



Research Article

Recognising, Responding & Re- Escalating Sepsis (RRR- Tool): Enhancing Early Recognition and Response to Sepsis

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Abstract

Sepsis continues to be a major global health challenge, with the World Health Organization estimating that it affects approximately 49 million individuals and results in 11 million deaths annually. In India, the situation is particularly dire; a study conducted in 2022 found that over 56% of ICU patients developed sepsis, with nearly 45% of these infections attributed to multidrug-resistant organisms.

Nurses are integral to the early detection, management, and prevention of sepsis. Their roles encompass vigilant monitoring of vital signs, identification of early sepsis indicators, administration of prescribed treatments, and patient and family education on infection prevention and the importance of timely medical intervention.

Recognizing the critical role of nursing in sepsis care, Apollo Hospitals initiated a Quality Improvement Project in 2024 aimed at enhancing nursing practices in sepsis management. This initiative focuses on educating nursing staff about the pathophysiology, risk factors, clinical presentations, and evidence-based interventions for sepsis and septic shock. By fostering a culture of continuous learning and collaboration, the hospital strives to create an environment where nurses are confident in their ability to recognize and respond to sepsis effectively. This proactive approach not only improves patient outcomes but also contributes to the overall efficiency and effectiveness of the healthcare system.

The integration of the "RRR Tool for Recognizing, Responding & Re-Escalating Sepsis" into nursing practice has demonstrated significant improvements in the early identification and management of sepsis. This structured, nurse-driven protocol enhances adherence to evidence-based sepsis care bundles, thereby improving patient outcomes. Implementing the protocol has led to increased compliance with timely interventions, such as lactate measurement, blood culture collection, and early antibiotic administration. Additionally, the protocol has contributed to reduced time to screening, decreased emergency department length of stay, and shortened hospital stays. Nursing staff satisfaction has also improved, highlighting the positive impact of structured protocols on both clinical outcomes and staff engagement.

Through initiatives like the RRR Tool, the integration of AI technologies, and a robust infection control program, Apollo Hospitals is enhancing its sepsis management protocols. These efforts underscore the critical role of nursing in sepsis care and the importance of continuous education and structured protocols in enhancing patient safety and quality of care.

Keywords: Antimicrobial Resistance, Clinical Competence, Early Identification, Evidence-Based Protocols, Healthcare Quality, Nurse Education, Nursing Practice, Patient Outcomes, Patient Safety, Quality Improvement, Sepsis Care Bundles, Sepsis Management, Structured Protocols

INTRODUCTION

Sepsis is a life-threatening condition resulting from the body's extreme response to infection, leading to tissue damage, organ failure, and, if untreated, death. It remains a global health challenge, with the World Health Organization (WHO) estimating that sepsis affects approximately 49 million people and causes 11 million deaths annually worldwide.¹

In India, the burden is particularly severe. A study by The George Institute for Global Health found that over 50% of patients in intensive care units (ICUs) develop sepsis, with a significant proportion caused by multidrug-resistant organisms. Furthermore, 33% of sepsis-related deaths in India are linked to antimicrobial resistance.^{2,3}

Nurses play a pivotal role in the early identification, management, and prevention of sepsis. Their responsibilities encompass monitoring vital signs, recognizing early signs of sepsis, administering prescribed treatments, and educating patients and families about infection prevention and the importance of timely medical intervention.

Apollo Hospitals, has recognized the critical importance of nursing in combating sepsis. In 2024, the hospital initiated a Quality Improvement Project aimed at enhancing nursing practices in sepsis management. This initiative focuses on educating nursing staff about the pathophysiology, risk factors, clinical presentations, and evidence-based interventions for sepsis and septic shock. By fostering a comprehensive understanding, the hospital aims to empower nurses to proactively contribute to minimizing the burden of sepsis on patients and the healthcare system.

Through such initiatives, nurses are better equipped to provide timely and effective care, ultimately improving patient outcomes and reducing the incidence of sepsis-related complications and deaths.

METHODOLOGY

In 2024, Apollo Hospitals launched a comprehensive Quality Improvement (QI) initiative to enhance nursing practices in sepsis management, aiming to improve patient outcomes and reduce complications associated with sepsis. This initiative focused on several key objectives:

1. **Early Identification and Diagnosis:** Implement structured screening tools and protocols to facilitate the timely recognition of sepsis at triage, aiming to reduce delays in diagnosis and initiate prompt treatment.
2. **Timely Antibiotic Administration:** Reduce door-to-antibiotic time (DTAT) by streamlining processes and ensuring adherence to the 1-hour sepsis bundle, thereby improving patient outcomes.
3. **Blood Culture Collection:** Increase the rate of blood culture collection prior to antibiotic administration to enhance diagnostic accuracy and guide appropriate antimicrