can contribute with practice-based perspectives to technical teams (often consisting of engineers, computer scientists, user interface design experts, etc.) to understand why some data elements are missing or incomplete (e.g. poor documentation of social risk factors) (Navathe et al., 2018) and offer potential strategies to address these shortcomings. Closely related is the potential for nurses to serve as key intermediaries between technical experts developing solutions and nurses as clinical end-users (Dykes & Chu, 2020). These two groups speak very different professional languages and nurses educated in AI concepts are perfect for bridging this vocabulary gap. Finally, nursing expertise in relational practice (i.e. understanding and focus on the quality of human relationships) represents a unique strength to contribute to the AI development lifecycle.

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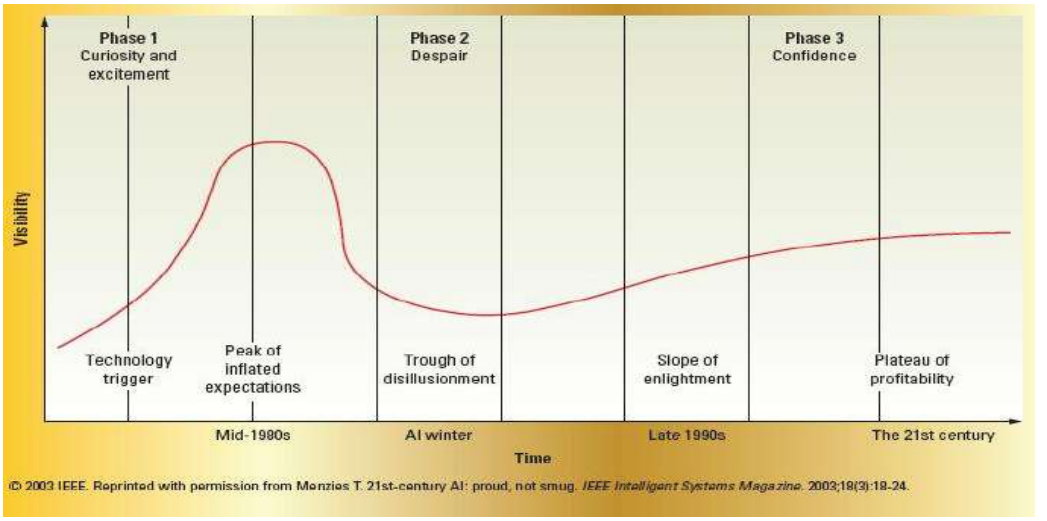

Figure 1. Technology trigger to plateau of profitability

A literature search reveals that there are a variety of AI definitions, with some more focused on technologic attributes whereas others describe human aspects of intelligent machines. A description of AI by Sara Castellanos, technology writer for *The Wall Street Journal*, captures the essence of what it aims to deliver: "Artificial intelligence encompasses the techniques used to teach computers to learn, reason, perceive, infer, communicate, and make decisions similar to or better than humans.". AI isn't one technology, but rather a collection of technologies that perform various functions depending on the task or problem being addressed. Often when people refer to AI, they're speaking about one or more of these computing technologies that you may already be using in your work for functions such as staffing optimization or at home for functions such as thermostat and lighting control. AI isn't a new technology. Its roots began in 1956 when Stanford University computer scientist John McCarthy coined the term while leading the Dartmouth Summer Research Project. Since then, the AI field has experienced many ups and downs. (See Figure 1.) Historically, we didn't have the computational power and supporting technologies to process vast amounts of data, which caused doubt in AI's ability to ever deliver on expectations.

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Beginning in 2011, the field started to see leaps in progress, with advances in computer processing capabilities, access to large data sets needed to train AI systems and the ability to process them, and discoveries in algorithm designs that are the foundation for AI processing. (See *Algorithms—the building blocks of AI*.) An example is the successful use of graphics processing unit chip technology, originally designed for the gaming industry, to help accelerate the development of AI applications in self-driving vehicles and healthcare. This technology brought new processing power to computer scientists at a reasonable cost, opening up opportunities for AI experimentation. Also in 2011, computer scientist Andrew Ng proved that computers can learn what an otbject is without being told what it represents. His research used 10 million online videos of cats; over time, the computer learned what a cat was. This breakthrough technology is used today in speech recognition systems.

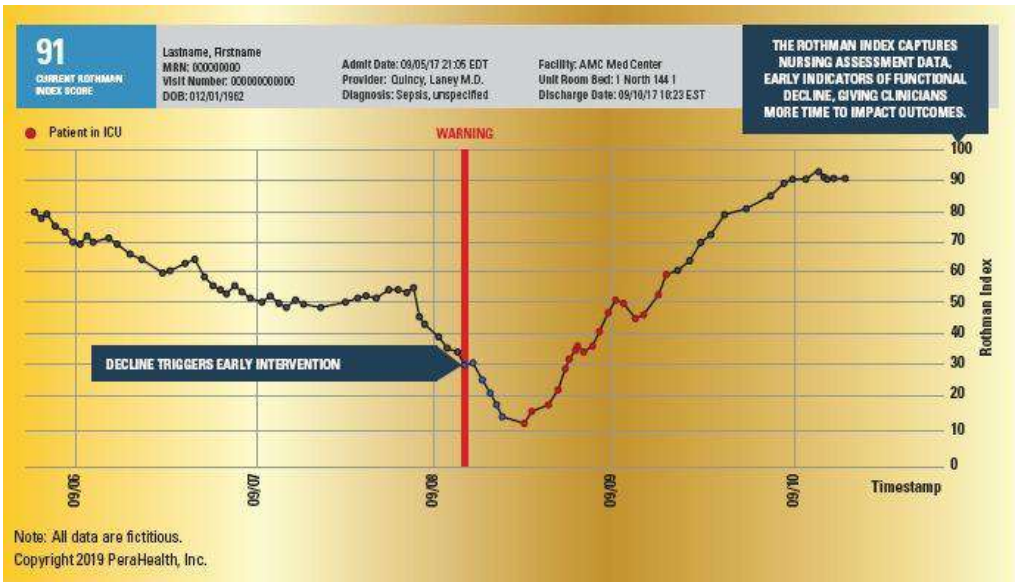

Figure 2. The Rotham index captures Nursing Assessment Data

Yale New Haven Hospital (YNHH) nursing was an early adopter of the Rothman Index, a tool that reflects patient acuity and risk. Director of Nursing Professional Practice Dr. Judith Hahn, Strategic Analytics

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Innovation Scientist Dr. Joan Rimar Sr., and Clinical Informatics Manager Leslie Hutchins highlighted what it takes to introduce new algorithms into nursing and interprofessional practice. In a personal communication, Hutchins described the goal of YNHH technology implementations as "providing the right advisory, at the right time, so we can look at what's meaningful information to achieve desired patient outcomes."

Rothman Index scores are calculated using electronic medical record (EMR) data associated with 26 variables, including 11 nursing assessment metrics, displayed in graphs. The introduction of the Rothman Index was accompanied by skepticism about its validity and reliability to produce actionable results. The technology initially didn't have ample peer-reviewed literature to convince nurses and other clinicians that the results would make a difference in patient care. However, research now suggests that Rothman Index performance is positively impacted by nursing assessment data, so the potential for nurses to impact patient care is significant. At YNHH, nurse SWAT teams use the Rothman Index to identify at-risk patients. A SWAT team is a group of experienced nurses trained in critical care, advanced cardiovascular life support, and trauma care. SWAT teams now receive immediate warning notifications on mobile phones when the index indicates patient deterioration. The SWAT team reviews the EMR and, as needed, assesses the patient and collaborates with clinical nurses and medical staff on pertinent aspects of care. SWAT nurses describe themselves as "a second set of eyes." The data used to generate the index are derived from routine nursing documentation. Timely input of nursing assessment data is critical to the calculation and value of index scores because the index updates in real time from the EMR. For acceptance and continuous use of the index, clinicians may need an "a-ha" moment when they discover that the data do make a difference when working with their patients and families. For example, at YNHH palliative care team members found Rothman Index graphs useful in goals of care discussions. (See Figure 3)

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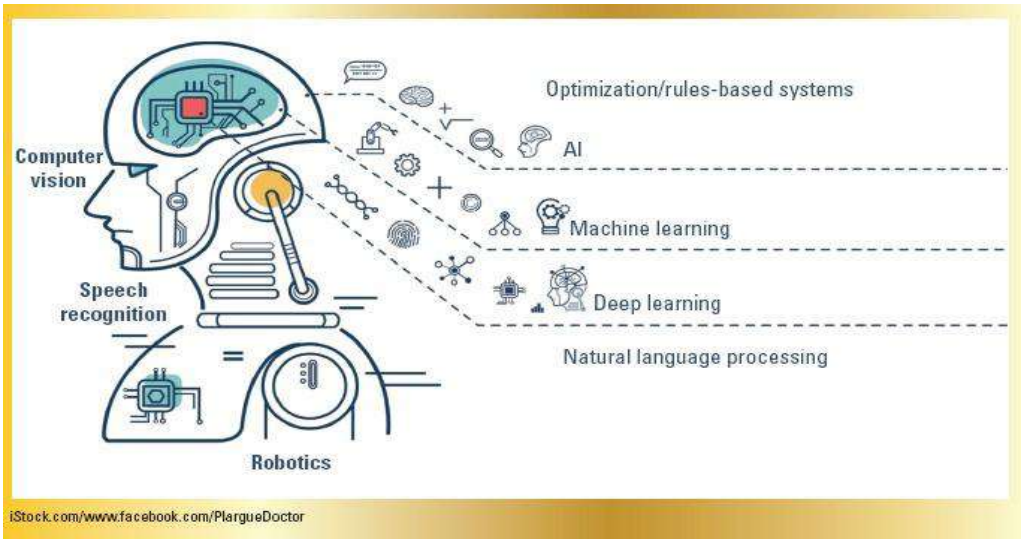

Figure 3: Robotic functionality in various perspectives

A term used interchangeably with AI is *cognitive technology*, such as the famous Watson computer that won the *Jeopardy!* Challenge in 2011. Following this success, Watson was trained in 13 different types of cancer by experts at Memorial Sloan Kettering Cancer Center. One function of Watson is to rank evidence and provide patient-relevant, evidence-based treatment options. Vice President of IBM Analytics Steven Astorino describes cognitive computing as the "ability of computers to simulate human behavior of understanding, reasoning, and thought processing."

Machine learning is a frequently used technology in which computers act intelligently on a specific task or problem without being explicitly programmed. The computer uses algorithms to derive knowledge from data and interprets data for itself. As more data are presented to the machine learning application, the computer learns from the data and corrects outputs. Machine learning can be supervised, unsupervised, semi supervised, or reinforcement learning depending on the kind of data being input into the program and the type of outputs that can be expected.

Another term encountered in AI is *deep learning*—a subset of machine learning. This computer science approach involves networked algorithms called *neural networks* because the inspiration for their

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creation was how neurons are networked in our brain. In deep learning, a set of mathematical instructions such as an algorithm, which is called a *node*, works like a neuron to fire the algorithm, process it as instructed, and pass its information to another node in the computer. That algorithm is then used as input by another node in the neural network. Data move through the nodes in a direction specified by the algorithm. A deep learning model can contain billions of nodes embedded in many layers. For context, Ng's model for computers learning to identify cats contained over 1 billion connections.

4.7 Continuous professional development on AI and emerging technologies

Ensuring nurses remain well-informed about the swift advancements in AI is vital for lifelong learning. Nurses can actively participate in ongoing professional development programs and partake in workshops, webinars, or conferences focused on AI in healthcare (Randhawa & Jackson, 2020). The flexibility of self-paced learning is readily accessible through online platforms and resources, including AI-oriented courses and educational websites. Collaborating with AI experts and interdisciplinary teams can provide invaluable insights (Abuzaid et al., 2022). Facilitating knowledge sharing and keeping abreast of developments via professional networks and journals is key to ensuring that nurses are continuously informed and equipped to leverage the latest AI innovations in their practice. To equip nurses with AI skills, dedicated training programs and resources are essential . These can encompass structured courses or workshops covering AI fundamentals, applications in nursing practice, and hands-on training with AI tools. Online modules, e-learning platforms or mobile apps offer accessible, self-directed learning opportunities. Collaborative efforts with universities, industry partners and professional associations can facilitate the creation of comprehensive training programs (Ahuja et al., . Furthermore, mentorship programs and shadowing experiences with AI experts can enhance practical knowledge and skill development for nurses looking to integrate AI into their practice .

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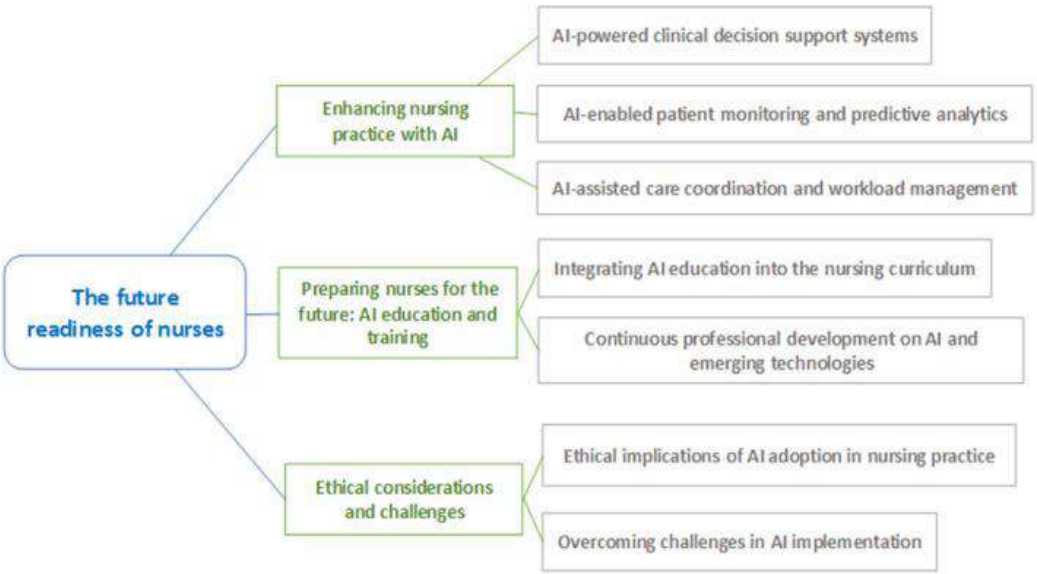

Figure 4: The future readiness of nurses

The primacy of nurse–patient relationship as a defining priority of nursing can contribute greatly to AI applications in robotics and elsewhere. Nurses can provide insight into the value of empathy and human touch, the role these concepts play in therapeutic relationships (Dobson et al., 2002; Kerr et al., 2019), and the dynamics between AI technologies and human relationships that need to be considered throughout the AI development lifecycle.

4.8 AI for Good in Nursing Gap:

There is a limited recognition of the relationship between AI technologies and the nursing profession as related to the contribution towards global (and oftentimes national) health and humanitarian efforts. There are numerous movements focused on the use of 'AI for good' in the academic, non-profit and industry spheres (e.g. Google's AI for Social Good, Google AI, 2018; Microsoft's AI for Good, Microsoft, 2020; AI for Good Foundation, AI for Good Foundation, 2015), AI for Good Global Summit (International Telecommunications Union, 2020), advocating for the use of AI to benefit humanity and address difficult social, economic,

DOI: https://doi.org/10.26524/232.4 ISBN: 9789348505385

environmental, health and humanitarian challenges around the globe. Despite the potentially significant impact of AI technologies on nursing work, there remain to be efforts from nursing relating to the notion of using AI4GN, or the use of AI technologies in nursing to achieve a greater good for the profession and for populations.

4.9 Strategies and opportunities in AI Nursing

Artificial intelligence (AI) has many potential benefits in healthcare, including improved diagnosis and treatment ,AI can help medical professionals and staff diagnose medical problems and create treatment plans. Reduced human error,AI can help reduce the risk of human error in surgical procedures. Drug discovery and development, AI can help researchers identify the best drug targets to test for various diseases. Patient services, AI can provide patient services 24/7, such as schedule reminders, tailored health tips, and suggested next steps. Streamlined administrative tasks,AI can help streamline administrative tasks, such as answering phones and analyzing population health trends. Data management ,AI can help healthcare organizations analyze large data sets and share them with different systems or departments. Dosage error reduction, AI can help reduce the risk of medication errors and improper dosage.

Efforts that recognize the contributions that fall in AI4GN can include leveraging the unique positionality of nurses in healthcare systems towards advocating for the inclusion of equity and social justice considerations in the development and implementation of AI technologies in health systems. Nurses are health professionals who spend the most time with patients and are often referred to as the most trusted profession. Nurses are well situated to identify potential biases in data collection (e.g. decontextualized data that does not consider the impact of systemic structures on individuals) which can lead to the embedding of these biases in the AI tools developed. As well, nurses are ideally situated to identify ethical concerns relating to the implementation and use of AI tools (e.g. highlighting the problematic nature of using facial recognition tools) and instances that can exacerbate existing inequities and cause

DOI: https://doi.org/10.26524/232.4 ISBN: 9789348505385

potential harm among particular groups and populations. For example, a recent study highlights the greater likelihood of digital data being collected and shared from children's use of apps when those children come from lower-education backgrounds. In the context of the healthcare system, this translates to an important facet of nursing education that needs to be developed and embedded as a routine component of a holistic nursing assessment and intervention. Namely, this comprises educating patients and families about digital literacy, digital privacy, laws and regulations on data collection and protection of digital health data and how these all relate to the AI tools

4.9.1 Application Scenarios for Artificial Intelligence in Nursing Care

Artificial intelligence (AI) holds the promise of supporting nurses' clinical decision-making in complex care situations or conducting tasks that are remote from direct patient interaction, such as documentation processes. There has been an increase in the research and development of AI applications for nursing care, but there is a persistent lack of an extensive overview covering the evidence base for promising application scenarios. This study synthesizes literature on application scenarios for AI in nursing care settings as well as highlights adjacent aspects in the ethical, legal, and social discourse surrounding the application of AI in nursing care. Following a rapid review design, PubMed, CINAHL, Association for Computing Machinery Digital Library, Institute of Electrical and Electronics Engineers Xplore, Digital Bibliography & Library Project, and Association for Information Systems Library, as well as the libraries of leading AI conferences, were searched in June 2020. Publications of original quantitative and qualitative research, systematic reviews, discussion papers, and essays on the ethical, legal, and social implications published in English were included. Eligible studies were analyzed on the basis of predetermined selection criteria. The titles and abstracts of 7016 publications and 704 full texts were screened, and 292 publications were included. Hospitals were the most prominent study setting, followed by independent living at home; fewer application scenarios were identified for nursing homes or home care. Most studies

DOI: https://doi.org/10.26524/232.4 ISBN: 9789348505385

used machine learning algorithms, whereas expert or hybrid systems were entailed in less than every 10th publication. The application context of focusing on image and signal processing with tracking, monitoring, or the classification of activity and health followed by care coordination and communication, as well as fall detection, was the main purpose of AI applications. Few studies have reported the effects of AI applications on clinical or organizational outcomes, lacking particularly in data gathered outside laboratory conditions. In addition to technological requirements, the reporting and inclusion of certain requirements capture more overarching topics, such as data privacy, safety, and technology acceptance. Ethical, legal, and social implications reflect the discourse on technology use in health care but have mostly not been discussed in meaningful and potentially encompassing detail.

The results highlight the potential for the application of AI systems in different nursing care settings. Considering the lack of findings on the effectiveness and application of AI systems in real-world scenarios, future research should reflect on a more nursing care–specific perspective toward objectives, outcomes, and benefits. We identify that, crucially, an advancement in technological-societal discourse that surrounds the ethical and legal implications of AI applications in nursing care is a necessary next step. Further, we outline the need for greater participation among all of the stakeholders involved.

4.10 Robotics Role in Nursing

Technological advancements have led to the use of robots as prospective partners to complement understaffing and deliver effective care to patients. This article discusses relevant concepts on robots from the perspective of nursing theories and robotics in nursing and examines the distinctions between human beings and healthcare robots as partners and robot development examples and challenges. Robotics in nursing is an interdisciplinary discipline that studies methodologies, technologies, and ethics for developing robots that support and collaborate with physicians, nurses, and other healthcare workers in practice. Robotics in nursing is geared toward learning the knowledge of robots for better nursing care,

DOI: https://doi.org/10.26524/232.4 ISBN: 9789348505385

and for this purpose, it is also to propose the necessary robots and develop them in collaboration with engineers. Two points were highlighted regarding the use of robots in health care practice: issues of replacing humans because of human resource understaffing and concerns about robot capabilities to engage in nursing practice grounded in caring science. This article stresses that technology and artificial intelligence are useful and practical for patients. However, further research is required that considers what robotics in nursing means and the use of robotics in nursing.

To explore the concept of futurism and the emergence of robotics in relation to the fundamentals of care, highlighting how nurses need a more anticipatory and contemporary position towards technology to maintain relevance in the future. The future of nursing in Western countries will soon be linked with the emergence of robotics for efficient and cost-effective provision of fundamental care. Their emergence and roles with care of the body and more broadly assisting people with their daily living activities has enormous implications for the profession and health care. Despite this importance, how nursing understands and will respond to technological trends and developments is insufficiently reflected in the professions discourse.

Literature from nursing fundamentals of care/fundamental care, information science, technology, humanities and philosophy informed the arguments in this article. This article examines the intersection of futurism and the fundamentals of care, and how adopting an anticipatory and posthuman perspective towards technological-care integration is necessary amidst a robot revolution in the techno-era. Nurses are currently challenged to understand, prioritise and deliver fundamental care. Health systems are challenged by a lack of care predicated by shortfalls in skilled staff and deficiencies in staff mobilisation. Both challenges can be compounded or alleviated by further integration of technology, but to maximise benefit requires forethought and understanding. This article can help open needed dialogue around planning for the future and is a call to action for the nursing profession to conceptualise its position on exponential technological growth and fundamental care provision.

DOI: https://doi.org/10.26524/232.4 ISBN: 9789348505385

4.10.1 Meet Nurse Robots and Healthcare AI Tools

In Japan, human-like robots have been utilized for years as supplemental healthcare workers in elderly homes across the country. More recently, hospitals and healthcare facilities have started to introduce nurse robots and other healthcare AI tools. Larger robotic machines can be used to carry out laborious physical tasks like moving patients, and smaller interactive robots are being used to combat loneliness and inactivity in the elderly population. Austin, Texas-based Diligent Healthcare was established in 2017 and has been working on Moxi ever since. Moxi is an advanced robot designed to assist healthcare teams . The robotic assistant is outfitted with modern sensors, cameras, and artificial intelligence algorithms that allow it to autonomously roam healthcare facilities, engage with people, and complete non-patient-facing tasks such as delivering lab specimens and supplies or collecting soiled linens. Moxi also greets patients in hallways and poses for selfies. The robot's social intelligence enables it to learn and adapt to its surroundings . Japanese robotics engineers at Riken and Sumitomo Riko Labs have created a robotic bear capable of helping care for elderly patients. This bear can lift a patient from a standing position or from the floor, transfer a patient to a wheelchair, carry a patient from point A to B, and turn patients in bed. An increasing elderly population paired with an insufficient amount of healthcare workers able to care for it makes revolutionary inventions like nurse robots incredibly helpful. Without sufficient staffing for elderly care, more Japanese citizens are forced to leave their jobs to take care of aging family members. And those who do work in nursing and healthcare, suffer from high stress and fatigue. So Japan is looking towards robotics for help.

In Johansson-Pajala et al. (2020),we found a definition of care robots that matches our understanding, the authors say: "we refer to care robots as machines that operate partly or fully autonomously with the aim of supporting potential users, older adults and relatives, as well as professional caregivers, in providing physical, cognitive, or emotional support." Krick et al. (2019) showed that the use of robots in care can be acceptable. However, even though there is a desire to increase the use of these new technologies and the presence of robots, it is important to

DOI: https://doi.org/10.26524/232.4 ISBN: 9789348505385

ensure that the human is still at the center of the collaboration. Human–robot interaction (HRI) is about people, and the use of robotics in care does not aim at replacing the nursing staff, but at supporting and helping them. In order to have a successful HRI, it is necessary to fulfill certain requirements. First, the interaction has to be physically close and safe, so it is necessary to consider the physical contact between the robot and the user when designing a solution, in order to mitigate possible injures. Secondly, there is a dependable physical interaction in a shared workspace, and for this reason, the human's intention and preferences have to be taken into account, so there is an interaction behavior and a realization of human-friendly motions (Gliesche et al., 2020). In addition to these aspects of the use of robots in care, thbetween (professional or informal) caregivers, the person in need of care, and a supportive robotic system. Depending on the functional (sensory, cognitive, motor) limitations of the patient and the activities to be supported, the strength of the interaction between both the patient and their caregivers varies. Figures 1–3 show three different scenarios where this triangular relationship is presented, at the same time, Figure 4 schematizes it. Kachouie et al. (2014) described how robots can benefit both the caregivers and patients. For the caregivers, the robots can help relieve them from tasks that are very time consuming and thus allow them to perform other tasks that are more useful and rewarding. For patients, the benefits are very extensive. Most of all, there is an increase of positive emotions, improving good feelings, general mood, and decreasing the stress and depression levels. They also promote engagement, increasing the commitment to physical activities and in also helping patients to externalize internal emotions. At the same time, there is an improvement in relationships, as they help with increasing social interactions and communication with other persons. An important building block fort his analysisis an overview of robotics projects in care, and a categorization of these according to a technical and a use case classification. Priority has been given to a broad coverage of projects worldwide. This provides an overview of the fields in care robotics where current investment in research and product development is concentrated and therefore could be considered as more relevant and to have bigger target groups. At the

DOI: https://doi.org/10.26524/232.4 ISBN: 9789348505385

same time, this approach identifies fields that have not been addressed intensively yet and might provide potential for further study. A secondary aim of this review is also to provide these results in a way that can help caregivers and patients to identify which robotic technologies can be used for their specific use cases. Due to the advances in the field of robotics and its possible use in nursing care, the aim of this review is to determine the directions in which the investigations in care robotics are going worldwide and to identify promising research and commercialization gaps. This article provides an overview of robots for care and projects that are prototyping them. It does not include projects that are developing or investigating applications of robots in care. After the identification of 133 projects worldwide, we performed an analysis of them, present in the following contributions:

- A novel four-category classification, deduced from the consideration of the triangle robot, patient, and nurse in the technical classification from Haddadin and Croft (2016).
- An engineering-driven and actionable use case classification, defined by the authors, the first to our knowledge with this degree of specification in nursing care.
- A technical classification, directly obtained from Haddadin and Croft (2016).
- An analysis unifying the classification schemes above in a multidimensional view.

4.11 Results

We identified a total of 133 relevant projects worldwide, including research and commercial products. We extracted 25 of these projects from internal documentation: 10 of them are the robotic projects that we supervise inside the Be Be Robot project (project within which this article is developed), and we got 15 from an internal project's document. In both cases we only got the names of the projects from these lists and, we searched later for the documentation and information attached to them and shown in this article. As we explained, we focused our search on projects and products and not on systematic literature search, i.e., once we identified a project or product, we searched for further information that

DOI: https://doi.org/10.26524/232.4 ISBN: 9789348505385

allowed us to classify and analyze them. project is at least published and described on a website, while for most of them, there are also popular and scientific articles that provide information about the project. The number of articles per project varies, but we selected a total of 161 articles. Supplementary Table S1 presents all the projects, along with the associated country and the specific references.

Figure 6 shows the number of projects found for each country. There is certainly a bias in the distribution of projects over countries because we could include German sources (in addition to English), which increases the number of German projects found, but we were unable to use similar sources in other languages.

The number of projects found in each country matched well with the distribution of articles across the countries included by Krick et al. (2019) in their scoping review on robotics in care . Only the number of projects found in Germany is significantly higher, since there were better search options (including the project database of the German Federal Ministry of Education and Research).

Among the international projects, it is possible to see that the two countries with a higher number of projects are the United Kingdom and Japan, both of which are large economic powers with significant capacity and need to invest in research and development of such new technologies and remain the largest markets for robotics after China (Bieller, 2019).

Robotic technologies are available on the market or in research. A first scheme is extended from Haddadin and Croft (2016) (Figure 7) applied to the identified projects. Both parameters defined by them, proximity and autonomy, were assigned and used for classification. For proximity, we considered how close the interaction with the patient or caregiver is as two different dimensions. For autonomy, we considered to which degree the robot could act independently, or conversely, to which degree it was (remote) controlled. Low autonomy means that the robot needs to be controlled directly or receives significant input/ supervision from the user. Medium denotes that at some point the robot requires some action from the user in order to proceed, or it requires that the user checks regularly if everything is working properly. High autonomy

DOI: https://doi.org/10.26524/232.4 ISBN: 9789348505385

means that the robot does not have to be controlled by a user to operate at all. Autonomy and decision-making are a very important aspect of assistive robots. According to ISO 8373 (ISO, 2021), a robot always has a certain degree of autonomy to perform its movements and tasks. However, the autonomy of some robots can go far beyond this. Kostavelis et al. (2017) showed a possible decision-making model in realistic situations, like those where service robots are designed to be used. Service robots can learn when to perform which task and when they need to take care of themselves (e.g., loading). This can lead to conflicts, especially in the medical and care sector. For example, unexpected situations can lead to a service robot actually having to charge its batteries at a time when it should be preparing critical medication. In this case, the robot must decide whether to perform the task that is important for the patient and then remain inactive or whether to charge first and deliver the medication to the patient too late, which may be time-critical, but still allow the robot to continue working. Alternatively, it would also be possible for the robot to outsource this decision to a human (nurse or patient). The German Ethics Council advocates "shared decision-making" here (Deutscher Ethikrat, 2020).

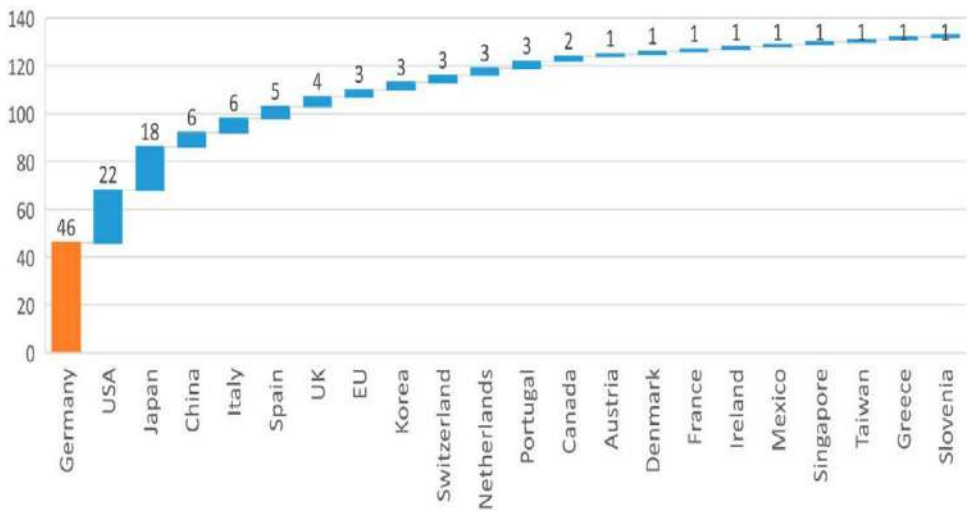

Figure .5 Number of projects found to be country

DOI: https://doi.org/10.26524/232.4 ISBN: 9789348505385

In this way, the greatest good can be achieved for everyone involved. The adaptation of the service robots' tasks and the degree of privacy can also be optimally adapted to the patient in this way. In the following, the categories are described (see the Supplementary Material for details) by highlighting up to three examples of projects for each category. An exhaustive list of projects and their assigned categories are available in the Supplementary Material. In the category Supportive (where robots assist in the performance of the task, providing tools or information), we find robots like TUG (Mutlu and Forlizzi, 2008; Niechwiadowicz and Khan, 2008; Zhang et al., 2008; AETHON, 2020), a robot to perform logistics activities in hospitals; BUDDY (Buddy Robotics, 2020), which has multiple functionalities at home (entertainment, monitoring old people, and reminding tasks and events); and AuRoRoll (German Federal Ministry of Education and Research, 2017; Wimmer et al., 2017) (when in automatic mode) a wheelchair capable of navigating autonomously. The parameters "Proximity" and "Autonomy" for these robots are identified as follows

- TUG: As it is a product designed to help nurses, patients have no contact with it, so we do not analyze the proximity aspect from their point of view. From the caregiver's perspective, it is possible to define it as "out of reach", even though there are moments when it comes closer (when delivering products), but most of the time, it moves autonomously, at a distance from the medical personnel.
- BUDDY: In this case, the situation is the other way around.

Caregivers have barely any contact with the robot, at the most, only when checking on the elderly via the telepresence system, so we can define the proximity as "out of reach". This is also the case from the user perspective, although in situations like playing it can also be considered "at arm length", because of the closer interaction.

DOI: https://doi.org/10.26524/232.4 ISBN: 9789348505385

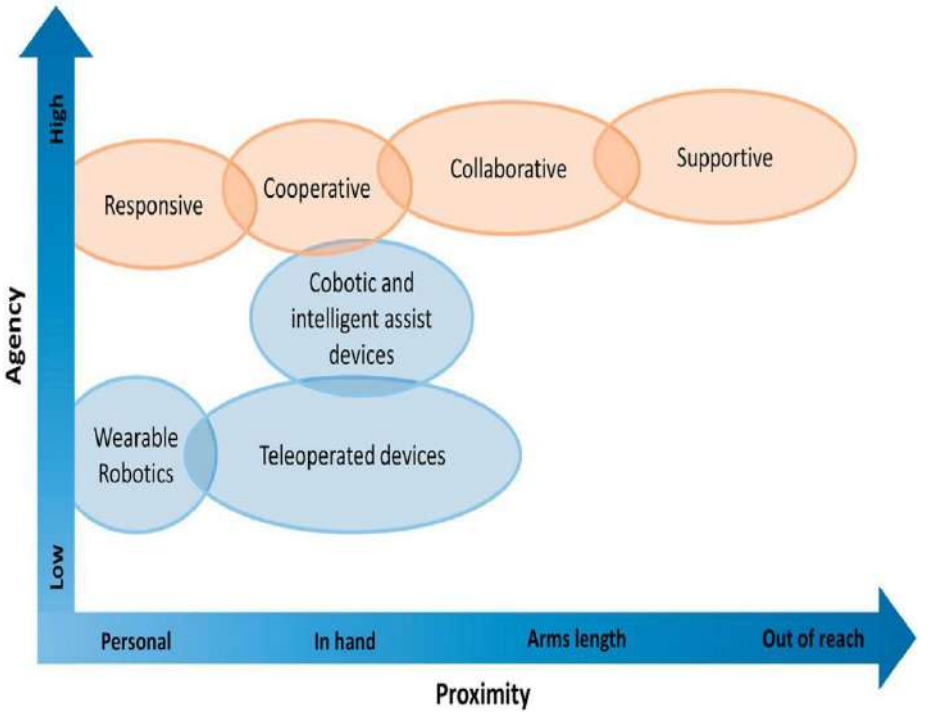

Figure 6: Classification scheme for HRI, by proximity of interaction and autonomy of the robot.

Baxter-based dressing assistant ,in the case of this robot, the nurse is out of the loop, so we do not analyze the proximity with them. From the patient's point of view, the proximity can be classified as "in hand" or "arms length" because the robot has to be close enough to help them get dressed. Pillo, when considering the proximity with the patient, ican be defined as "in hand" because the user has to collect the medicines dispensed by it and read the notifications on its screen. As caregivers can remotely control the robot to receive notifications or manage some actions via the app, the proximity is considered "out of reach". AuRoRoll , again in this case, the caregiver has no role in the interaction, and from the patient's point of view, it can be considered as "personal" because the user sits on the chair and as "in hand" because the user uses the joystick to direct the chair.

DOI: https://doi.org/10.26524/232.4 ISBN: 9789348505385

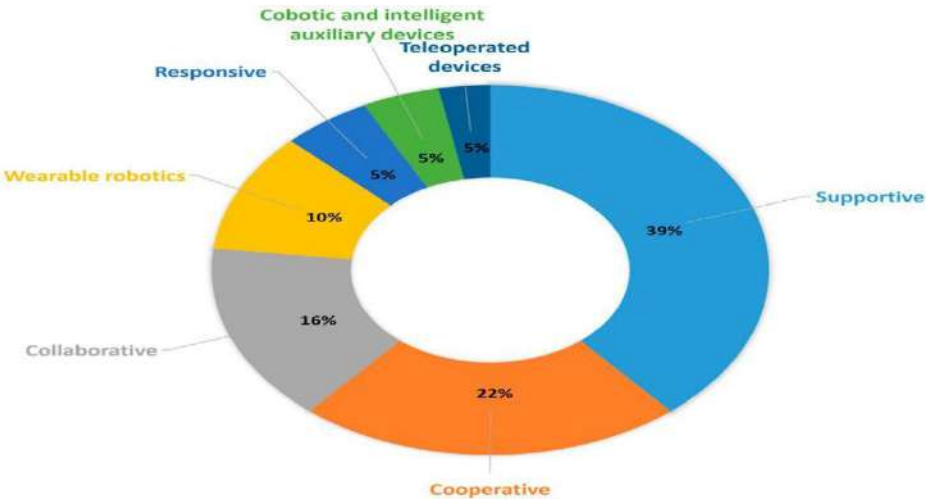

Figure 7: Percentage of project per each category of technical classification

Technical vs. Use Case

In the previous sections, we have analyzed both the technical characteristics and use case scenarios. However, the relationship between these two classifications is also of interest. Table 1 shows how many projects from each technical category support which use case category. The empty cells indicate that there are no projects categorized in that intersection.Before analyzing the relationship between these two categories, it is important to clarify that a project could have more than one use case scenario, as the robot capabilities could be used to perform different tasks that are not always covered by only one of them. However, the majority of systems have only one technical category, as the technical characteristics of the robot generally do not change. Although, in some cases, where the robot's degree of autonomy can change, it is possible to find more than one technical category. For this reason, it is possible to find in the analysis examples of robots that can be assigned to more than one class of the use case classification. This explains why the sum of all cells in Table 1, 263, is significantly higher than the number of projects reported in Section 3, 133.

DOI: https://doi.org/10.26524/232.4 ISBN: 9789348505385

The highest concentration of projects is found in the last three columns, that is, spread across the *Cooperative*, *Collaborative*, and *Supportive* categories of the technical classification. This means that in each of these categories, it is possible to find a robot for the majority of use cases. A plausible explanation of the high presence of projects in these categories is the fact that the settings where they are developed are directly related with the activities of daily living (ADL), scenarios where service robots have been already introduced in order to help with these activities. The advancement of the technology allows their evolution to more care-related scenarios.

We can conclude that for the use cases of logistics, companion robots, and mobility support, there is a greater offer of projects or products within the *supportive* category. For the first two use cases, we can assume it is because they present situations where the robot and the human do not have to share a task. In fact, the robot performs a task for the user, e.g., bringing objects from another place (logistics), reducing the feeling of loneliness by playing entertaining multimedia for the user, reminding them to

Conclusion

AI technologies will change the profession of nursing. AI technologies can serve as important tools to support the contribution of nurses towards higher level aims of evolving the nursing profession and improving population and global health. If nursing takes a proactive role in addressing these above-mentioned priorities, AI has the potential to enhance and extend nursing capabilities. In return, nursing has much to contribute to the development of AI systems that leverage nurses' strengths and expertise in relational practice and patient advocacy, towards the development of AI that considers patients with a more holistic view. It is important to note that all priority areas discussed in this paper are necessarily linked. They do not each sit on their own but inform a broad purposeful approach to empowering nurses in their active involvement in all aspects of AI in health care. We argue that nurses have a responsibility to know about the AI technology they use, as has been stated from an industry perspective (McGrow, 2019). Moreover, there is a

DOI: https://doi.org/10.26524/232.4 ISBN: 9789348505385

great opportunity for AI tools to support nurses' problem-solving abilities and identify solutions for optimizing care provision (Cato et al., 2020). There is nevertheless a need for support from health systems stakeholders and high-level decision-makers to facilitate the ability of the nursing profession to address these identified priorities. The priorities presented in the paper are summarized in Table 1, alongside a list of specific recommendations based on the strategies and opportunities outlined in this paper.

The following represent a summary of the discussion points identified in the NAIL Collaborative think-tank discussions, framed as pressing priorities for the nursing profession. Each priority point is introduced with the identification of a current gap in understanding or use of AI in relation to nursing practice. For each identified gap, we propose strategies and opportunities––with implications for nursing practice, education, research and leadership—that can be pursued to ensure the appropriate and safe use of AI in nursing and enable the nursing profession to use AI tools to optimize health outcomes. Unlike humanoid robots, TUG is a robotic cart designed to transport materials around a facility safely. It is capable of transporting medication, lab samples, and surgical supplies. It can also be used to facilitate EVS services by moving waste. Aethon holds a Veteran's Affairs contract, and TUG is currently used in over nationwide. As robotics become more prevalent in healthcare, nurses and other healthcare personnel can embrace new technology without fear of being replaced. Pepper is another notable robot found in healthcare facilities worldwide. Created by SoftBank Robotics of Japan, this robot assists with activities such as guiding patients, giving directions, answering basic questions, and providing emotional support. Its expressive and warm manners are designed to welcome and engage patients. This humanoid robot made headlines during the pandemic as hospitals leveraged technology to protect healthcare workers. Hospitals in Japan used Pepper to greet visitors and provide valuable information at facility entrances. French doctors used Pepper to enable COVID-19 patients to video chat with family and friends. In Sweden, the robots provided a fun distraction for

DOI: https://doi.org/10.26524/232.4 ISBN: 9789348505385

pediatric cancer patients. And in Germany, Pepper provided socialization for Alzheimer's patients . Technology and AI are useful and practical for patients. Robotics in nursing is an interdisciplinary discipline that studies methodologies, technologies, and ethics for developing robots that support and collaborate with physicians, nurses, and other healthcare workers in practice. Robotics in nursing is geared toward learning the knowledge of robots for better nursing care, and for this purpose, it is also to propose the necessary robots and develop them in collaboration with engineers. However, further research is required that considers what robotics in nursing means and the use of robotics in nursing. There is still a lack of study on whether they are capable of replacing humans due to human nurses' ability to manifest caring relates to their humanness or their unpredictable nature. One of the most important, in our opinion, would be to work on the Nursing Situation and Response Databases. The empathic capacities that robotics and AI can demonstrate for humans can exist through programmed activities. The knowledge generated will bring information to engage in relationships between empathy and AI and contribute to understanding its usefulness and impacting nursing/caring theories.

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DOI: https://doi.org/10.26524/232.4 ISBN: 9789348505385

CHAPTER - 5

PATIENT GENERATED CARE AND INTERDISCIPLINARY COLLABORATION

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Abstract

Interdisciplinary communication and collaboration are crucial in the care of people with multiple long-term conditions (MLTCs) yet are often experienced as insufficient. Through the lens of complexity science, this study aims to explain how healthcare professionals (HCPs) adapt to emerging situations in the care of patients with MLTC by examining interdisciplinary communication and collaboration in the outpatient hospital setting. We used the constant comparative method to analyze

DOI: https://doi.org/10.26524/232.5 ISBN: 9789348505385

transcribed data from seven focus groups with twenty-one HCPs to generate a constructivist grounded theory of 'interdisciplinary communication and collaboration in the outpatient setting of the hospital for patients with multiple long-term conditions'. Our theory elucidates the various pathways of communication and collaboration. Why, when, and how team members choose to collaborate influences if and to what degree tailored care is achieved. There is great variability and unpredictability to this process due to internalized rules, such as beliefs on the appropriateness to deviate from guidelines, and the presence of an interprofessional identity. We identified organizational structures that influence the dynamics of the care team such as the availability of time and financial compensation for collaboration. As we strive for tailored care for patients with MLTC, our theory provides promising avenues for future endeavors.

Key words: Tailored care, interdisciplinary collaboration, interdisciplinary communication, Grounded theory, complexity science. Team work, Group participation, Integrated work, disciplinary work .

5.1 Introduction

An increasing number of people live with multiple long-term conditions (MLTCs), defined as two or more chronic conditions. Similar to most other European countries, it is estimated that 32% of the Dutch population lives with MLTCs. Prevalence increases with age, reaching 87% of people aged 75 years and older. Due to an aging population, the prevalence of multiple long-term conditions will continue to rise. It is widely recognized that patients living with MLTCs require tailored and integrated care, which extends beyond their concurrent diseases . Tailored care considers not only the biomedical domain but consists of an integrated biopsychosocial approach taking physical and cognitive functioning, psychosocial context, as well as personal goals, priorities, and preferences into account. However, because care systems and guidelines are mostly focused on distinct diseases, patients currently receive care from multiple healthcare professionals (HCPs) based on disease-specific

DOI: https://doi.org/10.26524/232.5 ISBN: 9789348505385

guidelines. This fragmentation of care often leads to polypharmacy and higher care utilization. In addition, living with MLTCs is associated with lower life expectancy, poorer quality of life, and adverse psychosocial and functional outcomes [1,10]. Numerous studies and guidelines describe, in broad terms, what tailored and in tegrated care for patients with MLTCs should entail, highlighting the integral role of interdisciplinary communication and collaboration. Interdisciplinary care has already become common practice for various single diseases (e.g., breast cancer) where it has resulted in improved quality of care and patient satisfaction . However, the current literature and guidelines provide limited insight into the processes of interdisciplinary communication and collaboration for patients with MLTCs, nor do they offer guidance on howtooptimize it to meet this prerequisite for delivering high-quality, interdisciplinary, patient-centered care. To understand how interdisciplinary healthcare teams interact and collaborate, schol ars have introduced complexity science, particularly complex adaptive systems (CASs), as a framework [17–21]. A CAS is "a collection of individual agents with freedom to act in ways that are not always totally predictable, and whose actions are interconnected so that one agent's actions changes the context for other agents" [18]. As an open system, membership is subject to change and agents can be members of several systems at the same time [17–21].

5.2 Research Methodology

In the research study the researcher has used secondary data. The data has been collected from research papers, published materials, online websites, and survey reports published by various research organisations.

Design and Data Collection This descriptive qualitative study was based on constructivist grounded theory, a method used to explain the complexity of human interactions and social processes. The theories are generated from the context in which they will later be applied .In contrast to traditional grounded theory, constructivist grounded theory considers the re searcher's (theoretical) perspective as an integral role in the research process. Through grounded theory, it is possible to move beyond the mere descriptive level of qualitative data by theorizing about actions

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and processes in a specific context, which aligns with the process-focused aim of our study. Data were collected using focus groups with physician specialists, physician assistants, and nurse practitioners involved in the care of patients with MLTC in the outpatient hospital setting. Focus groups help identify individual and shared ideas . To ensure the expressed ideas were firmly rooted in daily clinical practice, we organized each focus group around a recent, local case study of a patient with MLTC and invited all HCPs of the care team of that patient to participate in the focus group. The focus group setting provided the opportunity for participants to interact and speak with candor about the process of their interprofessional communication and collaboration. Participants were recruited through members of a national working group mandated by the National Society of Internists (NIV) to develop a guideline for coordinated care for patients with MLTC. Recruitment ran from October 2021 until June 2022. Working group members asked colleagues in their respective hospitals to provide case studies involving a patient with at least three chronic diseases and three HCPs in their outpatient care team. A minimum of three chronic diseases and three HCPs were chosen to ensure a sufficient level of complexity in communication and collaboration. For each case study, a treating HCP provided pseudonymized data on age, gender, number and type of chronic diseases and HCPsinvolved, number of hospitalizations, emergency room visits, and outpatient clinic visits in the previous year. Through purposive sampling, we selected patient case studies that involved a range of medical specialties from both secondary and tertiary referral centers. Through theoretical sampling after three focus groups, we also invited the primary care physician and/or nursing home elderly care physician. Focus groups were organized when at least three HCPs agreed to participate. When a participant could not attend the focus group after agreeing to participate, a separate interview was scheduled if possible. Demographic characteristics were collected for each participant (i.e., profession, gender, and age).

Data collection ceased when no further insights emerged from the data [28]. Focus groups were held from November2021toJuly 2022 with EG, UdR,andJdG,and lasted 1.5 h. Focus groups were held online

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(Microsoft Teams or ZOOM) due to COVID-19 regulations. Attendees were instructed to find a comfortable, quiet room prior to logging on to prevent any distractions. All focus groups were led by an interviewer (EG) and supported by a note taker (UdR), both with a background in care for patients with MLTC. Asenior researcher experienced in qualitative research and interdisciplinary organization of care (JdG) was present to observe, summarize, and ask follow-up questions. We started each focus group with an introduction of the case study by one of the participants. To help build rapport, we gave each attendee the opportunity to introduce themselves and how they were involved in the case study. Then we explored interdisciplinary communication J. Pers. Med. 2024, 14, 533 4 of 14 and collaboration in relation to the case study using a discussion guide .

5.3 Role of NIV

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5.4 DATA ANALYSIS

We analyzed the data throughout the data collection process according to the constant comparative method Following each focus group, all researchers present engaged in a brief discussion to establish findings that were similar across previous groups and findings that deserved consideration in upcoming sessions. All focus groups were transcribed verbatim by a team of research assistants. Transcriptions were checked by a researcher (EG) and subsequently approved by the participants of the respective focus group.

Data coding started after the first focus group was completed and was performed by two researchers (EG and UR). Open and axial coding were completed independently while making use of memos to conceptualize how codes relate. Discussion followed (EG and UR) to agree upon the core and sub-core categories. Both researchers analyzed the data once more using selective coding, focusing on the core and sub-core categories. This was not a linear process but involved constant comparison between data and the categories, actively looking for similarities and differences in the data. Next, two researchers (EG and UR) convened for multiple, extensive sessions to take the analysis to a higher level of abstraction by

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investigating potential theoretical relationships between categories and concepts in the data. This collaboration led to the development of the final theory, as described below in 'results'. This study was approved by the Medical Research Ethics Committee of the University Medical Center Groningen (nWMO 202100785). Written informed consent was obtained from all participants. Pseudonymized data were analyzed, and data are presented in this paper anonymously.

Our theory reveals the process of interdisciplinary communication and collaboration but does not predict how it will occur in a certain situation. The theory consists of three core components 'the pathways of interdisciplinary communication and collaboration', 'internalized rules of HCPs', and 'organizational structures of influence'. The 'pathways of interdisciplinary communication and collaboration' are separated into five parts: 'reason', 'timing', 'mode', 'outcome', and 'goal'. Interaction between these parts is highly dynamic and influenced by 'internalized rules of HCPs' and 'organizational structures'.

5.5 Reasons for interdisciplinary communication and collaboration

The participants described situations in which they sought collaboration with their colleagues, which fall into four categories: 'biomedical complexity'; 'division of roles and tasks care team'; 'goals, values and capabilities of the patient'; 'signal patient or caregiver'. Commonly, participants sought collaboration for multiple reasons at once.

The first category, 'biomedical complexity', encompasses situations where HCPs are faced with a problem that falls outside of their own medical expertise, or where their own treatment or diagnostic decisions impact those of others. One participant explained that interdisciplinary communication allows them to *"call upon others to evaluate the situation too, because I can't possibly know everything".*

The second category, 'the division of roles and tasks care team', entails situations in which there is an unclear division of tasks and roles among HCPs. This often results in multiple HCPs attending to the same patient issue. Conversely, lack of communication may lead to issues not

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being attended to at all because HCPs assume that this falls under someone else's responsibilities.

The third category, 'goals, values, and capabilities of the patient', refers to when HCPs aim to incorporate the individual patient's goals, values, and capabilities into the treatment plan. This category also includes discussions on advance care planning and whether the treatment plan is proportionate to its goal, considering the context of the patient. Participants expressed that to do the above well and consistently across disciplines, interdisciplinary communication and collaboration are essential. However, as one participant described, HCPs often make assumptions rather than communicate.

The fourth category, 'signal patient or caregiver', refers to instances where the patient or caregiver gives a direct or indirect signal that they experience fragmented care. A direct signal can be a patient who expresses that they received contradicting advice. An indirect signal may be fraught patient–doctor communication. One participant reflected on how she successfully organized a multidisciplinary team meeting for a patient who repeatedly reached out to her .

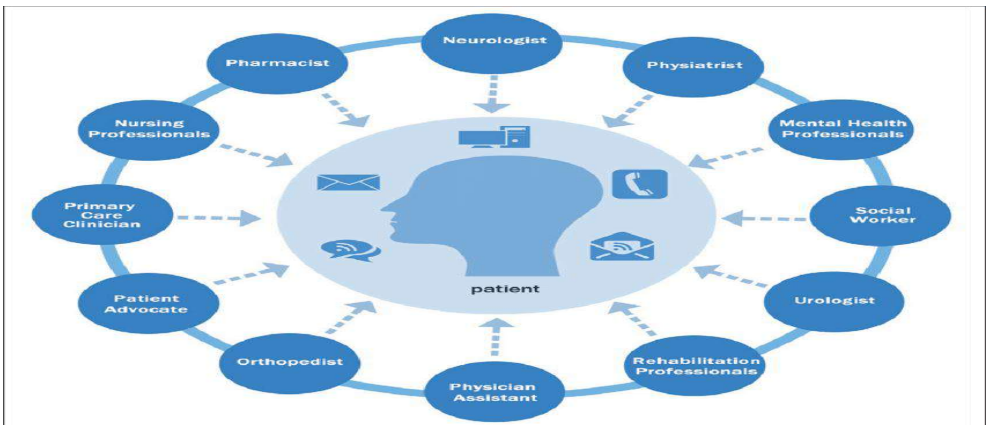

Figure 1: Roles in in interdisciplinary collaboration

Effective integration of PGHD into electronic health records (EHRs) can improve interdisciplinary collaboration among healthcare providers.

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EHRs enable real-time sharing of patient information across different healthcare settings, facilitating better clinical decision-making and fostering a more integrated approach to patient care. However, challenges exist in integrating PGHD into clinical workflows, including issues related to data quality, interoperability, and the potential for increased clinician workload. Addressing these challenges requires developing standardized protocols and leveraging technological solutions to ensure seamless integration and effective use of PGHD in patient care.

Overall, the incorporation of PGHD into healthcare systems holds significant potential to enhance patient-centered care and improve outcomes through strengthened interdisciplinary collaboration.

5.5.1 Timing of interdisciplinary communication and collaboration

Interdisciplinary communication and collaboration are most often employed for problem-solving, with varying degrees of urgency depending on the timing of interdisciplinary communication and collaboration. As HCPs wait longer to communicate or collaborate, problems become bigger or more acute. Participants expressed that collaboration early in the care process allows HCPs to prevent negative outcomes of care. At the same time, participants expressed that the timing is often random and reactive. Mode of interdisciplinary communication and collaboration

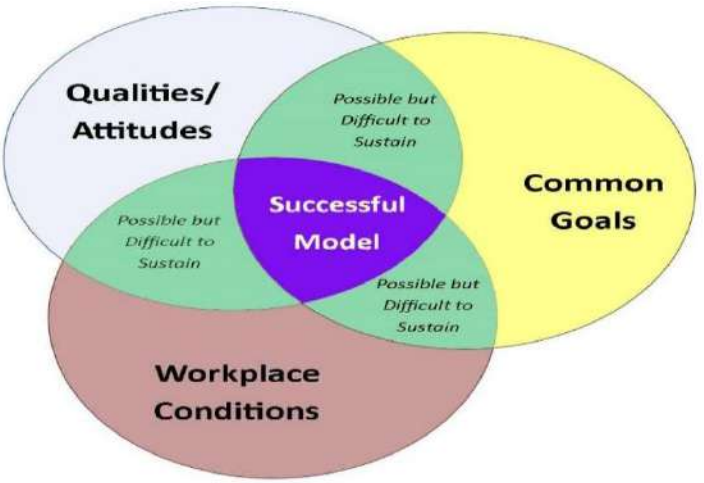

Figure 2 : Successful model in interdisciplinary collaboration

DOI: https://doi.org/10.26524/232.5 ISBN: 9789348505385

Effective interdisciplinary communication and collaboration are vital throughout the entire patient care process to ensure optimal outcomes. Engaging in collaborative efforts at the beginning, middle, and end of a treatment plan allows healthcare professionals to deliver timely and coordinated care, ultimately enhancing patient outcomes.

Structured interdisciplinary bedside rounds (SIBR) exemplify this approach by facilitating regular, scheduled interactions among healthcare team members. These rounds create a shared mental model, ensuring consistent and efficient communication, which is essential for effective collaboration.

To foster successful interdisciplinary collaboration, it's crucial to establish a culture of mutual respect and value for each professional's unique contributions. This foundation enhances teamwork and improves patient care. In summary, timely and continuous interdisciplinary communication—initiated at the onset of care and maintained throughout the patient's treatment journey—is key to delivering comprehensive and effective healthcare.

The participants described nine modes of communication and collaboration. There are four modes of indirect contact. First, 'letters' are written to update other HCPs, primarily those who work outside of the hospital. They simultaneously serve as comprehensive reports. Second, 'e-mails' are regularly exchanged when HCPs have a simple question. The advantages are their non-intrusive nature and minimal time investment. Disadvantages are that it is hard to keep track of unanswered e-mails and that not everyone replies promptly. Third, the 'electronic health record' is used to inform others by deliberately writing a more extensive report. Often-heard disadvantages were that these extensive reports can easily be overlooked, are difficult to find, and are limited to HCPs within the hospital. Fourth, HCPs make a 'referral' to colleagues when in need of their expertise or when they themselves experience too little time to take care of a problem outside of their usual tasks. Participants expressed that referrals are often utilized out of convenience because they require minimum effort. Participants conveyed that this behavior of is not desirable but happens frequently.

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There are five modes of direct contact. First, participants expressed that they often consult a colleague haphazardly when they run into them, a mode we coined "coffee-machine consultation". While this is experienced as convenient, the conclusions of these consultations are often not documented. Second, a 'multidisciplinary team meeting' is organized when it is deemed beneficial for more providers to speak to each other at the same time. A multidisciplinary team meeting for a patient with MLTC, with all involved HCPs, is not embedded in standard clinical practice. It can be organized ad hoc but this occurs rarely, because HCPs consider this time-consuming and logistically challenging. Third, a 'video conference' is sometimes organized instead of a multidisciplinary team meeting. This is considered especially convenient when HCPs from other organizations are invited to join. Fourth, 'multidisciplinary consultations' are standardized consultations where two professionals see patients together. For example, participants described oncologists and geriatricians holding clinic hours together. Fifth, 'phone calls' are made for relatively simple questions. Listed advantages are the minimal time investment and the possibility of an immediate answer. A disadvantage is that it is difficult to gauge when it is a convenient time to call.

5.5.2 Outcome of interdisciplinary communication and collaboration

Depending on the reason for -and chosen mode of- interdisciplinary communication and collaboration, participants described six outcomes that can be positively affected. However, when a reason for interdisciplinary communication and collaboration is present, but HCPs fail to act or choose an inappropriate mode, this can result in a lack of a positive impact or even a negative impact on these outcomes.

First, interdisciplinary communication and collaboration can provide clarity by making the 'division of roles and tasks of the care team' explicit. Participants described the importance of making deliberate choices concerning who should deliver which care and where it should take place:

Participants described finding it helpful to appoint someone within the care team as the coordinator of care. This coordinator is responsible for aligning care plans, communicating across all disciplines, and can serve as the point of contact for the patient. Second, proper

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interdisciplinary communication and collaboration can improve 'patient and caregiver satisfaction' and 'HCP satisfaction'. Participants expressed that patients and caregivers value it greatly when their HCPs are aware of each other's treatment trajectories. An often-heard complaint is that HCPs give contradictory advice. Communicating as a team can be beneficial .Participants explained that proper interdisciplinary communication and collaboration can also lead to HCP satisfaction because the lack thereof is often experienced as frustrating.

Third, participants discussed that interdisciplinary communication and collaboration can aid in 'incorporating patient goals, values, and capabilities'. Reflecting on the case studies, participants often expressed that, in hindsight, they would have liked to be aware of information concerning patient goals, values and capabilities that other health professionals had but they did not ask for:

In this situation, neglecting to involve the answers to these questions in the patients' care plan led to multiple, highly acute readmissions and unsafe circumstances at home without the needed support.

In addition, participants described 'less avoidable care' as a positive outcome. Participants were adamant that proper interdisciplinary communication and collaboration would lead to less avoidable and unnecessary care. Examples given were stopping medication or treatments earlier, avoiding protocolized care that does more harm than good and reducing the number of referrals. Participants also described how aligning care plans can prevent negative effects of drug and treatment interactions, such as emergency room visits or hospitalizations. Reflecting on the case studies, all participants described the provision of care that was considered unnecessary and avoidable due to a lack of interdisciplinary collaboration. For example, one surgeon described planning a surgery for a patient without being aware of comorbid dementia, for which the patient was receiving care in the same hospital.

5.5.3 Goal of interdisciplinary communication and collaboration

Participants described five internalized rules that influence whether they follow up on a reason that calls for interdisciplinary communication

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and collaboration, which mode they employ, and, consequently, which outcomes they are likely to bring about. First, participants expressed varying degrees of 'interprofessional identity'*:* some find it more important than others to collaborate and engage in collaboration more often. Some HCPs described that they are attached to delivering disease-specific care, that they will not entrust to others.

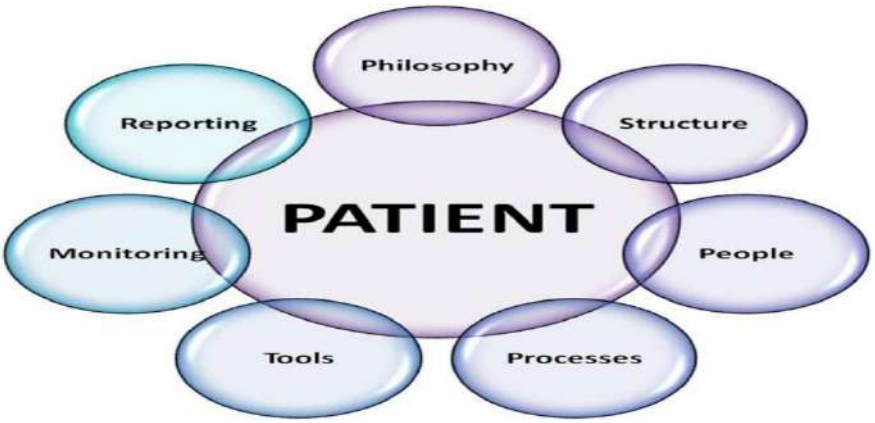

Figure 3 : patient centered approach roles involvement

Second, participants described that to reach outcomes such as "incorporating patient goals, values, and capabilities", and "less avoidable care", it is required to assess the patient in a holistic manner. Whether participants believed they had the 'appropriate skills and time required to perform a holistic assessment' varied. Some believe these skills are exclusive to a small number of specialists .Third, participants described that HCPs have varying levels of 'willingness to claim a care coordinator role'. The likelihood of experiencing a sense of duty to claim a care coordinator role increases when HCPs have treated the patient for a long time and know them well.

5.5.4 Organizational structures of influence

The way HCPs respond to emerging problems and choose to collaborate is influenced by several factors that relate to the broader

DOI: https://doi.org/10.26524/232.5 ISBN: 9789348505385

healthcare system. Three factors were reiterated in all focus groups. First is the 'financial compensation', or lack thereof, for the different modes of communication and collaboration. For example, an HCP receives financial compensation for evaluating a patient that is formally referred to them, while engaging in an ad hoc multidisciplinary team meeting about the appropriate course of action is not compensated. A second factor is the extent to which HCPs have 'flexibility in managing their daily schedules and time allocation'. For many, time is experienced as a scarce resource in their daily schedule and patient consultations are often limited to ten minutes. This limits HCPs greatly to what degree they can go beyond the minimal required effort in patient care. Finally, the 'electronic health record' is perceived as a barrier to interdisciplinary communication and collaboration because of the poor integration of patient information from other systems and the (un)findability of data. At the same time, HCPs see great potential in electronic health systems supporting them in collaborating across disciplines and hope that technological innovation will realize this.

Figure 4. Organizational structural influence

Discussion

Our study illustrates that HCPs in the outpatient setting of the hospital behave as a CAS in the care for patients with MLTC. To achieve tailored care, they often need to adapt to emerging situations through interdisciplinary communication and collaboration. We offer a theory of this adaptation process that covers the reasons that can catalyze an

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adaptive response (i.e., problems within the zone of complexity), its different approaches and outcomes. The adaptive response is shown to be non-linear and unpredictable, and its outcome variable. Moreover, there are numerous internalized rules at play that influence HCP behavior. Finally, we identify limitations to the self-organizing abilities of the system due to the environment in which it operates. Our study adds to the current body of literature that explores interdisciplinary healthcare teams as a CAS and is the first to apply this to care teams of patients with MLTC in the hospital.

Compared to other interdisciplinary teams that have been studied as CAS in the literature, there are a few elements that are distinct to the interdisciplinary team for patients with MLTC. Until now, CAS research primarily focused on interdisciplinary teams in nursing homes or primary care, which exhibit high levels of stability as they work on common ground towards objectives that are often shared. Contrarily, for patients with MLTC, HCPs join and leave care teams continuously depending on patients' comorbidities and developments in health status. HCPs can therefore be members of a multitude of differently composed interdisciplinary teams. Moreover, HCPs often work towards their own condition-specific goals, which are not shared across all members. Membership fluidity can be problematic to collaboration because it is known to reduce the feeling of belonging to a team, and can diminish trust in other team members to effectively complete the task

Another element distinct to care teams for patients with MLTC is that there is no set moment for collaboration. Thus, this is heavily dependent on opportunities created by members of the care team and the way in which they do so. Our theory describes nine modes of communication that members employ to create such opportunities. Due to the non-linear nature of the system, it is impossible to assert that mode X leads to outcome Y. However, it needs to be underlined that not all forms of communication lead to true collaboration when they are used as an exclusive approach. For example, merely referring patients from one HCP to the next, does not sustain collaborative teamwork and is unlikely to contribute towards tailored care. Research by Dukewits and Gowan,

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described the presence of a collaborative culture, fostered by activities such as conducting effective team meetings and reflecting on team performance, to be essential to successful collaborative teams . As shown in other clinical settings, just because people are members of the same team, does not mean that they behave as such Our study shows that the fluidity of the care team, in combination with the lack of a set moment for collaboration (i.e., regular team meetings) is likely to diminish team identity and collaborative behavior.

To enhance credibility and conformability, two independent researchers with experience in care for patients with MLTC performed the analysis. In case of no consensus, a third researcher with extensive experience in research on patients with MLTC (JdG) was consulted To ensure dependability, several experts working in the multimorbidity field performed skeptical peer review (JdG, AvH, and BvM) .Finally, to strengthen credibility, we performed member checking by presenting the results to the mandated national working group including a representative of the Dutch Patient Federation . All data were analyzed in Atlas.ti version.We report our findings in accordance with the Standards for Reporting Qualitative Research We identified six internalized rules that influence if, and to what degree, an HCP engages in interdisciplinary collaboration. Some of these internalized rules seem more pivotal to obtaining the goal of tailored care, such as 'interprofessional identity'. The literature on interprofessional identity describes how a diminished team identity and team performance, as seen in highly fluid interdisciplinary teams, can be overcome when individuals identify themselves with a larger group of various professions . A strong interprofessional identity has a positive effect on interprofessional collaboration . A survey among HCPs in the Netherlands showed that, overall, the interprofessional identity of the different specialties is strong but the individual differences within groups are significant . These individual differences contribute to the variability of the degree of collaboration that we describe in our theory.

'Beliefs on the appropriateness to deviate from guidelines or standard practice' is another key internalized rule in realizing tailored care. The

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literature shows that following disease-specific guidelines may be inappropriate, as these guidelines frequently do not apply to patients with MLTC, may be mutually incompatible, and may result in an increased treatment burden . However, we found that not all HCPs are comfortable to deviate from guidelines or standard practice. This is in line with a study by Brown et al., which identified medicolegal vulnerability as a barrier for primary care physicians to deliver personalized care to older patients with MLTC. This calls for a discussion and improved comprehension of the intricate challenges in providing care for patients with MLTC within the medicolegal domain.

Our theory also uncovers starting points to improve interdisciplinary communication and collaboration for patients with MLTC. The outcomes and goals we present in our theory show that HCPs believe that interdisciplinary communication and collaboration can lead to improved care for patients with MLTC, as described in guidelines and consensus documents. At the same time, a key conclusion from our study is that whether the CAS adapts to emerging situations in such a way that the outcomes and goals are achieved, is highly unpredictable and dependent on members of the CAS, and their interrelationships and connections. Given that care teams for patients with MLTC behave as a CAS, it is important to accept that adaptive responses will never be linear and predictable. However, provided that tailored care is greatly beneficial to the patient, we should strive to consistently achieve this for patients with MLTC and thus reduce the variability in patient healthcare experiences.

Solutions in healthcare tend to be top-down and linear: implementing care pathways, defining roles and responsibilities, standardizing consultations, etc. Although these solutions have their own merits, we should also explore innovative solutions that foster collaborative care because interdisciplinary teams in the care for patients with MLTC behave as a CAS. When we recognize that the connectivity between members of a CAS is more important than the members themselves, it becomes clear that future efforts should focus on lifting barriers that halt this connectivity and on promoting behaviors that facilitate it. The internalized rules and structures of influence identified in our theory,

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provide anchor points for innovative endeavors. For example, medical curricula should cultivate a stronger interprofessional identity and focus on enabling HCPs to recognize which problems lie in the zone of complexity that ask for a different response than merely following guidelines and protocols. Secondly, providing time and financial compensation for efforts that promote tailored care will create the freedom for a CAS to self-organize and adapt to problems in an effective manner. Third, efforts to enhance information mobility and technological innovations for electronic health records could play an important role in facilitating tailored care. Another direction of interest is to take a closer look at patterns that emerge in a CAS. While CASs are intrinsically unpredictable, it is possible to draw conclusions from overall patterns that emerge . For example, in the case studies discussed, one patient had 64 phone calls or visits to the outpatient clinic in the past year. While it is impossible to predict the timing or reason of the next consultation, it is evident that unless the system adapts, this patient will appear very regularly. Activating HCPs to look for these patterns could trigger adaptive responses where necessary. Providing evidence through future research endeavors to support that strengthening interdisciplinary communication and collaboration will reduce care utilization, alleviate treatment burden, and improve patient care experiences, would help in creating consensus amongst HCPs regarding the approach to care and expected outcomes.

An important limitation of our study is that although we aimed to apply purposive and theoretical sampling, we were limited to participants that volunteered to partake. The primary care physicians of the patients discussed in the focus groups, for example, were invited after three focus groups but were unable to join. Therefore, our performed sampling methods closely resembled convenience sampling, potentially leading to selection bias. It did however provide valuable insight because the difficulties we experienced in organizing a focus group study with all HCPs involved in the care for patients with MLTC are likely to resemble the difficulty of organizing an ad hoc multidisciplinary team meeting. We experienced the enthusiasm of most HCPs to engage in the group

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discussion concerning this topic, but also the restraints of time and lack of flexibility in their schedule. Furthermore, our findings should be interpreted in the context from which our grounded theory emerged: secondary and tertiary hospitals in The Netherlands. The unique characteristics of our healthcare system, working environment, and culture may limit the broader generalizability to other healthcare systems or cultural contexts. At the same time, most Western healthcare systems face similar challenges concerning the fragmentation of care, so valuable insights can still be drawn from our findings while taking context into consideration.

Conclusion

Interdisciplinary care teams in the outpatient setting of the hospital operate as a CAS in the care for patients with MLTC. Our theory elucidates the different pathways of communication and collaboration that exist in the care of patients with MLTC. Why, when, and how team members choose to communicate and collaborate influences if and to what degree tailored care is achieved. Currently, there is great variability and unpredictability in this process due to internalized rules and organizational structures. As we strive for tailored care for patients with MLTC, our theory provides promising avenues for future endeavors to optimize interdisciplinary communication and collaboration that take the principles of a CAS, such as non-linearity and self-organization.

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CHAPTER - 6

PAIN MANAGEMENT AND PALLIATIVE CARE IN MEDICAL SURGICAL UNITS

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Abstract

The chapter emphasizes the importance of communication and shared decision-making, underscoring the need for a compassionate, patient-centered approach to ensure dignity, comfort, and a better quality

DOI: https://doi.org/10.26524/232.6 ISBN: 9789348505385

of life in both medical and surgical care settings.This chapter on pain management and palliative care in medical and surgical units provides a comprehensive overview of the essential principles and practices in managing pain for patients with life limiting or serious illnesses.The chapter by outlining the pathophysiology of pain,empahasizing its complex nature in both acute and chronic settings.It delves into the various types of pain-nociceptive ,neuropathic and mixed and the importance of accurate assessment using a multidisciplinary approach.Special focus is given to the role of pharmacological treatments,including opioids,non-opioid analgesics and adjuvants,while also addressing the potential risks and side effects,such as opioid misuse and overdose.In addition to pharmacological interventions,the chapter highlights the significance of non pharmacological therapies,such as physical therapy,cognitive behavioural therapy and complementary approaches,which can enhance pain relief and improve quality of life.A section on palliative care outlines how to provide holistic care, and address the psychological,spiritual and social needs of patients and their families.

Keywords: Pain, palliative care, effectiveness, medical unit, surgical unit, management, settings, chronic diseases, end stage life, team work, palliative team, interdisciplinary collaboration, pain analog scale, techniques of pain management.

6.1 Introduction

Pain management in medical-surgical units is complex and multifaceted, requiring an individualized approach that combines pharmacologic and non-pharmacologic treatments. Effective pain management not only enhances patient comfort but also improves recovery outcomes and quality of life. It necessitates continuous assessment, patient education, and a collaborative, multidisciplinary approach to ensure that patients receive optimal care.High quality pain management is a part of optimal therapy and requires knowledge and skill in pharmacologic, behavioral,social, and communication strategies

grounded in the holistic palliative care approach.palliative care improves the quality of life of patients and that of their families who are facing challenges associated with life threatening illness,whether physical, Psychological, social or spiritual. The quality of caregivers improves as well. Each year, an estimated 56.8 million people, including 25.7 million in the last year of life, are in need of palliative care. Worldwide, only about 14% of people who need palliative car currently receive it. In the United States, chronic pain, defined as pain lasting more than 3 months, is a devastating public health issue, affecting approximately 20% of adults and costing approximately $600 billion annually, more than any other medical condition.[1,2] Of the more than 50 million adults with chronic pain, 8% to 10% are estimated to have high-impact chronic pain, defined as pain that limits work or life activities. (Call Reports Medicine Oct 2024)

6.2 Research Objectives

1. To assess the effectiveness of current pain management strategies in medical and surgical units.
2. To evaluate the implementation and impact of Palliative care services on patient outcomes.
3. To identify barriers and facilitators to effective pain management and palliative care in medical and surgical units.

6.3 Research Methodology

The research study is using the descriptive research design.In the research study the researcher has used secondary data.The secondary data has been collected from research papers,published materials,online websites, HR blogs, and survey reports published by various research organizations.

6.4 Assessment of Pain

Accurate pain assessment is the cornerstone of effective pain management. In medical surgical units,pain assessment is typically performed using self report tools, such as the Numeric Rating Scale (NRS), Visual Analog Scale(VAS) or the McGill Pain questionnaire. These tools allow patients to express the intensity and nature of their pain,which

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guides treatment decisions. For patients unable to communicate, observational tools such as the Behavioural Pain Scale(BPS) or Critical Care Pain Observation Tool(CPOT)are used.

A thorough pain assessment involves considering not only the intensity but also the location, duration, quality and impact of pain on the patient's ability to perform daily activities. The World Health Organization (WHO) analgesic ladder provides a systematic approach to pain management, escalating from non-opioid analgesics for mild pain to opioid analgesics for severe pain(Kaufman et al.,2020

6.4.1 Pharmacologic Interventions

Pharmacologic management is a mainstay of pain control in medical-surgical units.Key drug classes used include:

- Nonsteroidal Anti-Inflammatory drugs(NSAIDs):These are effective for mild to moderate pain and have the added benefit of reducing inflammation(e.g.,ibuprofen,naproxen).However,long term use requires monitoring for gastrointestinal,renal and cardiovascular side effects.
- Acetaminophen:Often used for mild to moderate pain,acetaminophen is commonly combined with opioids to provide enhanced pain relief without adding the side effects of additional narcotics(Michaud et al., 2018).
- Opioids:Opioids remain the mainstay for managing severe pain,especially post-surgery or following trauma.Common opioids used in medical-surgical units include morphine,fentanyl,hydromorphone and oxycodone.However,due to the risks of dependency,overdose and side effects(e.g,constipation,respiratory depression),opioids should be prescribed with caution and used for the shortest duration possible(Bicket et al.,2017).
- Adjuvants:Medications such as anticonvulsants(e.g.gabapentin) or antidepressants(e.g.amitryptyline) may be used to treat neuropathic pain.Additionally,muscle relaxants or local anesthetics may be used for specific pain syndromes (Micheli et al., 2021).

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6.4.2 Non-Pharmacologic Interventions

In addition to pharmacologic approaches, non-pharmacologic strategies play a significant role in pain management. These include:

- Cognitive-Behavioral Therapy (CBT): CBT techniques, including relaxation, distraction, and guided imagery, can be effective in reducing the perception of pain, particularly in chronic pain or patients with psychological distress.
- Physical Therapy: Physical interventions such as exercise, stretching, and positioning can alleviate pain, especially musculoskeletal pain.
- Heat/Cold Therapy: Local application of heat or cold is useful in managing pain related to inflammation or muscle spasms (Kenny et al., 2019).
- Acupuncture and Massage: Some patients in medical-surgical units benefit from complementary treatments like acupuncture or therapeutic massage for pain relief.

6.4.3 Patient Education and Involvement

A crucial part of pain management is ensuring that patients are well-informed and actively involved in their care. Education should include information about the pain relief options available, potential side effects, and the importance of reporting pain regularly. When patients are empowered to manage their pain, they are more likely to adhere to treatment regimens and have improved satisfaction with care (Liu et al., 2019).

6.4.4 Multidisciplinary Approach

Effective pain management in medical-surgical units often requires a multidisciplinary approach involving nurses, physicians, physical therapists, and sometimes psychologists. Collaborative care ensures that all aspects of the patient's pain are addressed, from pharmacological management to psychosocial support.

DOI: https://doi.org/10.26524/232.6 ISBN: 9789348505385

- Nurses play a central role in monitoring pain levels, administering medications, providing education, and using non-pharmacologic interventions.
- Physicians assess and adjust pain management plans, balancing the benefits of pain relief with the risks of adverse effects, especially in vulnerable populations such as the elderly or those with substance use disorders.

6.4.5 Challenges in Pain Management

Despite advances in pain management strategies, several challenges remain:

- Patient Expectations vs. Reality: Patients may have unrealistic expectations regarding pain relief, which can lead to dissatisfaction if pain is not fully relieved. Communicating realistic outcomes and managing expectations is essential.
- Opioid Crisis: The opioid epidemic poses challenges in balancing effective pain relief with the risks of misuse, dependency, and overdose. Hospitals must implement careful monitoring systems to reduce these risks, including protocols for opioid stewardship.
- Cultural Sensitivity: Pain perception varies across cultures, and nurses and healthcare providers must be sensitive to these differences when assessing and managing pain (Patterson et al., 2020).

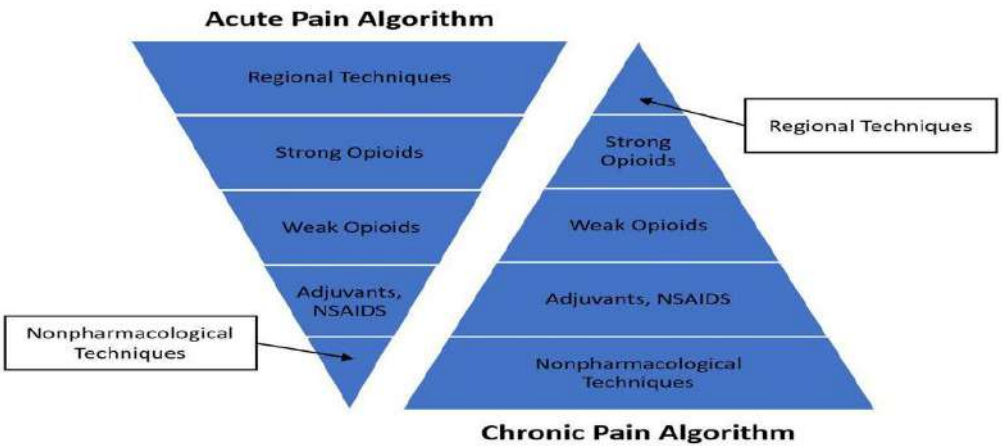

Fig 1. Multidisciplinary Pain management:Acute pain and Chronic pain

DOI: https://doi.org/10.26524/232.6 ISBN: 9789348505385

6.4.6 Acute Pain Management Algorithm

1. Assess Pain

- Use a validated pain scale (e.g., Numeric Rating Scale (NRS), Visual Analog Scale (VAS), or Wong-Baker Faces).
- Consider pain characteristics (onset, location, duration, intensity, quality, aggravating/alleviating factors).
- Assess for red flags (e.g., trauma, infection, ischemia, neurological deficits).

2. Categorize Pain Severity

Mild (1–3/10): Non-opioid analgesia (e.g., acetaminophen, NSAIDs).Moderate (4–6/10): Combination therapy (e.g., NSAIDs + weak opioids like tramadol).Severe (7–10/10): Strong opioids (e.g., morphine, fentanyl) + multimodal analgesia.

3. Identify Pain Type & Etiology

- **Nociceptive (somatic/visceral)** – Responds well to NSAIDs, opioids.
- **Neuropathic** – Consider gabapentinoids, antidepressants, local anesthetics.
- **Inflammatory** – NSAIDs, steroids (if indicated).

4. Select Appropriate Treatment

- **Non-Pharmacologic:** Ice/heat, physical therapy, cognitive-behavioral therapy (CBT), acupuncture.
- **Pharmacologic:** Start with lowest effective dose, monitor side effects.
- **Interventional:** Nerve blocks, epidural analgesia, TENS therapy if needed.

5. Reassess & Adjust Treatment

- Monitor pain relief & side effects every **30–60 minutes (IV) or 1–2 hours (oral).**
- Escalate or de-escalate treatment based on response.
- Consider referral for uncontrolled pain or complex cases.

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6.5 Evaluation of Pain

The foundation of successful pain treatment is an accurate assessment of pain.Self report instruments like the McGill Pain Questionnaire,Visual Analog Scale(VAS) and Numeric Rating Scale(NRS) are commonly used in medical-surgical departments to assess pain. Patients can use these tools to communicate the type and severity of their pain,which helps doctors make judgments about how best to treat them. The Critical Care Pain Observation Tool(CPOT) and the Behavioral Pain Scale(BPS) are two observational techniques used with patients who are unable to talk.

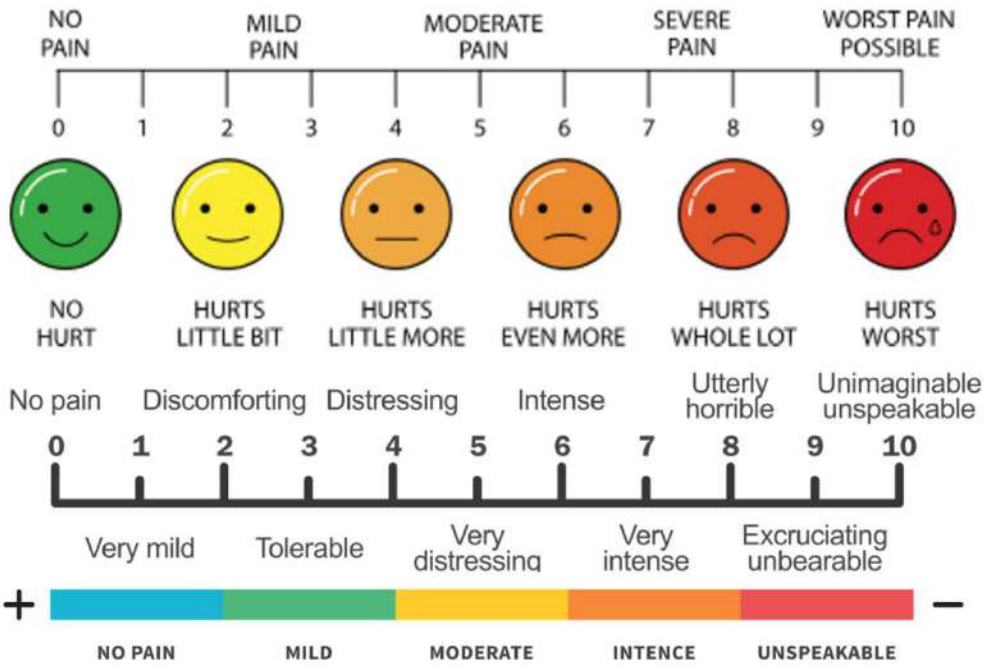

Fig 2 Universal Visual Analogue scale(VAS)

6.5.1 Visual analog scale

The Universal Visual Analog Scale (VAS) is a simple and widely used tool for measuring subjective experiences like pain, mood, or fatigue. It typically consists of a straight line, usually 10 cm (100 mm) long, with endpoints representing extreme states (e.g., "No pain" to "Worst pain imaginable").

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6.5.2 How It Works:

1. The patient marks a point on the line that represents their perception of the symptom.
2. The distance from the "no symptom" end to the mark is measured in millimeters.
3. The score is recorded on a scale from **0 to 100**.

6.5.3 Common Uses:

- **Pain assessment** (e.g., in medical settings)
- **Mood evaluation** (e.g., depression or anxiety)
- **Fatigue measurement** (e.g., in chronic illness management)
- **Quality of life research**

6.6 Case Studies in pain Management and Palliative care

6.6.1 case study

Acute pain event John, a 28 year old male, presents to his local pharmacy with acute ankle pain after a football training accident this evening. He requests ibuprofen combined with codeine as it was recommended by a friend to relieve his pain.

6.6.2 Action plan:

In any person with pain, the focus should be on identifying and managing the underlying cause. Specific treatment for the underlying condition may be required in addition to symptomatic management of the pain. 1 Be empathetic It is important to build an empathetic relationship with John. When initially seeing a person with acute pain like John, take time to fully understand all the factors that may be involved. This is the first step in building a positive relationship with him. 2 Establish the cause of John's pain Establishing the cause of the pain will help you assess the situation and manage John's pain. Some example questions are: - - - How did you injure yourself? Can you describe what happened? On a scale of 1 to 10, with 1 being no pain and 10 being the worst pain imaginable, how bad is your pain right now? Can you describe the type of pain you are experiencing (e.g. sharp, dull, tingling)? Case studies: Pain management

DOI: https://doi.org/10.26524/232.6 ISBN: 9789348505385

and codeine use Guidance for Pharmacists 1 Case studies: Pain management and codeine use Guidance for Pharmacists . Are you able to weight-bear on the injured foot? Do you have any medical conditions? Are you taking any medicines that are prescribed, over the counter or complementary? 3 Manage John's pain Once the cause and severity of the pain and a medical history are established, you can develop a plan with John to manage his pain. This plan may include analgesics and/or non-drug management. Some example responses are (provided John does not have any medical conditions and is not taking any medicines): The pain you have described to me sounds like acute pain. There are non-drug treatments available for your injury. These include the RICE method (Rest, Ice, Compression and Elevation) avoiding HARM (Heat, Alcohol, Running, and Massage) for the first 48 hours and visiting a physiotherapist for further assessment of your injury. There are also over-the-counter medicines available that can be used to manage your pain. These include paracetamol, non-steroidal anti-inflammatory drugs (NSAIDs) or combination of paracetamol/NSAIDs. If pain persists despite using an over-the-counter medicine, follow-up by an authorised prescriber is recommended. (' If symptoms worsen or have not subsided 48 hours after the injury, follow-up with an authorised prescriber is recommended. John's specific request for low dose codeine will also need to be addressed: You mentioned your friend's recommendation of ibuprofen and low-dose codeine. There is no conclusive evidence to show that low-dose codeine-containing medicines are any more effective than paracetamol, aspirin or ibuprofen.2 Codeine can also be very dangerous, addictive and potentially deadly, so we do not recommend it. However, I will recommend an alternative for you that can assist you while you are performing the RICE method. Consider referral if: there is a possibility of a more serious injury, e.g. severe bruising and/or swelling, a possibility of ligament/tendon damage or a broken bone; over-the-counter medicines do not effectively treat the acute pain and stronger pain relief is required; or John does not have full function of the area, or if the pain and swelling do not subside after a couple of days.

DOI: https://doi.org/10.26524/232.6 ISBN: 9789348505385

6.6.3 Case study : Measures to Evaluate High-quality Palliative Care in Surgery

Palliative surgical procedures are intended to reduce suffering or support quality of life rather than prolong life or cure disease. Prior studies have described the considerable risks of postoperative complications and mortality after palliative surgery, but few have measured the impact of palliative surgery on restoration of function and quality of life, or conversely, the occurrence of adverse outcomes that further threaten quality of life, function, and ability to achieve a good death. Absence of a uniform system for designating and classifying procedures performed with palliative intent presents a barrier to studying outcomes of palliative surgery. Generation of standards for palliative surgery will permit future studies to assess the quality of palliative surgical care using criteria consistent with high-quality palliative care, rather than current metrics used in surgery, namely mortality and morbidity. Future comparative effectiveness trials are needed to compare the effectiveness of surgical procedures to non-surgical management on palliative outcomes for multiple surgical indications, including limb salvage, valve repair, and malignant obstruction.

6.6.4 Case report

An 81-year-old diabetic patient with peripheral vascular disease developed necrosis of the foot. Revascularisation attempts were complicated leading to ICU admission for intravenous antibiotics and haemodynamic support. They were diagnosed with necrotising fasciitis but were not fit for further surgery. Referral was made from ICU to hospice, their preferred place of death. After inotrope withdrawal, the patient was transferred with a bupivacaine spinal line in-situ for pain control. Diabetic control was challenging in the context of variable oral intake and sepsis. Morphine and midazolam syringe drivers were titrated; the patient died peacefully eight days after admission. Evolving case mix: Admissions to the hospice inpatient unit from 2015–2019 were reviewed retrospectively. Although we were unable to identify those patients transferred directly from ICU to hospice, the proportion of patients admitted to the hospice with non-malignant conditions had risen from 11% (2015) to 21% (2018) during this time.

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6.5 Staff training

Teaching sessions were provided for staff to highlight key considerations when caring for patients with necrotising fasciitis, including symptoms and infection control advice. Feedback was gathered from staff attending teaching with 82% rating it as 'useful' or 'very useful' and 90% indicating that they would be interested in future education sessions.

The breadth of patients referred for inpatient hospice management is growing. The case outlined may represent an emerging patient subgroup; those without a prior palliative diagnosis whereby active treatment of an acute complication has failed. Teaching sessions proved beneficial to hospice staff and should be considered in the future to promote individualised integration of care across disciplines.

6.6 Case study 4

A total of 9 physicians and 22 nurses of the Infectious Diseases Unit and two physicians of the Palliative Care Unit participated in the study. The Palliative Care Unit developed a feasible 18-day consultation intervention (9–28 March 2020) with the following components:

- Supervision of 18 daily briefings with nine Infectious Diseases Unit physicians;
- Forty-eight PC bedside consultations together with the referring physician;
- Two brief (30–40 min) lectures on PC topics, with a PC expert answering the Infectious Diseases Unit physicians' and nurses' questions;
- A booklet addressing the assessment and treatment of PC needs based on issues emerging during the first week of the intervention and elaborated for use by professionals.

The Head of the Infectious Diseases Unit requested assistance from the Palliative Care Unit on 8 March 2020, specifically in communicating deterioration of health or bad news to patients and their families and in managing patients' physical and psychological symptoms. Assistance to the entire Infectious Diseases Unit staff facing the COVID-19 emergency

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was also requested. Given this request, the Palliative Care Unit reorganized its activity: two senior PC physicians assisted only COVID-19 patients, the third physician and one advanced nurse continued assisting cancer patients, and one nurse was reassigned to a COVID-19 ward.

The Palliative Care Unit developed a consultation intervention and training program to meet the Infectious Diseases Unit healthcare professionals' needs during the emergency. The numerous patients assisted and the severity of symptoms left no time for the Infectious Diseases Unit healthcare providers for training; daily clinical meetings to organize admissions, discharges, and restrictions on family visits due to the need to isolate COVID-19 patients had priority over everything else.

Three macro themes and several subthemes were identified thanks to the audio recordings of the daily briefings and the audio recorded lectures and daily personal field notes drawn up by two PC physicians. These three macro themes were the following:

(a) New answers to new needs;
(b) Symptom relief and the decision-making process;
(c) Educational and training issues.

Table 1 : Requirement of palliative care by 2032

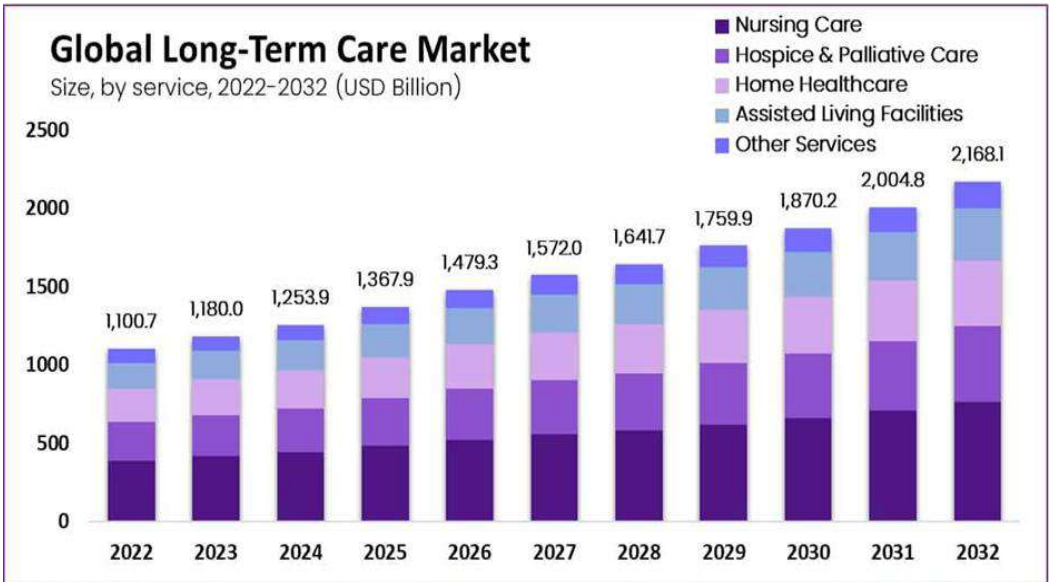

Table 2: Palliative care patients illness among adolscents

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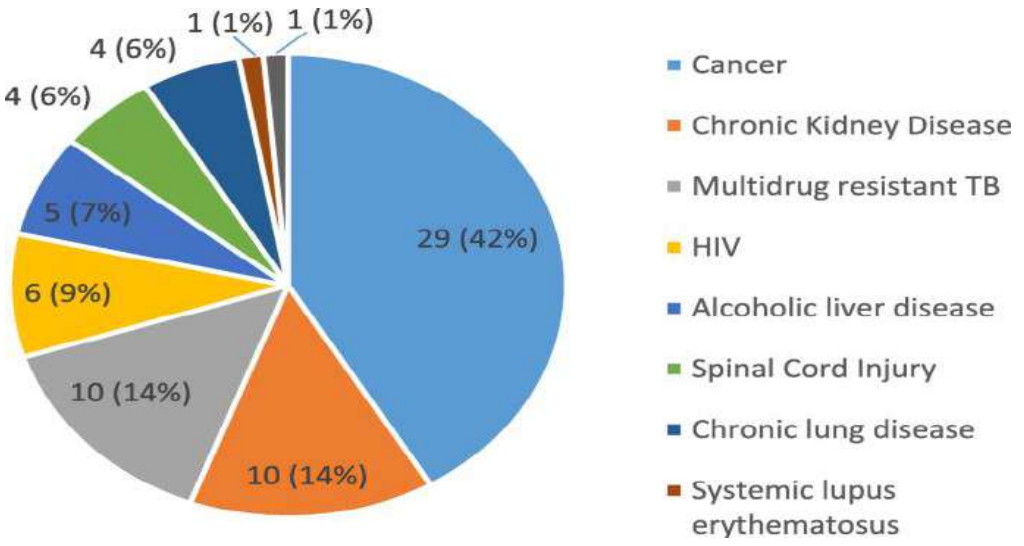

Palliative care focuses on improving the quality of life for patients with advanced illnesses by addressing physical, emotional, social, and spiritual needs. Patients with conditions such as cancer, heart failure, COPD, chronic kidney disease, and neurodegenerative disorders often require specialized palliative care interventions.

6.7 Key Palliative Care Needs in Advanced Illness

1. Physical Needs

- Pain management (opioids, NSAIDs, adjuvant therapies)
- Symptom relief (nausea, dyspnea, fatigue, constipation)
- Nutrition and hydration support

2. Psychological and Emotional Needs

- Anxiety, depression, and distress management
- Cognitive and behavioral support
- Coping strategies for patients and families

3. Social and Caregiver Needs

- Family and caregiver support (respite care, counseling)
- Financial and legal planning
- Coordination of home care or hospice services

DOI: https://doi.org/10.26524/232.6 ISBN: 9789348505385

4. Spiritual and Existential Needs

- Finding meaning and purpose
- Support from chaplains or spiritual counselors
- End-of-life preferences and legacy planning

5. Communication and Decision-Making Needs

- Advance care planning (ACP) and goals-of-care discussions
- Ethical decision-making in end-of-life care
- Ensuring patient autonomy and dignity

Conclusion

Effective pain management and palliative care in medical surgical units require a comprehensive approach, incorporating assessment, pharmacological and non- pharmacological interventions and interdisciplinary teamwork. By prioritizing patient-centered care,nurses can improve quality of life and reduce suffering for patients with serious illnesses. Management of pain involves efforts from all the healthcare providers engaged in the curative and palliative phase of treatment but maintaining this continuity while the patient shifts from one phase to another is the biggest challenge. The transition from the curative to the palliative phase represents a critical juncture at which continuity of care is often compromised. Therefore, it is necessary that this transition should take place gradually. The challenge of maintaining continuity grows progressively as the number of professionals involved with a patient increases.

Palliative radiotherapy (PRT) is indicated in 30-50% of all cancer patients and patients receiving PRT should be adequately attended for pain and symptom relief. Issues related to pain, difficult physical symptoms and psychosocial aspects can coexist during PRT, which needs to be addressed by a palliative care unit (PCU).

The term palliative care has often been misused; many people still refer to palliative medicine as being entirely focused on terminal illness.[6] Palliative care specialists are faced with extensive barriers to providing effective end-of-life care. It is important to explore these barriers to PCU

DOI: https://doi.org/10.26524/232.6 ISBN: 9789348505385

and hospice referrals because late referrals result in low family satisfaction and adverse clinical outcomes. Many studies have identified barriers like difficulty in predicting prognosis, physician's unwillingness to refer, physician's unfamiliarity with hospice, physician's negative opinion of hospice services, a medical system that does not include hospice as standard care, lack of acceptance of terminal diagnosis by the patient and his family, patient and his family's unwillingness to use hospice and their desire for life-prolonging treatment, insufficient knowledge amongst general population about hospice service, and social attitudes towards health.

In addition, there are other PCU-related issues which include poor access to PCUs (shortage of PCUs, inconvenient locations), environment of PCUs (private room, loneliness, and isolation from general ward), poor communication between staff of PCU and general ward, economic problems (expensive room fees and hospital bills), doctrine beliefs of PCU (emphasis on philosophy, stringent rules for admission) etc.

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DOI: https://doi.org/10.26524/232.6 ISBN: 9789348505385

CHAPTER - 7

INFECTION CONTROL AND PREVENTION STRATEGIES IN SURGICAL SETTINGS

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Abstract

Infection control and prevention are critical components of ensuring patient safety and optimal outcomes in surgical settings. This chapter explores the key strategies implemented to minimize the risk of surgical site infections (SSIs) and other healthcare-associated infcetions (HAIs) in

DOI: https://doi.org/10.26524/232.7 ISBN: 9789348505385

operating rooms. It begins by examining the importance of stringenthygienic practices, such as hand hygiene and aseptic techniques, to prevent the introduction of pathogens. The chapter also addresses the role of sterilization and disinfection protocols in safeguarding surgical instruments, surfaces, and environments. Additionally, it highlights the significance of surveillance systems to monitor infection rates, identify trends and inform evidence based interventions. Emphasis is placed on the roles of multidisciplinary teams,including surgeons,nurses and infection control specialists, in maintaining a culture of safety and adherence to infection prevention protocols.Moreover,the chapter discusses the challenges posed by emerging antimicrobial-resistant organisms and the evolving guidelines for antibiotic stewardship in surgical settings. Finally the cahapter considers the role of patient factors. Such as comorbidities and preoperative preparation, in reducing infection risks. By synthesizing current best practice and emerging trends, this chapter provides comprehensive overview of infection control and prevention strategies essential for improving surgical outcomes and protecting patients in healthcare settings.

Keywords: Infection control, Prevention Strategies, surgical settings, fumigation, hospital acquired infection, aseptic techniques, contamination, hygiene, spill kits, bio medical waste management.

Objectives

- To understand the epidemiology and burden of SSIs in surgical settings.
- To explore key infection control measures at different surgical phases.
- To discuss the role of antimicrobial stewardship in preventing infections.
- To evaluate the impact of emerging technologies in infection control.
- To provide guidelines for healthcare professionals on best practices.

DOI: https://doi.org/10.26524/232.7 ISBN: 9789348505385

Research Methodology

The research study is using the descriptive research design.In the research study the researcher has used secondary data.The secondary data has been collected from research papers,published materials,online websites, HR blogs, and survey reports published by various research organizations.

7.1. Introduction

Surgical site infections (SSIs) account for a significant proportion of healthcare-associated infections (HAIs), posing risks to patient safety and increasing hospital stays. Effective infection control measures are essential to minimize these risks and improve surgical outcomes.

Infection control prevents or stops the spread of infections in healthcare settings.Healthcare workers can reduce the risk of healthcare-associated infections and protect themselves , patients and visitors by following CDC guidelines .Infection control actions help keep germs from spreading and causing infection.Following standard precautions every day for every patient minimizes germs from spreading.As infection risks will always exist in healthcare settings, following standard precautions always protect patients,coworkers and self.

Infection prevention and control(IPC) is a practical,evidence based approach preventing patients and health workers from being harmed by avoidable infections.Effective IPC requires constant action at all levels of the health system,including policymakers,facility managers,health workers and those who access health service.IPC is in the field of patient safety and quality of care, as it is universally relevant to every health worker and patient, at every health care interaction.Defective IPC causes harm and can kill.Without effective IPC it is impossible to achieve quality health care delivery. Infection prevention and cotrol effects all aspects of health care,including hand hygiene,surgical site infections,injection safety,antimicrobial resistance and how hospitals operate during and outside of emergencies.Programmes to support IPC are particularly important in low and middle income countries,where health care delivery and medical hygiene standards maybe negatively affected by secondary infections.

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7.2. Epidemiology and Risk Factors

7.2.1 Incidence of SSIs

- According to the WHO, SSIs occur in 2-5% of surgical procedures globally.
- Higher rates in developing countries due to limited resources.

7.2.2 Risk Factors

- Patient-related: Diabetes, obesity, smoking, immunosuppression.
- Procedure-related: Duration of surgery, wound classification, use of implants.
- Environmental: Poor ventilation, unsterile equipment.

Fig 1. Graph showing the trend in surgical site infection (SSI) incidence rates over the years, with a notable reduction after the intervention in 2020.

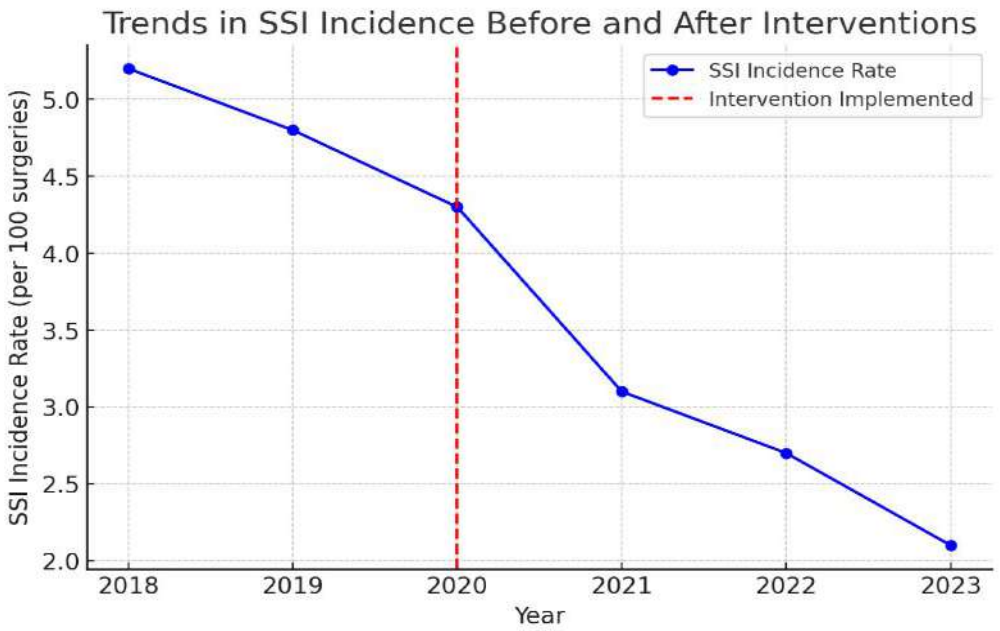

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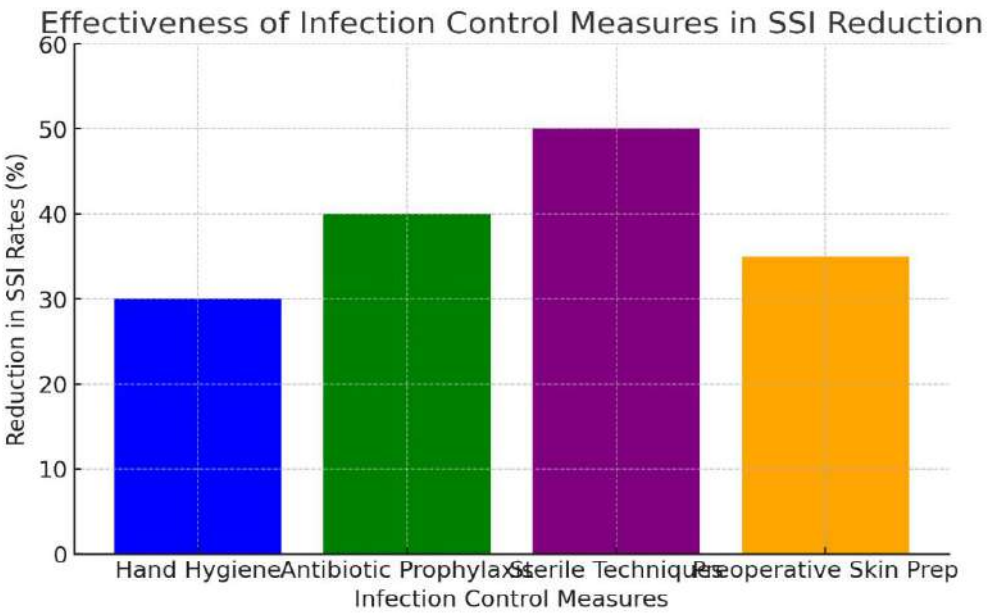
Fig 2. Bar chart illustrating the effectiveness of different infection control measures in reducing surgical site infections (SSIs). Sterile techniques had the highest impact, followed by antibiotic prophylaxis, preoperative skin preparation, and hand hygiene.



7.3. Infection Control Strategies

7.3.1 Preoperative Measures

7.3.1.1 Patient Preparation

- Preoperative bathing with antiseptic agents (chlorhexidine gluconate).
- Glycemic control in diabetic patients.
- Nutritional optimization to enhance immunity.

7.3.1.2 Antibiotic Prophylaxis

- Administration within 60 minutes before incision.
- Selection based on procedure type (e.g., cefazolin for clean-contaminated surgeries).
- Discontinuation within 24 hours post-surgery.

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7.3.2 Intraoperative Measures

7.3.2.1 Hand Hygiene and Surgical Attire

- WHO's Five Moments for Hand Hygiene.
- Use of sterile gloves, gowns, and masks.

7.3.2.2 Aseptic Surgical Techniques

- Maintenance of sterile field.
- Proper handling of surgical instruments.

7.3.2.3 Environmental Controls

- Laminar airflow systems in operating rooms.
- Routine disinfection of high-touch surfaces.
- Restriction of unnecessary personnel in the OR.

7.3.3 Postoperative Measures

7.3.3.1 Wound Care Management

- Daily monitoring for signs of infection.
- Use of advanced dressings (silver-impregnated dressings).

7.3.3.2 Surveillance and Monitoring

- Implementation of electronic health records for tracking infections.
- Reporting and analysis of infection rates.

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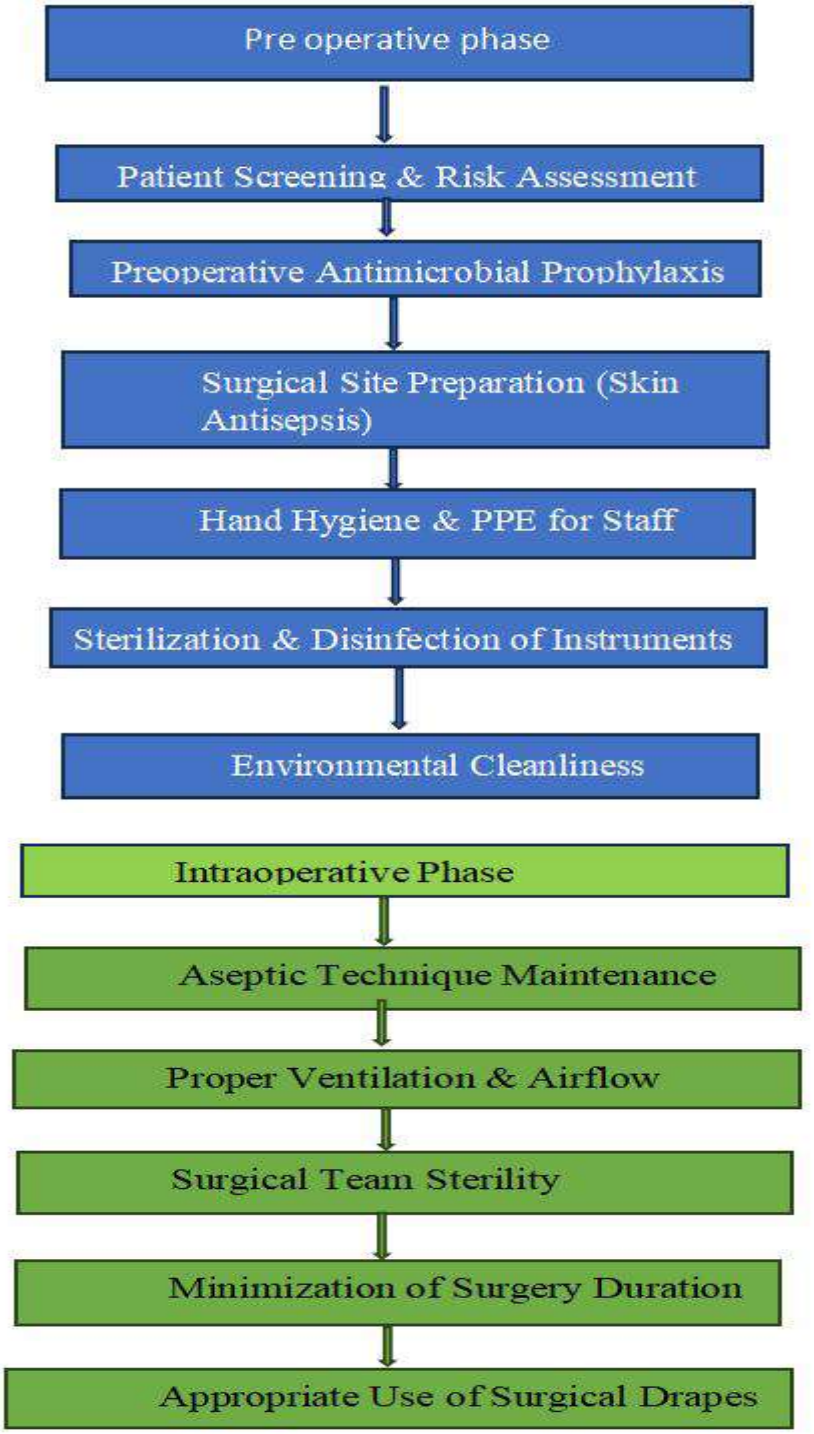

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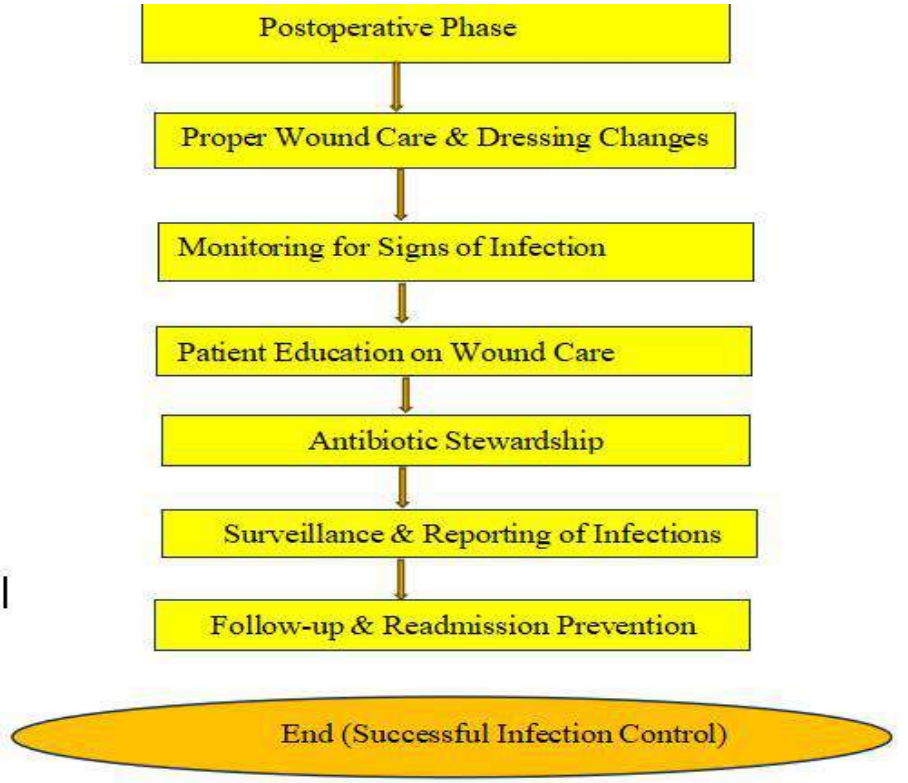

Fig 3. Flowchart of Infection Control Workflow in Surgical Settings(Pre operative, Intra operative and Post operative)

7.4 Emerging Technologies in Infection Prevention

Below are some of the emerging technologies in infection prevention:

1. AI & Machine Learning (20%) – Used for early detection, outbreak prediction, and automated disinfection monitoring.
2. UV-C & Robotics (15%) – Automated UV-C robots for surface and air disinfection in hospitals.
3. Antimicrobial Coatings (15%) – Surfaces with long-lasting antimicrobial properties to reduce pathogen spread.
4. Wearable Biosensors (10%) – Real-time monitoring of infections and exposure risks.
5. CRISPR-Based Diagnostics (10%) – Rapid and precise identification of infectious agents.

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6. Telemedicine & Remote Monitoring (10%) – Reducing direct contact in healthcare while maintaining patient care.
7. Blockchain for Infection Tracking (10%) – Ensuring secure and transparent data-sharing for outbreak control.
8. Smart PPE (10%) – Self-sanitizing masks, temperature-sensitive gloves, and IoT-enabled protective equipment.

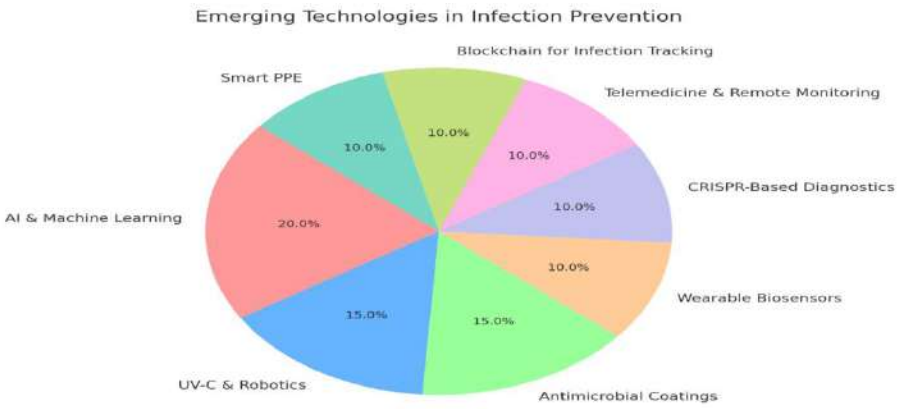

Fig 4. Pie chart illustrating the emerging technologies in infection prevention.

Emerging technologies in infection control and prevention are revolutionizing healthcare, public health, and hygiene practices. Here are some cutting-edge advancements: UV-C Light Disinfection. How It Works: Uses ultraviolet (UV-C) light to kill bacteria, viruses, and fungi on surfaces and in the air. Example UV-C robots in hospitals to sanitize patient rooms. Portable UV wands for personal and commercial use. UV air filtration systems for HVAC units. Antimicrobial Surface Coatings. How It Works: Special coatings on high-touch surfaces (e.g., doorknobs, hospital beds) that continuously kill bacteria and viruses. Example Copper-infused surfaces (shown to reduce hospital-acquired infections).Self-cleaning nanotechnology coatingAI-Powered Infection Surveillance SystemHow It Works: Uses artificial intelligence (AI) to analyze hospital data and detect early signs of infection outbreaks. Examples: AI-driven hand hygiene

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monitoring systems. Predictive analytics for antimicrobial resistance (AMR) tracking. Wearable Biosensors for Infection Detection. How It Works: Wearable technology that monitors vital signs and detects early symptoms of infections. Example Smart patches measuring temperature and inflammation markers. Continuous glucose monitors detecting infections in diabetic patients.

7.5 Case Studies and Clinical Guidelines

- CDC Guidelines for SSI Prevention (2023 update).
- WHO Global Guidelines on Infection Prevention (2022).

7.5.1 Case studies on **surgical infection control and prevention measures**:

Case Study 1: Decreasing Surgical Site Infections (SSIs) by Preoperative Screening and Decolonization

7.5.1.1 Background:

A U.S. hospital saw a rise in SSIs in patients who received orthopedic surgery, especially joint replacements.

7.5.1.2 Intervention:

1. Preoperative Screening: Patients were tested for Staphylococcus aureus (both MSSA and MRSA) prior to undergoing surgery.
2. Decolonization Protocol: Patients who had tested positive for Staphylococcus aureus were treated with a five-day decolonization protocol of intranasal mupirocin and chlorhexidine body washes.
3. Antibiotic Prophylaxis : The hospital changed its antibiotic prophylaxis regimen based on screening results (vancomycin for MRSA carriers).
4. Sterile Technique Reinforcement: Additional staff education on sterile techniques and hand hygiene compliance.

DOI: https://doi.org/10.26524/232.7 ISBN: 9789348505385

7.5.1.3 Outcome:

- A 40% reduction in SSIs among joint replacement patients.
- Enhanced adherence to preoperative hygiene practices.
- Reduced costs through fewer postoperative infections and reduced hospital stays.

7.5.2 Case Study 2: Adoption of a Bundle Strategy to Prevent SSIs in Cardiac Surgery

7.5.2.1 Background:

A cardiac surgery department had a cluster of deep sternal wound infections (DSWIs), resulting in increased morbidity and longer hospital stays.

7.5.2.2 Intervention:

A bundle strategy was adopted:

1. Compliance with Strict Hand Hygiene: Audits and hand hygiene champions on a regular basis.
2. Preoperative Antisepsis of the Skin: Systematic application of chlorhexidine-alcohol rather than povidone-iodine.
3. Intraoperative Normothermia: Preservation of normothermia to avoid hypothermia-associated infections.
4. Postoperative Glucose Management: Strict glucose control in diabetic and non-diabetic patients to minimize hyperglycemia-associated SSIs.
5. Antibiotic Timing Optimization: Adhering to ensuring antibiotics were given within 60 minutes of incision time and re-dosed accordingly as necessary.

Outcome:

- A 60% reduction in DSWIs during a 12-month period.
- Improved adherence to infection control guidelines by staff.
- Decline in infection-related complication readmissions.

DOI: https://doi.org/10.26524/232.7 ISBN: 9789348505385

7.5.3 Case Study: Decreasing Postoperative Infections by Increasing Environmental Cleaning

7.5.3.1 Background:

One hospital in the UK found a high infection rate in patients who were having colorectal surgery, with some infections linked to environmental contamination.

7.5.3.2 Intervention:

1. Terminal Cleaning Protocols: More thorough cleaning of operating rooms through hydrogen peroxide vapor disinfection.
2. Checklists for Cleaning Staff: Standardized procedures to make sure high-touch surfaces were cleaned and disinfected.
3. UV Light Disinfection: Installation of UV-C light disinfection in high-risk surgical suites.
4. Monitoring and Compliance Audits: Sustained surface sampling and ATP bioluminescence testing to measure cleaning efficiency.

7.5.3.3 Outcome:

- A 50% decrease in postoperative infections among colorectal surgery patients.
- Enhanced cleaning compliance from 65% to 95%.
- Staff and patient increased confidence in hospital infection control protocols.

7.6 Case Study: Preventing Catheter-Associated Infections in Post-Surgical ICU Patients

7.6.1 Background:

A tertiary care hospital discovered that post-surgical patients in the ICU comprised a high number of catheter-associated urinary tract infections (CAUTIs).

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7.6.2 Intervention:

1. Nurse-Led CAUTI Prevention Protocol: Spurred nursing staff to apply early catheter removal protocols.
2. Use of Silver-Coated Catheters: Switched to silver-alloy catheters to decrease bacterial colonization.
3. Sterile Insertion Training: Re-education of all staff on the correct aseptic catheter insertion technique.
4. Daily Catheter Necessity Assessments: Implementation of checklists to minimize unnecessary catheter placement.

7.6.3 Outcome:

- A 70% reduction in CAUTIs at six months.
- Reduced antibiotic use and resistance levels.
- Better patient outcomes and reduced ICU stays.

These case reports demonstrate the power of multimodal infection control practices in operating rooms. Key takeaways are:

- ✓ Preoperative decolonization & screening can decrease Staphylococcus. aureus-associated SSIs.
- ✓ Bundle strategies integrating antisepsis, normothermia, glucose management, and optimal antibiotic timing are extremely effective.
- ✓ Environmental cleaning improvements can dramatically decrease infection risk.
- ✓ Empowering the nursing staff in infection control improves long-term results.

Conclusion

In conclusion, infection control and prevention in surgical settings are paramount to ensuring safety, promoting positive surgical outcomes and minimizing healthcare-associated infections (HAIs). Effective strategies, such as stringent hand hygiene, proper sterilization of surgical instruments, appropriate use of personal protective equipment (PPE) and adherence to aseptic techniques, are essential components in minimizing

DOI: https://doi.org/10.26524/232.7 ISBN: 9789348505385

the risk of infections. Furthermore, ongoing education and training for healthcare professionals, surveillance systems to monitor infection rates and a culture of safety are critical in reinforcing these strategies. Collaboration across all levels of healthcare teams, from surgeons to support staff, plays a vital role in maintaining a sterile environment and upholding the highest standards of infection control. By implementing these comprehensive strategies, surgical settings can significantly reduce the incidence of infections, ensuring better outcomes and enhancing the overall quality of care for patients. Strict adherence to infection control measures significantly reduces SSIs and improves surgical outcomes. The integration of new technologies further enhances infection prevention, making it a multidisciplinary responsibility for healthcare providers.

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DOI: https://doi.org/10.26524/232.7 ISBN: 9789348505385

CHAPTER - 8

ADVANCES IN MEDICAL SURGICAL NURSING: EVIDENCE-BASED PRACTICES INNOVATION IN PATIENT CARE

Managing Post-Operative Complications Case Studies and Best Practices

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Abstract

Post operative complications remain a critical concern in surgical care, often determining patient outcomes and healthcare resource utilization. This chapter provide a comprehensive exploration of the identification, management, and prevention of post operative complications through a humanized approach. By integrating evidence -based practices with real world case studies, we aim to bridge the gap between clinical guidelines and individual patient care. The chapter begins with an overview of common post operative complications, including infections, thromboembolic events, anastomotic leaks, and organ dysfunction. Each complication is analysed in the context of risk factors, early detection

DOI: https://doi.org/10.26524/232.8 ISBN: 9789348505385

strategies, and management protocols. Special emphasis is placed on patient- centred care, highlighting communication, empathy, and shared decision making in addressing these challenges. Through detailed case studies, we illustrate the complexity of real-world scenarios and the application of multidisciplinary strategies to optimise outcomes. These cases also underscore the importance collaboration among surgical teams, anaesthesiologists, nursing staff, and rehabilitation specialists. Finaly the chapter presents best practices for minimising complications, focusing on pre-operative optimization, intra- operative vigilance, and post operative monitoring. By integrating clinical innovation with a humanised perspective, this chapter aim to enhance the quality and safety of surgical care while prioritizing the wellbeing of patients and their families. This resource serves as a valuable guide for surgeons, health care professionals, and trainees, offering actionable insights to improve patient outcomes and foster a culture of compassionate care.

Keywords: Post operative complications, case studies, best practices, evidenced based practices, surgical care.

8.1 Introduction

There are many postoperative complications related to particular procedures that are beyond the scope of this text. Hospitalists caring for surgical patients should have an understanding of what surgical procedure was performed, the indication for that operation, and what perioperative concerns the operating surgeon has based on the circumstances of that particular patient or procedure. This should be part of the communication between the surgical and hospitalist staff. Here we will consider complications that are commonly associated with all surgical procedures. The prevention of postoperative complications should begin in the preoperative period. A thorough history and physical examination should identify conditions that increase the risk for bleeding, infection, and cardiopulmonary compromise. Elective surgery provides an opportunity to uncover and modify risk factors. Aspirin, antiplatelet

agents, NSAIDS, and anticoagulant therapy are routinely held pre-operatively to decrease bleeding risk. Low-grade postoperative fever occurs in as many as one-third of postoperative patients and is usually caused by postoperative inflammation, atelectasis, or hematoma absorption rather than infection. Fever from inflammation occurs earlier than fever from infection; 1.6 vs. 2.7 days in 1 series. Evaluation should include physical exam and a white blood cell count, and should otherwise be targeted toward specific signs and symptoms in the first 48 hours. After 48 hours, temperatures greater than 38.5°C without a clear source should prompt a complete fever workup including chest X-ray, blood, sputum, and urine cultures, and a white blood cell count.

In 2010, there were an estimated 51.4 million surgical procedures performed in the United States. In healthy patients, postoperative complications occur less than 0.1%, but vary by surgical type and patient risk factors [1]. A systematic review found 14.4% of patients undergoing surgery experienced an adverse event, defined as injury from medical management which prolongs length of stay, causes disability at discharge, or both. Of these, 5.2% were considered potentially preventable. Of the adverse events that occur in the hospital, as many as 39.6% are surgically related [2]. Care of the surgical patient commonly includes preoperative evaluation, often during a clinic visit, for risk stratification and medical optimization before surgery. The preoperative evaluation facilitates identification of these risk factors and can help minimize postoperative complications. Common surgical complications, including thrombotic and cardiopulmonary events, have been addressed in prior articles in this perioperative series. Although adverse cardiac events are considered major postoperative complications, there are other more common postoperative complications, such as acute renal failure, postoperative gastrointestinal complications, anaemia, fever, and delirium that represent significant morbidity for patients, leading to longer lengths of stay and increase cost of care. The goal of this review is to address these very common postoperative complications.

DOI: https://doi.org/10.26524/232.8 ISBN: 9789348505385

8.2 Research Objectives

8.3 Research Methodology

The research study is using the descriptive research design. In the research study the researcher has used secondary data. The secondary data has been collected from research papers, published materials, online websites, and survey reports published by various research organisations.

8.4 Risk Factors of Post-Operative Complications

The causes of intraoperative complications are generally attributed to the following incorrect patient selection, lack of adequate equipment, and technical errors. PCNL is contraindicated should be avoided in an untreated coagulopathy, urinary tract infection and the presumptive access tract area, potential malignant kidney tumour, and pregnancy. Anticoagulant therapy must be discontinued before PCNL. The presence of comorbidities such as diabetes, pulmonary disease, or cardiovascular disease increase the risk of suboptimal outcomes following PCNL.

Accurate kidney access during PCNL is aided by proper patient positioning, which reduces the likelihood of intraoperative complications. Based on the stone burden and the patient's anatomy, multiple tracts may be required to achieve stone-free status in a single PCNL session. While this approach is widely accepted, it is important to note that it carries an increased risk of postoperative complications, such as pleural injury, infections, and the need for blood transfusion.

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There are no significant differences between tubeless PCNL compared to standard PCNL in terms of blood transfusion rate, need for angioembolization, fever, urinary infections, sepsis, perirenal fluid collection, pleural breach, hospital readmission, or stone-free rate.

8.4.1 Post-Operative Complications

Complications after surgery can range from minor issues to life-threatening conditions. Understanding these potential complications enables healthcare providers to respond swiftly and effectively. The most common complications include:

8.4.2 Pain

Common complication of the surgery is pain, but modern expertise with painkillers and pain blocking techniques are controlled most of the pain, so pain in not well controlled is seen as a complication rather as an expected side effect.

8.4.3 Confusion

It is one of the common complications identified in the patients after surgery it is quite common after surgery, particularly in elderly patients. It can be caused by due anaesthesia or by other medicines which may have been given, including pain killers. Confusion can occur for several reasons, including severe pain disturbed sleeping pattern due to pain, infection, constipation and fluid and electrolyte imbalance.

8.4.4 Nausea and vomiting

Feeling sick nausea and being sick vomiting are common reaction to an anaesthetic. Certain drugs, especially general anaesthetics like volatile agents' opioids, can trigger nausea and vomiting. Certain procedure involving the abdomen, inner ear, or brain have a higher risk.

8.4.5 Temperature

A raised temperature after surgery may be caused by many of the conditions including infection in the surgical wound, infection in the lungs,

DOI: https://doi.org/10.26524/232.8 ISBN: 9789348505385

cystitis, deep vein thrombosis (DVT), after blood transfusion and as a reaction medication. A raised temperature is symptom not a cause. Patients' temperature will be checked regularly in the post operative period and if raise in body temperature indicating presence of infection careful monitoring is important to prevent complications.

8.4.6 Septicaemia

Septicaemia also known as blood poison it is a life-threatening infection that occurs when bacteria, fungi, or virus enter the bloodstream and spread throughout the body. It can lead to sepsis, the body's reaction to the infection, which can cause organ damage and even death. Septicaemia is more who are hospitalized or have other medical condition.

8.4.7 Bleeding, wound and skin complications

It is more common in the patients who is suffering from blood disorder. Bleeding of any sort is more common after very long and very major operations, and after operations in which patients need blood transfusion. It is also more common in patients who is suffering from blood and bleeding disorder especially the patients under the treatment of anticoagulant medicine can identified such complications.

8.4.8 Surgical infection

Wound infection can occur after any surgery but is particularly a problem after abdominal surgery which involves opening the bowel. To try to prevent this, providing antibiotics for the patients before surgery however drug-resistant microorganisms are increasing the problem.

The most common type of infection is surface or superficial wound infection occurring within the first week. It causes soreness and localised pain, redness, tenderness a slight sticky discharge bleeding. It usually responds to antibiotics, sometimes as ointment.

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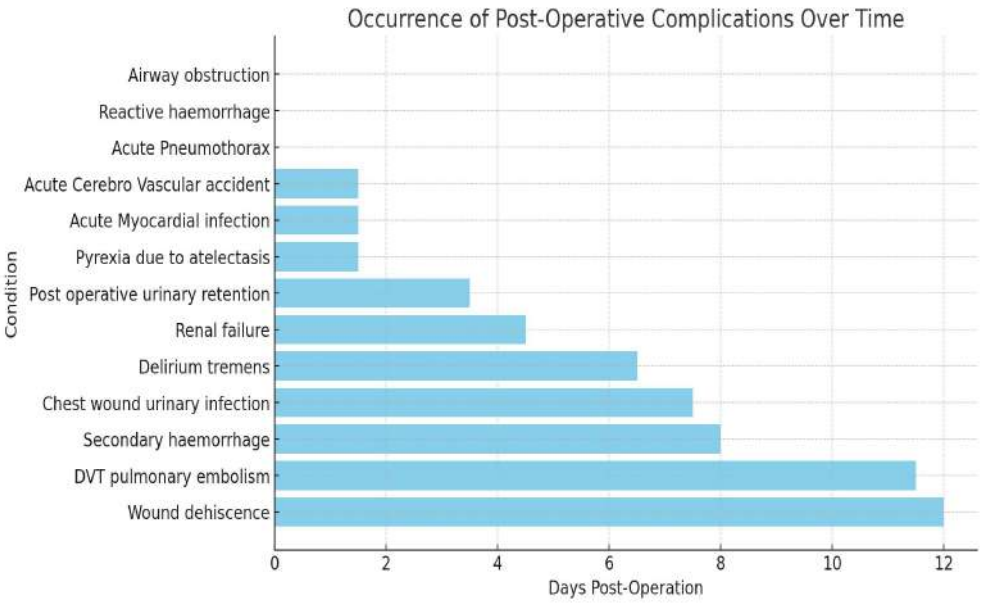
Figure - 2. Common post operative complications



8.4.9 Wound dehiscence

Wound dehiscence occurs when the wound comes partially or completely open again. This is obviously very upsetting and it can be shocking, particularly if an abdominal wound is involved. If it happens to you then you should then you should cover the open wound with a clean cloth and seek medical help urgently.

It is uncommon, affecting about 1 out of every 100 large abdominal wounds. Sometimes there is leakage of pink liquid from the wound just beforehand. If you have wound dehiscence your wound will need to be re-stitched, usually under anaesthetic.

8.4.10 Incisional hernia

It develops as a late (it can be years afterwards) complication of about 1 in 10 abdominal operations. Usually, the hernia is a bulge in the abdominal wall near the surgical scar. It is not usually painful and will not usually block (strangulate); however, incisional hernias do tend to get steadily larger and they may need to be repaired.

DOI: https://doi.org/10.26524/232.8 ISBN: 9789348505385

8.4.11 Nerve damage

Damage to other tissues may occur during many types of surgery. If nerves are damaged theses can take a particularly long time to heal and they never completely recover. Some nerve damage may be impossible to avoid during surgery. Example tumours of parotid gland (a salivary gland on the side of the face) tend to be wrapped around the nerve, so that when the tumour is removed the nerve is cut out with it. Other nerve damage can sometimes, but not always, be avoided.

8.4.12 Pressure ulcers

A pressure sore (pressure ulcer) is an ulcerated area of skin caused by irritation and continuous pressure on part of the body. Pressure ulcers are more common over places where the bones are close to the skin (bony prominences), such as heels, the lower part of back and bottom, and risk of developing a pressure ulcer is increased if you are spending long periods lying in bed or sitting in a chair, particularly if you are not moving very much.

Table- 1
Breathing and lung complications

Classification of complications	Complications	No of Cases
Gastrointestinal	ileus	11
	GI Bleeding	5
Renal	Acute Renal Failure	5
Embolism	Pulmonary Thromboembolism	1
	Deep Vein Thrombosis	1
Pulmonary	Pulmonary edema	3
	Atelectasis	7
	Pleural Effusion	4
Cardiovascular	Arrythmia	1
	Myocardial Infraction	1

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This table provides a classification of post operative complications, grouping them based on the affected system (Gastrointestinal, Renal, Embolism, Pulmonary, and cardiovascular) it also lists the number of cases reported for each type of complications.

Additionally, the table mentions that the total number of cases with complications is 41(26.6%)

8.5 Lung atelectasis

This is very common and involves a blockage and then collapse atelectasis of a part of one of your lungs, usually lungs, usually at the bottom, so that it no longer fills with air when you inhale. It is particularly common after surgery to the abdominal or the chest. Lung collapse occurs when the finer airways get blocked with trapped mucus. Once air cannot get in or out, the air that is already behind the blockage is absorbed by the body and the fine tubes collapse. These collapsed sections of lung easily become infected due to trapping of microorganisms. Atelectasis is more likely if you are overweight, smoker, are in a severe pain coughing or the patients is taking long period pain killers. The condition makes the patient breathless and develop painful coughing and increase in body temperature

8.5.1 Pneumonia

Infection in the lungs (pneumonia) can occur after surgery. It is fairly common, although much less common than atelectasis. The patients may have a cough or abdominal pain and increased body temperature and possibly shortness of breath can be identified.

8.5.2 Deep vein thrombosis and pulmonary embolism

Deep vein thrombosis (DVT) occurs when clot form in the large veins in the legs and pelvis, and pulmonary embolism (PE) occurs when bits of those come loose, enter the systemic circulation and accumulated in the lungs. PE is very serious and can be fatal. There is an increased risk of PE and DVT ant time from surgery until the patients are fully mobilised again; however, the risk is highest in the first two to three days after the operation.

DOI: https://doi.org/10.26524/232.8 ISBN: 9789348505385

8.5.3 Heart problems

Heart problems associated with surgery most often happen in the 48 hours after the surgery, although they may occur in the first six days. It includes heart attacks, abnormal heart rhythms, angina and heart failure. They can sometimes go undetected, because the patients are on strong pain killers which mask pain and discomfort, or the patients are still sleepy of confused state because the patient undergone for general anaesthesia.

It occurs because the physical strain and challenge of surgery, including the anaesthetic, the surgery itself and the medicines and any fluids given for the patients, are an extra load on the heart. A normal, healthy heart can cope with this extra work; however, if you were already at risk of (or you already had) heart disease or cardiovascular disease, surgery may be enough to trigger heart problem.

8.6 Kidney and bladder complications

8.6.1 Urinary retention

This is very common after surgery, particularly to the abdomen or pelvis. The patient is unable to pass urine despite a full bladder. Urinary retention is most common aften caused by pain and it will after settle with pain relief. It is sometimes necessary to pass a catheter to allow the bladder to drain, particularly if it is full that is causing the patient discomfort.

8.6.2 Cystitis

Urinary tract infection (UTI, or cystitis) is very common after surgery, especially in women, and particularly if the patient had a catheter during the surgery. Urinary tract infection often causes a high temperature (fever), although the usual symptoms of needing to pass urine often, and pain on passing urine, do not always occur.

8.6.3 Acute kidney injury

The kidneys have a difficulty to function when the patient have surgery, as kidney do most of the function of clearing medicines,

DOI: https://doi.org/10.26524/232.8 ISBN: 9789348505385

painkillers and chemicals (produced by the body in response to injury) from the body. Injury to the kidneys can happen because they don't get given quite enough fluid during surgery to help them process all these materials, so that the kidneys reduce the function.

8.7 Complications of bowel surgery

Constipation

Inability to pass a stool (constipation) is very common in the patients after few days and weeks after surgery. The medicines used in providing anaesthetic tend to send the bowel to reduce the function initially and this may cause trigger constipation. Other factors that lead to constipation are being dry (dehydrated), on NPO (so the bowel is not stimulated) and most postoperative medications. Lack of movement (immobility) and a reduced diet (whilst in hospital) also contribute.

8.7.1 Paralytic ileus

Sometimes the bowel takes a while to start working again after surgery - a condition called paralytic ileus. The bowel becomes still and stops its usual rhythmic contracting, so food is not pushed through it and you stop opening your bowels or passing wind. Paralytic ileus usually lasts from a few hours to a few days, but occasionally it can last much longer.

8.7.2 Bowel leakage

If the bowel has been cut and then stitched closed (for example, in appendicectomy) or if a section of bowel has been removed, the 'join' (anastomosis) in the bowel can leak or come apart. Small leaks are common and cause small abscesses in the tummy, sometimes several weeks after surgery. Larger leaks are rare but cause severe tummy pain and widespread infection (peritonitis). This is a surgical emergency and you will need to go back to theatre for treatment.

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Table- 2
Stress Ulcer Prophylaxis Criteria

Major risk factors	Minor risk factors
Mechanical Ventilation > 48 hrs	Gastro intestinal bleed within 1 year
Coagulopathy > 1.5 or Platelet count <50x10/L	Head Injury
	Hepatic or renal failure
	Hepatic or renal transplant
	Spinal cord injury
	Severe burns
	Multiple trauma
	Partial Hepatectomy
	Septic
	ICU stay > 1 wk.
	Occult Gastrointestinal Bleed

Data from the American Journal of Health-System Pharmacy and the Eastern Association for the Surgery of Trauma guidelines

8.8 Case Studies in Managing Post-Operative Complications

Examining real cases provides insight into how complications can be identified, addressed, and prevented. The following case studies illustrate different scenarios:

8.8.1 Case Study 1:

Managing Surgical Site Infections (SSIs) A 58-year-old patient underwent abdominal surgery and developed an infection at the incision site. The case outlines early signs like persistent fever and wound discharge, leading to the implementation of targeted antibiotic therapy and wound care management. Best practices discussed include rigorous preoperative skin preparation and timely post-operative monitoring.

DOI: https://doi.org/10.26524/232.8 ISBN: 9789348505385

8.8.2 Case Study 2:

Deep Vein Thrombosis After Major Surgery A 65-year-old patient who had hip replacement surgery developed DVT due to prolonged immobility. This case emphasizes the importance of preventive measures such as early mobilization, the use of compression devices, and anticoagulant therapy. Lessons learned highlight the need for regular assessments and patient education.

8.8.3 Case Study 3:

Pulmonary Complications Post-Surgery A 70-year-old patient experienced respiratory distress post-cardiac surgery due to pneumonia. This case explores interventions like incentive spirometry and early ambulation to prevent lung complications. The use of supportive oxygen therapy and prompt antibiotic treatment is also reviewed.

8.8.4 Case Study 4:

Acute Kidney Injury (AKI) Following Abdominal Surgery

Patient Profile: A 62-year-old patient with a history of hypertension and diabetes underwent abdominal surgery. A few days post-surgery, they developed symptoms consistent with acute kidney injury, including decreased urine output and elevated serum creatinine levels.

Management and Outcomes: Prompt fluid resuscitation, electrolyte monitoring, and consultation with a nephrologist were essential steps. The team implemented careful fluid balance and limited nephrotoxic medications, allowing for gradual renal recovery.

8.8.5 Case Study 5: Post-Operative Delirium in Elderly Patients

Patient Profile: An 80-year-old patient underwent a complex orthopaedic procedure and developed confusion and agitation within 24 hours post-surgery, indicative of post-operative delirium.

DOI: https://doi.org/10.26524/232.8 ISBN: 9789348505385

8.8.6 CASE 6: RADICAL CYSTECTOMY IN ELDERLY MAN WITH CARDIAC RISK FACTORS

A 78-year-old obese Russian-speaking man is seen in the preoperative clinic prior to a scheduled radical cystectomy for highly invasive bladder cancer. He is a poor historian and argues with the several family members accompanying him, but it is determined that his medical history includes hypertension, diabetes mellitus, a myocardial infarction (MI) 5 years previously (in Russia), and stable angina that is determined to be class II. He had no previous work-up and no electrocardiogram (ECG). His medications are aspirin, metoprolol, and metformin. His blood pressure is 190/100 mm Hg, heart rate 90 beats per minute, and body mass index 32. On examination, there is no murmur, S3 gallop, or rales. His blood glucose is 220 mg/dL, and his creatinine is slightly elevated (1.4 mg/dL). ECG verify es a prior MI.

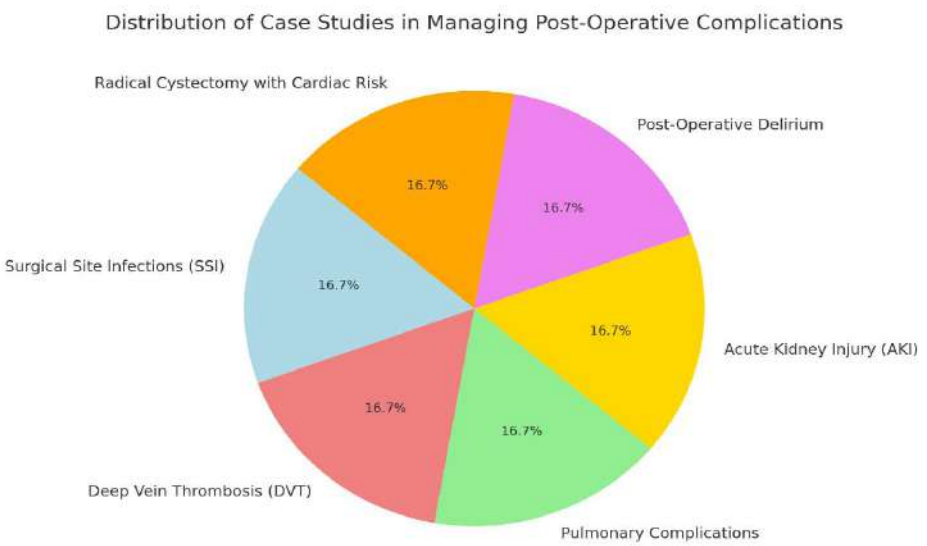

Figure 1

Management and Outcomes: Strategies included re-orienting the patient, providing adequate pain management, reducing unnecessary medications, and encouraging family presence to comfort the patient. Delirium was resolved with a multidisciplinary approach, including nursing and psychiatric support.

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8.9 Best Practices for Managing Post-Operative Complications

Managing post-operative complications effectively is crucial for enhancing patient recovery, preventing long-term issues, and reducing the risk of hospital readmission. Post-operative complications can arise due to various factors, including the type of surgery, the patient's underlying health condition, and the adequacy of perioperative care. Below are detailed best practices to help healthcare professionals manage post-operative complications:

Preoperative Assessment and Risk Stratification

It is a systematic process that helps heath care providers evaluate a patient's overall health and predict potential complications before surgery. The goal is to ensure that the patient is as prepared as possible and to minimise risks during and after the procedure.

A thorough preoperative assessment can help identify patients who are at higher risk for complications. This includes:

Medical History: Consider comorbidities such as diabetes, cardiovascular disease, respiratory conditions, and obesity, as they may increase the likelihood of complications. The doctor will ask about patients past and current health conditions include chronic illnesses like diabetes, heart disease and lung problems. Previous surgeries and any complications you may have had like reactions to anaesthesia and also the nurses are enquiring about any allergies to medication, food or other substance so that we control the complication.

Laboratory Tests and Imaging: before we are taking the patient for surgery, he/she needs to undergo for the laboratory tests example blood examination, urine culture CBC, liver and kidney function test, CT/MRI scan is mandatory to know the health status of the patient and also can identify the potential risks such as anaemia, infections, undiagnosed conditions that may affect surgery and recovery.

Medication Review: it is one of the important assessments of the patients before they undergo for the surgery check with the patients is he/she taking any medications example anticoagulants, immunosuppressant that may impact healing or bleeding risks. Check the

DOI: https://doi.org/10.26524/232.8 ISBN: 9789348505385

patients already taking any antibiotics for any conditions and also check the patients is having any hypersensitivity reaction that may adversely affecting the patient's recovery and having more chance to develop the post operative complications.

Nutritional Assessment: it is very to know the nutritional status of the as malnutrition and or dehydration can delay wound healing and increase the risk of infections, so it is essential to address these issues preoperatively can prevent the development of post operative complications. Maintain proper fluid and electrolyte balance is very important to prevent the complications.

Optimizing Surgical Technique

It involves refining and improving the methods used in surgical procedures to achieve better patient outcomes, reduce complications, and enhance efficiency. Here is a detailed breakdown in everyday terms. The choice of surgical technique significantly impacts the risk of post operative complications.

Minimally Invasive Surgery: identification of the proper diagnosis or procedure for the condition is important to minimise the risk, whenever possible for minor condition selection of the minimally invasive procedure like laparoscopic or robotic techniques will be helpful for lower the complications, rates reduce the pain fast recovery and smaller incisions and reduce the risk of infections.

Surgical Precision: improving techniques to reduce the risk of infection excessive bleeding or accidental injuries. Ensuring precise surgical procedure, including proper aseptic techniques, careful handling of tissues, and appropriate haemostasis, can reducing the further complications like bleeding and infections.

Team Coordination: A multidisciplinary approach involving surgeons, anaesthesiologists, nursing staff lab technicians OT technicians, health care providers in coordination with all the team members of the health team playing vital role in providing care for the patient before and after the surgery to prevent the post operative complications.

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Post-Operative Monitoring

Immediately after the surgery assess the patient condition check the vital signs every 2 hrs is important to identify the complications proper assessment of the patient is very important to prevent the complication.

Vital Signs Monitoring: checking vital signs is very important for the post operative patient important to know the condition of the patients like temperature, pulse, respiration and blood pressure and continues monitoring of the spo2 that is oxygen saturation level is important particularly first 24 hours of surgery to prevent complications.

Pain Management: assessment of pain is crucial part and important responsibility of the nurses adopt Implement different pain management techniques to reduce the pain of the patient. Provide medications as prescribed by the physician, a multimodal pain management strategy to control acute pain without over-relying on opioids. This can include NSAIDs, regional anaesthesia (e.g., nerve blocks), and acetaminophen.

Early Mobilization: Encourage the patient to have mobility to reduce complications immediately after the surgery after 24 hours u can assist the patient to move from the bed to prevent the complications like (once medically stable) to reduce the risk of deep vein thrombosis (DVT), pulmonary embolism (PE), and pressure ulcers.

Wound Care: assess the surgical wound any discharge Monitor surgical wounds for signs of infection (redness, warmth, discharge, fever). Proper dressing of the wound and proper cleaning the wound is important to prevent infection. Aseptic measures is important to prevent infection.

8.10 Preventing and Managing Common Post-Operative Complications

Several complications are commonly encountered in the post-operative period. Managing them effectively requires early detection and prompt intervention. Early identification of the complication and prompt treatment will prevent the development of complications include.

a. Infection Prevention

Infections can occur at the surgical site or in the bloodstream (sepsis). Preventive measures include:

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- **Antibiotic Prophylaxis**: administration of antibiotics can prevent the infection Administer appropriate prophylactic antibiotics before the surgery, during, and possibly after surgery based on the type of surgery or procedure and infection risk. This can prevent the development of infection.
- **Sterile Technique**: Use aseptic techniques like hand washing proper cleaning of the operation theatre before the surgery use of sterilized equipment's proper handling of the cleaning of the surgical site is important during and after surgery, particularly when handling surgical sites or changing dressings.
- **Wound Care**: Proper assessment of wound cleaning and dressing techniques should be followed to minimize infection risk. If any infection identified like the symptoms of fever redness, severe pain, tenderness, discharge indicating that the patient is having infection immediately start providing treatment to prevent the complications.

Venous Thromboembolism (VTE)

Post-operative patients are at high risk for VTE (DVT and PE). Preventive measures include:

- **Pharmacologic Prophylaxis**: Administer low molecular weight heparin (LMWH) or direct oral anticoagulants (DOACs) as per institutional protocols.
- **Mechanical Prophylaxis**: Encourage early ambulation, and use compression devices (sequential compression devices or TED stockings).
- **Monitoring for Symptoms**: Watch for signs of DVT (leg swelling, pain) and PE (chest pain, shortness of breath), as early detection and treatment are crucial.

Haemorrhage and Bleeding

Bleeding is a potential complication after many surgeries. Key practices for managing bleeding include:

- **Hemodynamic Monitoring**: Assess for signs of shock or significant blood loss (hypotension, tachycardia).

DOI: https://doi.org/10.26524/232.8 ISBN: 9789348505385

- **Blood Transfusion**: Be prepared for the need to transfuse blood products if significant blood loss occurs.
- **Reoperation or Embolization**: In some cases, surgical intervention may be required to control bleeding, or embolization may be used to address bleeding vessels.

Pain Management

Effective pain control is essential for post-operative recovery. Strategies include:

- **Multimodal Approach**: assess the level of pain by pain measuring scale so that we can identify the level of pain the Use a combination of analgesics, including non-opioid medications (acetaminophen, NSAIDs), regional anaesthesia (nerve blocks, epidurals), and opioids when necessary. And also, some other pain management techniques like diversional therapy, music therapy, can prevent further infection.
- **Patient Education**: Ensure that patients understand pain management strategies and the importance of reporting severe or unmanageable pain. Explain the patient about personal hygiene wound hygiene advice the patient about nutrition explain about proper rest and sleep.

Respiratory Complications

Post-operative patients are at risk for pneumonia, atelectasis, or respiratory failure, particularly after thoracic, abdominal, or major orthopaedic surgeries.

- **Oxygen Therapy**: it is a treatment that provides the patient with extra supplemental oxygen. It is only available through a prescription from the physician is is important patients who undergo for the surgery after the surgery the patient may needed the artificial ventilation.
- **Incentive Spirometry**: it is a technique that uses a hand-held device to help the patient to take slow, deep breath it helps to smoothen the mucus Encourage deep breathing exercises to prevent atelectasis.
- **Chest Physiotherapy**: also known as respiratory or cardiac thoracic physiotherapy. It is a treatment that helps improve breathing by removing mucus from the lungs. It can help with acute and chronic

DOI: https://doi.org/10.26524/232.8 ISBN: 9789348505385

respiratory disorders, and is often used as an adjuvant treatment for pneumonia. This may be indicated for patients at high risk of respiratory complications.

Urinary Complications

Urinary retention or infections are common after surgery, especially in patients receiving epidural anaesthesia or those who have undergone pelvic or abdominal surgeries.

- **Monitoring Output**: it refers to assessment of urinary output indicates whether the patients have developed any complications like urinary retention or incontinence of urine should be checked properly. Ensure that urinary output is adequate, and assess for signs of urinary retention (e.g., distended bladder).
- **Catheter Management**: If a catheter is used, ensure it is maintained sterile and removed as soon as possible.

Patient Education and Follow-up Care

Educating patients about their post-operative care is crucial for preventing complications. Information should include:

- **Signs of Infection or Complications**: give health education for the patients sighs of complications develop in the patient like rise in body temperature swelling redness tenderness, discharge Educate patients on what symptoms (e.g., fever, increased pain, swelling, redness) to look out for that may indicate complications.
- **Wound Care**: assessment of wound every 2 hours is important prevent complications assess if any discharge or puss formation inform immediately to doctor take precautionary action Explain how to care for surgical wounds, including how to keep them clean and when to change dressings.
- **Medications**: Advise on the proper use of prescribed medications, including pain relievers, antibiotics, and blood thinners.
- **Follow-up Appointments**: Ensure patients understand the importance of attending follow-up visits to monitor for complications and ensure proper healing.

DOI: https://doi.org/10.26524/232.8 ISBN: 9789348505385

Early Discharge Planning and Support

Effective discharge planning can reduce the risk of post-operative complications. Key aspects include:

- **Clear Instructions**: Provide clear, written instructions for home care, including signs of complications to watch for and emergency contact information.
- **Post-Discharge Monitoring**: For high-risk patients, arrange for follow-up phone calls or home visits to monitor recovery progress.
- **Rehabilitation**: If necessary, refer patients for physical therapy or other forms of rehabilitation to promote recovery and mobility.

Conclusion

In summary, the management of post-operative complications requires a multifaceted approach that combines diligent preoperative preparation, precise surgical techniques, vigilant post-operative monitoring, and timely interventions. As outlined in the case studies and best practices, successful post-operative care is contingent on a comprehensive understanding of common complications such as infections, bleeding, venous thromboembolism (VTE), and respiratory issues, along with the implementation of preventive strategies.

Key takeaways from the best practices include:

- Proactive Risk Stratification: Thorough preoperative assessment helps identify patients at higher risk, enabling tailored perioperative care to mitigate complications.
- Multidisciplinary Team Approach: Collaboration between surgeons, anaesthesiologists, nurses, and other healthcare providers ensures that complications are managed swiftly and effectively.
- Patient Education: Educating patients about post-operative care, including signs of complications and the importance of follow-up, plays a critical role in preventing adverse outcomes.
- Timely and Accurate Interventions: Recognizing the early signs of complications such as infection, bleeding, or VTE and intervening promptly can significantly improve recovery and reduce the risk of long-term issues.

DOI: https://doi.org/10.26524/232.8 ISBN: 9789348505385

By adhering to evidence-based practices, optimizing surgical and post-operative protocols, and learning from real-world case studies, healthcare providers can ensure better patient outcomes, minimize complications, and expedite recovery. The post-operative period is a critical phase in the patient's journey, and meticulous management during this time can substantially influence their overall health and quality of life.

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CHAPTER - 9

ADVANCES IN MEDICAL SURGICAL NURSING: EVIDENCE-BASED PRACTICES INNOVATION IN PATIENT CARE

Nursing leadership and advocacy in medical surgical units

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Abstract

Nursing leadership and advocacy are at the heart of effective patient care in medical surgical units. In these dynamic and often high-pressure environments, nurse leaders guide teams, foster collaboration, and drive quality improvement. They are responsible for decision making, mentoring staff, and ensuring evidence-based practices are upheld. Beyond managing patient acre, they advocate for fair working conditions, patient rights, and policy advancements that shape the future of health care. Effective nurse leadership is essential for promoting teamwork, reducing burnout, and maintaining a high standard of care. However, challenges such as staffing shortages, emotional and physical exhaustion, and resistance to change can hinder their efforts. Nurse leaders must engage in continuous education, develop strong communication skills, and actively participate in healthcare policy discussions to create a balanced

DOI: https://doi.org/10.26524/232.9 ISBN: 9789348505385

and supportive environment. By championing both patient welfare and staff well-being, nursing leaders ensure that medical-surgical nursing continues to evolve. Their commitment to advocacy and leadership helps shape a healthcare system that is both compassionate and effective, ultimately improving patient outcomes and fostering professional growth within the nursing community.

Keywords: Nursing leadership, nurse advocacy, medical surgical nursing, evidence based practice, patient care

9.1 INTRODUCTION

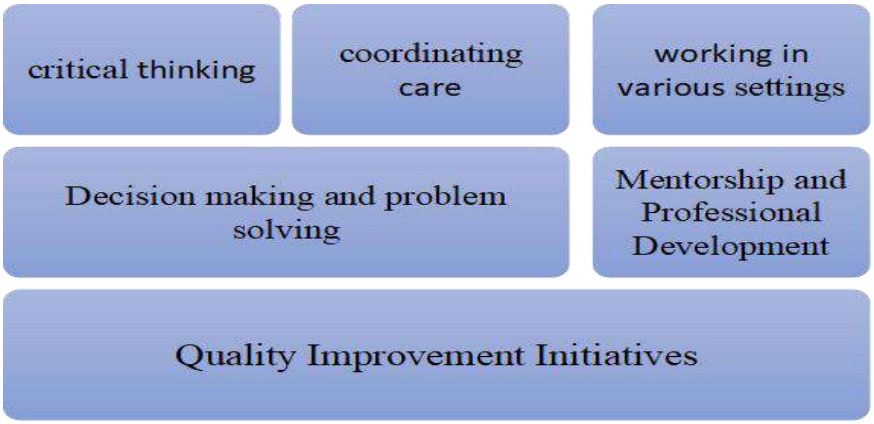
Global health demands have set new roles for nurse leaders. Nurse leaders are referred to as nurses, nurse managers, or other nursing staff working in a health care context who attempt to influence the behaviour of individuals or a group based on goals that are congruent with organisational gaols they are seen as professionals armed with data and evidence, and a commitment to mentorship and education , and as a group in which leaders innovate, transform, and achieve quality outcomes for patients, health care professionals, organisation, and communities. Effective leadership occurs when team members critically follow leaders and are motivated by a leader's decision based on the organisation's requests and targets. On the other hand, problems caused by poor leadership occurs may are essential in medical surgical units, as they create an environment where patient care thrives and the team feels supported. Strong nursing leaders provided guidance, ensure smooth coordination and foster collaboration among health care professionals. This is crucial in fast paces settings where patients often have complex medical needs. advocacy ensures that patients voices are heard and patients' rights are respected, especially during vulnerable times. Nurses plays a key role in bridging communication between patients, families, and the medical team, ensuring care is both effective and compassionate. For the staff, good leadership promotes a culture of teamwork, learning, and resilience, reducing burnout, and improving job satisfaction. By championing both patient and staff need, nursing leaders create a balance where quality care and professional growth go hand.

DOI: https://doi.org/10.26524/232.9 ISBN: 9789348505385

Medical surgical nursing is practiced in several settings across the health care industry, including hospitals, outpatients' settings, in homes, via telemedicine and other nontraditional settings. As the only national professional organisation representing the voice of medical surgical nursing, our strategic mission for patients and their access to high quality, affordable health care includes developing and promoting nursing leadership to improve health care. For every health care policy, advisory leadership role here practical patients care expertise and professional credibility would be valuable medical surgical nurses are prepared to fulfil the need. In addition to their advanced academic and professional education, their national professional association, makes valuable numerous leadership development opportunities for its members. They include AMSN engagement on the multidisciplinary nurses on boards coalition, clinical and professional leadership development education and training, the nightingale challenges initiative for early career nurse's certification board. Every nurse is a leader, and everyone can benefit from more use of nursing leadership nurses have credibility as leaders because people believe they are in it for their patients, not for themselves. Nurses represent the largest share U. S health care workforce and are the health care professionals with whom patients have most contact. Medical surgical nurses should be regularly called upon to serve in policy, adviser and leadership roles.

9.2 The Role of Nurse Leaders in Medical-Surgical Units

Figure 1



DOI: https://doi.org/10.26524/232.9 ISBN: 9789348505385

Who is medical surgical nurse

A medical surgical nurse is a registered nurse who specialises in caring for patients with a wide range of medical conditions. They are often considered the backbone of hospital nursing, as they handle patients with diverse health issues. From preoperative care to post operative recovery, these nurses are involved in nearly every aspect of patient care, making their role incredibly versatile and demanding.

Critical thinking

One of the most crucial skills for a medical surgical nurse is critical thinking. This involves the ability to assess patient condition rapidly, identify potential complications, and took appropriate action. For example, if a patient suddenly shows signs of sepsis, the nurse must quickly recognise the symptoms and initiate treatment protocols. Critical thinking is not just about quick decision making also involves long term planning and anticipating future health care needs.

Coordinating care

Medical surgical nurse often serves as the primary coordinators of patient care. They work closely with doctor, specialists, and other health care professionals to ensure that each patient receives comprehensive and cohesive care. This coordination involves everything from scheduling surgeries and diagnostic tests to managing medication regimens and discharge planning.

The role of technology in care coordination

With advancement in health care technology, medical surgical nurses now have access to electronic health records and patient management systems that facilitate seamless care coordination. These tools allow nurses to tract patient progress, communicate with other health care providers, and update treatment plans in real time ensuring that all team members are on the same page.

DOI: https://doi.org/10.26524/232.9 ISBN: 9789348505385

Working in various settings

Medical surgical nurses work in variety of settings, each offering unique challenges and opportunities for professional growth. Medical surgical nurses spend a significant portion of their time. These units cater to patients who require hospitalization for surgeries, acute illness, or chronic illness management. Nurses in these settings must adopt at handling high patient volumes and managing complex care plans. Outpatient units provide care for patients who do not require overnight hospitalization. Medical surgical nurses in these settings often handle pre operative and post operative care, minor surgical procedures and routine check-ups. Speciality units such as oncology, cardiology, and neurology, require nurses with specialized knowledge and skills, Medical surgical nurses in these units often undergo additional training to mange the unique needs of their patients.

Decision making and problem solving

Decision making is the process of making choices by evaluating alternatives. It requires analytical and critical thinking skills, alongside an understanding of te implications and consequences of each option. Problem solving entitles identifying, analysing, and resolving problems in a systematic manner. It often requires innovative thinking and the ability to apply learned concepts to the novel situations.

Mentorship and Professional Development

Supporting nurses through mentorship, continuous education, and leadership training. Guiding the nurses for enhancing their knowledge and skills through the in-service education for nurses and continuing nursing education can improve the skills of the nurses.

Quality Improvement Initiatives

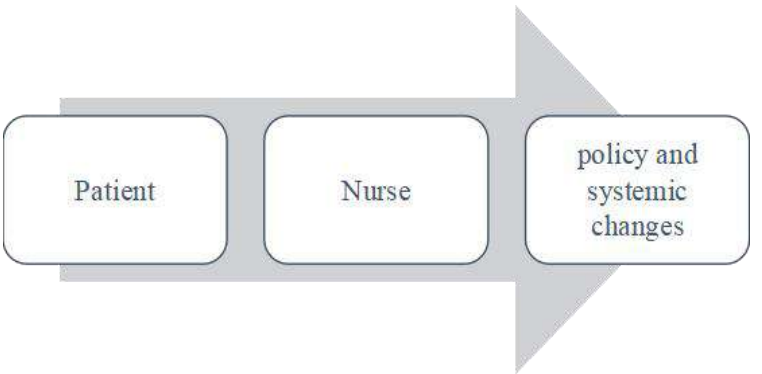
Leadership efforts to improve patient safety, reduce hospital acquired infection, and improve workflow efficiency. A Healthcare Quality Improvement (QI) program is a set of focused activities designed to monitor, analyse, and improve the quality of processes to improve

DOI: https://doi.org/10.26524/232.9 ISBN: 9789348505385

the healthcare outcomes in an organization. By gathering and analysing data in key areas, a hospital can effectively implement change. Many programs are organization-wide, ongoing, and long-term. Concerned specifically with a hospital's more cyclical activities, these programs aim to continually increase levels of performance, such as improving patient safety or lowering patient mortality.

9.3 Advocacy in medical surgical nursing

Figure-2



9.3.1 Patient

Patient advocacy is a fundamental principle of nursing practice and plays a crucial role in ensuring patient safety, dignity, and well-being. In the surgical setting, patient advocacy becomes even more critical as patients are often invulnerable states, undergoing complex and potentially life-altering procedures. Surgical nurses are in a unique position to advocate for patients throughout their surgical journey, from preoperative preparation to postoperative care. This review article aims to discuss the importance of patient advocacy in surgical nursing and to provide strategies for advocating for patients undergoing surgical procedures to ensure they receive the best possible care. Key aspects include preoperative advocacy, intraoperative advocacy, and postoperative advocacy, with a focus on optimizing outcomes and ensuring patient safety. By advocating effectively, surgical nurses can ensure that the patients' needs are met, their rights are respected, and their overall experience is improved.

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9.3.2 Nurse as advocate

We identified four primary themes in the discourse on nursing advocacy: responsibility to support patient autonomy regarding treatment decisions, responsibility to protect the patient from the physician, responsibility to act as an intermediary between the physician and the patient, and responsibility to support the well-being of the patient.

Responsibility to support patient autonomy regarding treatment decisions

In 1975, lawyer George Annas observed patients had limited rights in the hospital due to the nature of the physician-patient relationship; physicians had control of medical information and at times made decisions that were inconsistent with the needs of the individual patient. To improve this relationship, Annas proposed the role of a patient advocate, whose "primary responsibility is to assist the patient in learning about, protecting, and asserting his or her rights within the health care context." (p201) Annas noted that nurses were ideally suited for the role of patient advocate because nurses provide moment-to-moment management of patient care, which includes addressing the majority of patient questions and concerns.

Responsibility to protect the patient from the physician

Concerns about the physician-patient relationship also led to the notion that nurses should protect the patient from the physician. According to Allmark and Kluczynski, "…the growth of the idea of advocacy is, at least in part, a response to a perceived need to empower patients, particularly against doctors." (p33) Here the importance of empowering patients is in the context of *against* the doctor: nurses are not only to act for the patient, but also may need to push back against the doctor if necessary to protect the patient's needs and desires. Working against the physician for the good of the patient can put nurses in difficult situations.

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Responsibility to act as an intermediary between the physician and the patient

Aside from protective purposes, the nurse also needs to work with the physician and the patient to ensure understanding between them. O'Connor and Kelly investigated nurses' perceptions of advocacy and described, "The essence of advocacy for most of the participants interviewed was the role of the nurses acting as intermediaries for patients or, as one participant described it, 'bridging the gap.'" (p462) In this role, the nurse translates information from the physician to the patient or vice versa.

Responsibility to support the well-being of the patient

In nursing discourse, the nurse also has the responsibility to work toward the patient's well-being. According to Winslow, "more than any other health care professionals, nurses tend to be concerned with the well-being of the *whole* patient." (p35) This goes beyond the medical model—which is primarily concerned with eliminating disease processes—to include a concern for psychological, emotional, and spiritual well-being. Nurses aim to help patients live as fully as possible and "reach out for a plenitude of being that is always possible, in spite of biologic limitations against which medicine is helpless." (p9) Even when medical treatments are exhausted and can no longer provide a cure, nursing care enhances the patient's functional abilities and sense of well-being throughout the illness.

9.4 Responsibility to prevent harm to the patient from surgery

The discourse suggests that surgeons would not operate if they believed the operations would be unsuccessful or result in a bad outcome. By not operating, surgeons are protecting patients from burdensome treatments. According to Cassell, "It is perhaps easier for a surgeon not to operate and accept that the patient has a fatal condition than to operate, find the same thing, and then have to 'let go' without having 'fully atoned' for the increase in pain and suffering wrought by the knife and the scissors, the clamps and the retractors." (p77) When surgeons do not

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operate, they understand that subsequent patient death results from disease. However, if the surgeon did perform the surgery and the patient incurred pain and suffering before dying, the surgeon would then be responsible for not only the death, but also the pain and suffering that resulted from the surgery.

9.4.1 Policy and Systemic Changes

There are persistent and pervasive inequities in health outcomes along racial, ethnic, socioeconomic, and geographic lines in the United States. Given that many of these disparities have their roots in structural inequities, addressing them requires attention to the broader policies that can impact health outcomes. These include policies that influence access to care, policies that influence quality of care, and policies that influence broader social and economic context such as community development, education, and job opportunities.

The most powerful determinant of access to care in the United States is insurance coverage. The United States is alone among industrialized nations in not offering its citizens universal health coverage, and, as a result, major gaps remain that impact individuals' ability to pay for the health care they need. Prior to passage of the Affordable Care Act (ACA) in 2010, the uninsurance rate in the United States was roughly 15%–20%. The ACA had four major features aimed at increasing insurance coverage: the "individual mandate," a requirement that individuals purchase health insurance or face federal fines; a series of reforms aimed at insurance companies, such as requiring that companies cover individuals without discrimination based on preexisting conditions and eliminating lifetime caps on benefits; the expansion of the Medicaid program to all individuals earning less than 138% of the federal poverty level; and the creation of insurance exchanges, government-run marketplaces where individuals could purchase health insurance, often subsidized, on the individual market.

There is also policy efforts aimed at improving the quality of care delivered; these policies impact equity both directly and indirectly. A large consistent body of research has demonstrated that the quality of care

DOI: https://doi.org/10.26524/232.9 ISBN: 9789348505385

delivered in the United States is uneven, with many missed opportunities for optimal treatment, and that suboptimal care is more often delivered to people from racial or ethnic minority backgrounds who live in poverty, lack insurance, face other socioeconomic challenges, or live in rural areas discussed earlier, some of these inequities are related to access issues, but a great deal are also related to the infrastructure available to deliver care in historically disinvested areas and at struggling hospitals.

9.5 Challenges in Leadership and Advocacy

Staffing shortage

Across industries, headlines scream of a critical situation: staffing shortages. But what exactly does this mean, and how is it impacting the world around us? This blog dives deep into the issue, exploring its causes, consequences, and potential solutions, with a specific focus on the healthcare sector in 2024.A staffing shortage simply means there aren't enough qualified people to fill open positions in a company or industry. It's like having a bunch of empty seats at a table, but not enough people to fill them all, even though you might have invited everyone you know.

Burnout and Stress

Burnout is a work-related stress syndrome resulting from chronic exposure to job stress. The term was introduced in the early 1970s by psychoanalyst Freudenberger and has subsequently been defined by Maslach et al as consisting of three qualitative dimensions which are emotional exhaustion, cynicism and depersonalization, reduced professional efficacy and personal accomplishment. Burnout can occur in any kind of profession. Healthcare workers, and especially perioperative clinicians seem to be at particular risk for burnout. This may have significant negative personal (substance abuse, broken relationships and even suicide), but also important professional consequences such as lower patient satisfaction, impaired quality of care, even up to medical errors, potentially ending up in malpractice suits with substantial costs for caregivers and hospitals.

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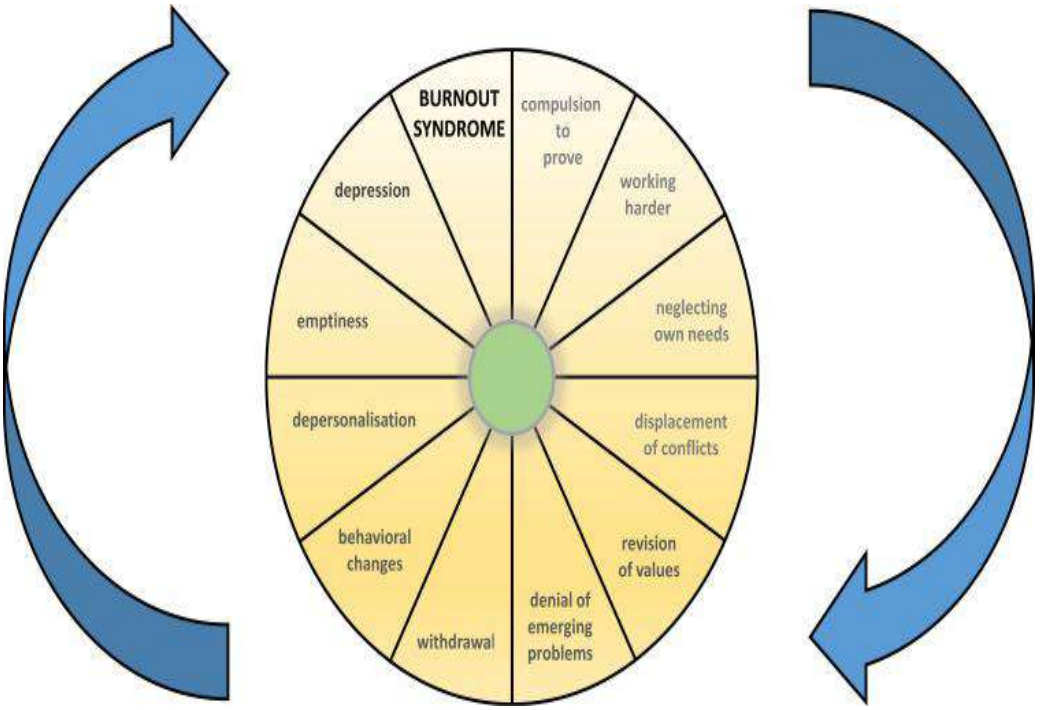
Model-1

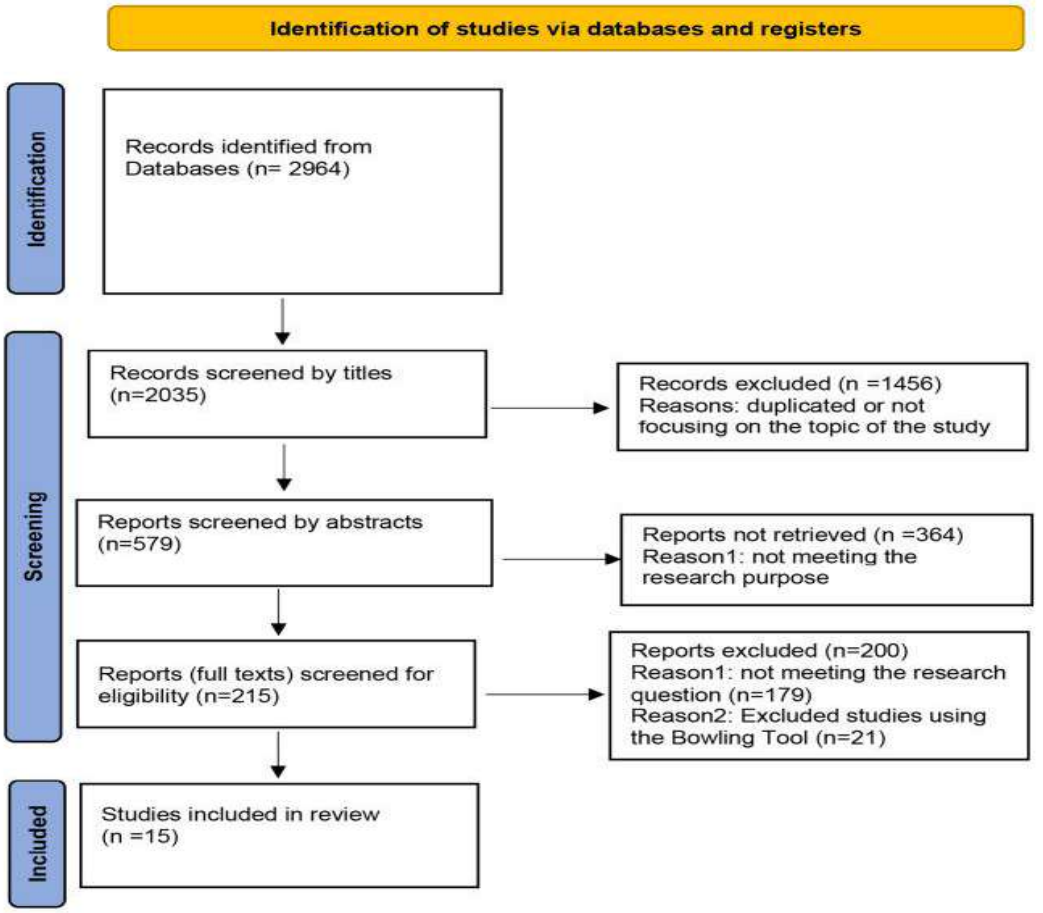


12-stage model for the development of burnout as described by Freudenberger.

Resistance to Change

Generally defining the concept of "resistance to change" is not easy. but based on the literature; resistance is defined as the informal and covert behaviour of an individual in response to a perceived or actual threat to maintain the status quo. In other words, resistance is defined as failure to do anything that is asked by managers from employees. Also, behavioural resistance is known as a prevent or stop change, which can ultimately be the main cause of change failure. However, sometimes the nature of resistance can finally be a valuable resource for achieving change.

DOI: https://doi.org/10.26524/232.9 ISBN: 9789348505385



Flow chart-1

Ethical Dilemmas

When caring for human lives, the decisions you have to make as a nurse are anything but black and white. In addition to taking vital signs and doing dressing changes, there is a realm of tough choices and ethical dilemmas that nurses have to face every day.

1. Patient Autonomy vs. Beneficence

Balancing a patient's right to make decisions about their own care with the nurse's duty to promote their overall well-being. Let's say a patient diagnosed with diabetes refuses to take insulin, despite it being essential for controlling their blood sugar levels and preventing serious complications.

DOI: https://doi.org/10.26524/232.9 ISBN: 9789348505385

2. Confidentiality vs. Duty to Warn

Struggling with maintaining patient confidentiality while also considering the potential harm to others if vital information is not shared. Imagine a scenario where a nurse working in a mental health facility becomes aware that a patient with a history of violent behaviour has confided in the nurse about their plan to cause harm to their former partner. The nurse finds themselves in a challenging ethical dilemma: on one hand, they have a duty to maintain the confidentiality of the patient's personal information, and on the other hand, they have an obligation to protect other people from harm.

End-of-Life Care

Managing the ethical complexities around decisions about withdrawing or withholding life-sustaining treatment, considering the patient's wishes, quality of life, and family dynamics. For example, consider the situation where a nurse is caring for an elderly patient with a terminal illness. The patient expresses the desire to die a peaceful death without aggressive interventions. However, the patient's family opposes this and wants "everything medically possible" to be done to save the patient's life. The nurse finds themselves in a complex ethical dilemma, torn between honouring the patient's wishes and respecting the concerns of the family.

Resource Allocation

Facing the difficult task of distributing limited resources fairly and ethically among patients, especially during times of scarcity or emergencies. Consider this scenario: During a severe flu outbreak, a nurse working in a hospital emergency department faces the ethical dilemma of resource allocation. The hospital is overwhelmed with patients, and the available resources, such as beds, ventilators, and medications, are limited. The nurse must make decisions about which patients receive the resources, balancing the needs of the patients in their care while also considering the needs of other patients in the hospital.

DOI: https://doi.org/10.26524/232.9 ISBN: 9789348505385

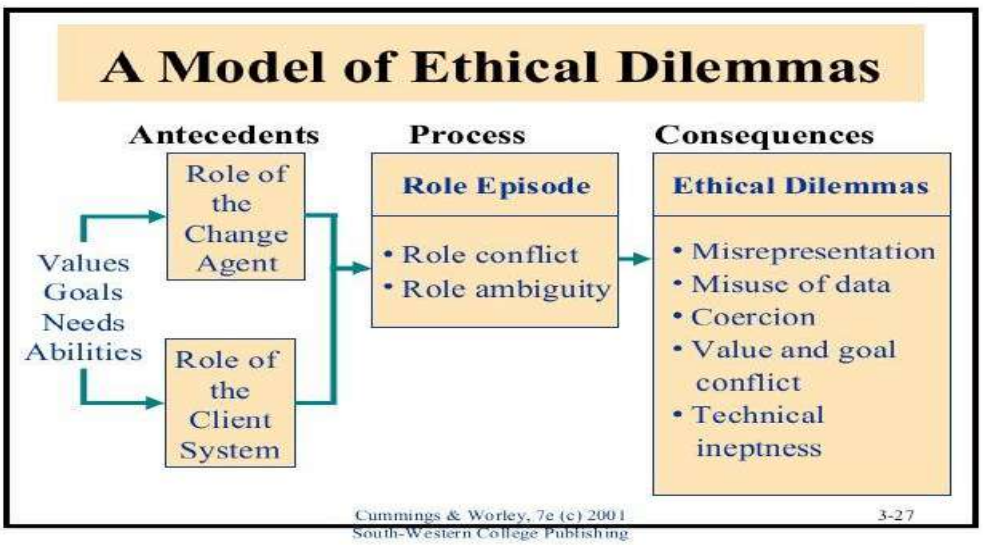
Informed Consent

Ensuring patients have a clear understanding of the risks, benefits, and alternatives of proposed treatments or procedures before they provide consent. Here's an example of how this ethical dilemma could occur: A nurse assists a physician who is rushing to obtain informed consent for a surgical procedure despite the patient's pain and anxiety. However, the nurse quickly recognizes the patient's limited understanding of the procedure's implications, raising ethical dilemmas regarding informed consent.

Cultural and Religious Beliefs

Navigating conflicts between a patient's cultural or religious values and the standard practices or protocols of healthcare. In a multicultural society, nurses often encounter ethical dilemmas when a patient's cultural or religious beliefs clash with the standard practices or protocols of healthcare. An example is when a nurse is caring for a patient from a cultural background who strongly believes in traditional healing methods and is hesitant to accept Western medicine.

Model- 2



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The **Model of Ethical Dilemmas** explains how role conflicts and ambiguities between change agents and client systems, influenced by values and goals, lead to ethical dilemmas such as misrepresentation, coercion, and misuse of data. Clear communication and ethical leadership can help mitigate these issues.

9.6 Strategies for Effective Leadership and Advocacy in Medical-Surgical Nursing

Nurses play a crucial role in leading healthcare teams and advocating for their patients, especially in fast-paced medical-surgical units. Here are some practical ways to strengthen leadership and advocacy skills:

9.6.1 Never Stop Learning

Healthcare is constantly evolving, so staying updated is essential. Take part in leadership workshops, attend professional conferences, and pursue certifications that boost both your confidence and expertise. Whether it's a course on conflict resolution or evidence-based practice, continuous learning helps you grow as a leader.

9.6.2 Communicate with Confidence and Clarity

Good communication isn't just about talking—it's about listening, understanding, and making sure everyone is on the same page. Encouraging open discussions with your team ensures better collaboration and, ultimately, better patient care. When advocating for patients, speak up confidently, ensuring their needs and concerns are heard and addressed.

9.6.3 Base Decisions on Solid Evidence

Relying on research and data helps nurses make informed decisions that improve patient outcomes. Instead of just following tradition, look at the latest studies, best practices, and clinical guidelines to ensure your patients receive the safest and most effective care possible.

DOI: https://doi.org/10.26524/232.9 ISBN: 9789348505385

9.6.4 Get Involved in Policy and Advocacy Efforts

Healthcare policies directly impact patient care and nursing practice, so why not have a say in shaping them? Join professional organizations, participate in hospital committees, or connect with policymakers to advocate for positive changes in healthcare. Even small actions, like signing petitions or attending meetings, can make a big difference.

By continuously learning, communicating effectively, using evidence-based practices, and getting involved in policy, nurses can become strong leaders and advocates in their field. Leadership isn't about having a title—it's about making a meaningful impact every day.

Table:1 Impact of Nursing Leadership and Advocacy in Medical-Surgical Units

Category	Key Findings	Percentage/Statistical Data
Impact of Leadership on Patient Outcomes	Increased Patient Satisfaction	Higher satisfaction levels reported under relational leadership
	Reduced Adverse Events	Notable decrease in medication errors, restraint use, and hospital-acquired infections
	Lower Patient Mortality Rates	Some studies indicate a correlation, but findings are inconclusive
Facilitators of Nursing Advocacy	Effective Communication	81% of nurses consider it a primary enabler
	Problem-Solving Abilities	69% emphasized its importance
	Readiness for Patient Care	60% noted preparedness as a key factor

DOI: https://doi.org/10.26524/232.9 ISBN: 9789348505385

Category	Key Findings	Percentage/Statistical Data
Barriers to Nursing Advocacy	Fear of Job Risk	81% of nurses feared advocacy could jeopardize their jobs
	Poor Team Coordination	79% cited lack of cooperation as a major hindrance
	Low Self-Confidence	69% reported poor self-image as an obstacle

This table provides a clear and structured summary of the statistical data related to nursing leadership and advocacy in medical-surgical units.

Conclusion

Nursing leadership and advocacy make a real difference in medical surgical units. When nurses have supportive leaders who comminate well and foster teamwork, patient satisfaction goas up, decrease errors, and overall patient care improves. However, many nurses struggle with speaking p their patients due to fears of job loss, poor team support, or lack of confidence. By addressing these challenges through better training, open communication, and a culture that values nursing voices health care organisations can create safer, more effective environments for both patient and staff. At the end of the day, when nurses feel empowered to lead and advocate, everyone benefits patient receive standard care, and hospitals function more efficiently

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DOI: https://doi.org/10.26524/232.9 ISBN: 9789348505385

CHAPTER - 10

ETHICAL CONSIDERATIONS AND DECISION MAKING IN MEDICAL SURGICAL NURSING

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Abstract

Medical-surgical nursing is a fast-paced and demanding field where nurses often face difficult ethical decisions. Patients in these settings are frequently critically ill, requiring quick judgment calls while balancing complex needs. Core ethical principles—such as respecting patient

DOI: https://doi.org/10.26524/232.10 ISBN: 9789348505385

autonomy, doing good (beneficence), avoiding harm (non-maleficence), and ensuring fairness (justice)—are essential in guiding practice. This chapter explores real-world ethical challenges nurses encounter, from consent dilemmas to end-of-life conflicts, and offers practical frameworks to navigate them. We'll also discuss how laws, cultural differences, and teamwork influence ethical care. Through case studies and the latest research, we provide actionable strategies to help nurses make sound, compassionate decisions.

Keywords: Ethics , Medical, Surgical . Nursing, DecisionMaking ,Patient Rights Beneficence, Harm Prevention, Nonmaleficence, Fairness, Justice

Objectives

1. Understand the key ethical principles that shape medical-surgical nursing.
2. Explore common ethical dilemmas nurses face in hospitals and acute care.
3. Learn structured approaches to resolving ethical conflicts.
4. Examine how laws, culture, and teamwork impact ethical decisions.
5. Discover evidence-based strategies to handle tough moral choices.

10.1 Introduction

Every day, medical-surgical nurses make decisions that affect lives. Whether it's respecting a patient's refusal of treatment, advocating for pain relief, or deciding how to allocate limited resources, ethical challenges are inevitable. With medical technology advancing and healthcare policies evolving, nurses must constantly adapt while staying true to ethical standards.

This chapter breaks down the core principles of nursing ethics, presents real-life scenarios, and provides step-by-step methods to approach dilemmas thoughtfully and confidently.

DOI: https://doi.org/10.26524/232.10 ISBN: 9789348505385

Fig 1.Core Ethical Principles in nursing

10.2 Core ethical principles in nursing : Guide nurses in making ethical decisions and ensuring high-quality patient care. These principles include:

1. **Autonomy** – Respecting a patient's right to make their own decisions regarding their healthcare, as long as they have the capacity to do so.
2. **Beneficence** – Acting in the best interest of the patient to promote well-being and prevent harm.
3. **Nonmaleficence** – "Do no harm." Nurses must avoid causing unnecessary suffering or injury to patients.
4. **Justice** – Ensuring fairness in healthcare delivery, including equal access to care and resources.
5. **Fidelity** – Being honest, keeping promises, and maintaining trust in the nurse-patient relationship.
6. **Veracity** – Telling the truth to patients to help them make informed decisions about their care.
7. **Confidentiality** – Protecting patient privacy and only sharing information with authorized individuals.

DOI: https://doi.org/10.26524/232.10 ISBN: 9789348505385

Table 1. Real Life Principles

Principle	What It Means	Everyday Example
Autonomy	Respecting patient choices	Honoring a Jehovah's Witness's refusal of a blood transfusion.
Beneficence	Promoting well-being	Advocating for a patient in severe pain
Non-maleficence	Preventing harm	Reporting a near-miss medication error
Justice	Fairness in care	Ensuring homeless patients receive equal treatment

10.3 Common Ethical Dilemmas Nurses Face

1. **Informed Consent** – What if a patient refuses life-saving treatment due to cultural beliefs?

- Case: A study (Smith et al., 2023) found that 20% of consent conflicts arise from religious views.

2. End-of-Life Care – When families demand aggressive treatment against a patient's advance directive.

- Challenge: Balancing legal documents with emotional family dynamics.

3.Resource Shortages –Deciding who gets limited resources (e.g., ventilators during a pandemic).

- Research: Powell et al. (2022) highlight the stress of triage decisions in crises.

4. Confidentiality– When to share patient information and when to protect privacy.

- Example: A nurse debates whether to disclose a patient's HIV status to their partner.

10.4 How to Make Ethical Decisions: A Step-by-Step Approach

1.Identify the Dilemma – What is the core issue?

2. Gather Facts– Medical history, patient wishes, legal policies.

3. Explore Options – What are the possible actions?

DOI: https://doi.org/10.26524/232.10 ISBN: 9789348505385

4. Choose the Best Path – Which option aligns best with ethics?
5. Reflect– Did the decision lead to the best outcome?

10.5 Frameworks for Ethical Decision-Making

10.5.1 : The Four-Box Method (Jonsen et al., 2022)

Medical Facts – What's the diagnosis and prognosis?
- Patient's Wishes – What does the patient want?
- Quality of Life – What will recovery look like?
- External Factors – Family input, hospital policies, legal constraints.

10.5.2 The MORAL Model (Crisham, 2023)

- M- Massage the dilemma (Understand the problem fully).
- O-Outline possible solutions.
- R-Resolve by choosing the best option.
- A-Act on the decision.
- L-Look back—was it the right choice?

10.6 Legal and Cultural Influences on Ethics

- Laws to be known: HIPAA (patient privacy), state nursing regulations, and malpractice risks.
- Cultural Sensitivity: Different beliefs affect care—e.g., some cultures prioritize family decisions over individual autonomy (Campinha-Bacote, 2023).

10.7 Trends in Ethical Issues (2020-2024)

Ethical challenges in medical-surgical nursing are constantly evolving, requiring nurses to navigate complex situations while prioritizing patient well-being. Here are some of the key ethical issues shaping the field today:

10.7.1 Informed Consent

Ensuring patients fully understand their treatment options is a fundamental ethical responsibility. However, nurses often encounter

DOI: https://doi.org/10.26524/232.10 ISBN: 9789348505385

situations where patients or their families struggle to grasp medical information, leading to confusion or hesitation. In these moments, clear communication and trust-building are essential to help patients make informed choices about their care.

10.7.2 Patient Privacy and Confidentiality

Respecting patient confidentiality is a cornerstone of ethical nursing practice. With the growing use of electronic health records and digital communication, maintaining privacy can be challenging. Nurses must carefully balance sharing necessary information with protecting patient rights, ensuring that sensitive details remain secure and only disclosed when appropriate.

10.7.3 Shared Decision-Making

Healthcare is moving toward a more collaborative approach, where patients and nurses work together to make care decisions. This shift recognizes the importance of patient preferences and values, ultimately leading to better adherence to treatment plans and improved health outcomes. Nurses play a key role in fostering this partnership by guiding discussions and ensuring patients feel heard and respected.

10.7.4 Advanced Care Planning

End-of-life care is a sensitive but crucial topic. Nurses often facilitate discussions about patients' future medical wishes, helping them document their preferences before critical moments arise. These conversations ensure that patients receive care aligned with their values, reducing uncertainty for both families and healthcare providers.

10.7.5 Resource Allocation and Staffing Challenges

With staffing shortages and limited resources becoming more common, nurses frequently face difficult decisions about prioritizing patient care. The struggle to provide high-quality care under these conditions can lead to moral distress, as nurses feel torn between meeting

DOI: https://doi.org/10.26524/232.10 ISBN: 9789348505385

patient needs and the constraints of the healthcare system. Addressing these challenges requires institutional support and policies that promote safe staffing levels.

10.7.6 Moral Distress and Compassion Fatigue

Constant exposure to ethical dilemmas and emotionally demanding situations can take a toll on nurses. Many experience moral distress when they feel unable to provide the level of care they believe is right. Over time, this can lead to compassion fatigue, impacting both mental health and job performance. To combat this, healthcare organizations must offer resources for emotional support and professional well-being.

10.7.7 The Role of Artificial Intelligence (AI) in Nursing

Technology is rapidly transforming healthcare, and AI is becoming more integrated into nursing practice. While AI has the potential to enhance efficiency and decision-making, it also raises ethical concerns—particularly about whether machines might replace human nurses in certain tasks. The challenge lies in finding a balance where technology supports, rather than diminishes, the compassionate, human-centered care that nursing is built upon.

10.8 Moving Forward

Navigating ethical issues in medical-surgical nursing requires ongoing education, open communication, and strong institutional support. By staying informed and advocating for ethical practices, nurses can continue to provide compassionate and effective care, even in the face of complex challenges.

10.9 Case Study : End-of-Life Decision-Making in Surgical Nursing

10.9.1 Scenario:

Mrs. Angela Carter, a 72-year-old woman, is admitted to the surgical ward for an emergency colectomy due to a perforated bowel. She has a history of congestive heart failure and chronic kidney disease. After the surgery, she is placed in the intensive care unit (ICU) on a ventilator.

DOI: https://doi.org/10.26524/232.10 ISBN: 9789348505385

However, her condition deteriorates rapidly, and she develops multi-organ failure.

Angela had previously signed an advance directive stating that she did not want to be kept alive on life support if there was no reasonable chance of recovery. However, her son, Mark, insists on continuing aggressive treatment, believing that "miracles can happen." The medical-surgical nursing team is caught in an ethical dilemma—should they honor Angela's wishes or continue life-sustaining measures as requested by her son?

10.9.2 Ethical Considerations:

- **Autonomy:** Respecting Angela's right to make her own medical decisions through the advance directive.
- **Beneficence:** Acting in her best interest by considering whether continued treatment is prolonging suffering.
- **Nonmaleficence:** Avoiding unnecessary harm, such as prolonged suffering with little hope of recovery.
- **Justice:** Ensuring fair treatment and resource allocation in the ICU.

10.9.3 Decision-MakingProcess:

After consulting with the hospital's ethics committee, the healthcare team, including the nurses and physicians, sits down with Mark to discuss Angela's prognosis. They explain the ethical and medical concerns and the importance of honoring her wishes. Eventually, Mark agrees to palliative care, allowing Angela to pass away peacefully with dignity.

10.10 Case Study : Informed Consent and Surgical Nursing

10.10.1 Scenario:

Mr. James Lopez, a 45-year-old construction worker, is admitted for an urgent appendectomy. He speaks only Spanish, and his wife, who speaks limited English, is present. The surgeon quickly explains the procedure in English and asks James to sign the consent form. The nurse, Maria, notices that James looks confused and hesitant.

DOI: https://doi.org/10.26524/232.10 ISBN: 9789348505385

10.10.2 Ethical Considerations:

- **Informed Consent:** Ensuring the patient fully understands the risks, benefits, and alternatives.
- **Cultural Sensitivity:** Recognizing language barriers and addressing them appropriately.
- **Autonomy:** Giving James the ability to make an informed decision about his own body.

10.10.3 Decision-Making Process:

Maria steps in and advocates for James by requesting a medical interpreter. With the interpreter's help, James fully understands the procedure and asks relevant questions before signing the consent form. This ensures ethical and patient-centered care.

Conclusion

Ethical dilemmas in Medical surgical nursing won't disappear, but with strong principles, clear frameworks, and teamwork, nurses can navigate them with confidence. By staying informed, reflecting on decisions and advocating for patients, provide care that's not only skilled but also deeply ethical. Ethical and legal considerations in Medical and Surgical nursing are crucial in ensuring patient safety, dignity and rights. Nurses must uphold ethical principles like autonomy, beneficence, nonmaleficence and justice while adhering to legal regulations such as informed consent, confidentiality and professional accountability. Ethical dilemmas often arise in end-of-life care, resource allocation, and patient autonomy. Legal frameworks guide nursing practice, preventing malpractice and ensuring adherence to professional standards. Continuous education on ethical and legal issues help nurses make informed decisions, advocate for patients and maintain high standards of care while navigating complex healthcare environments.

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Published By :
Royal Book Publishing
contact@royalbookpublishing.com
www.royalbookpublishing.com

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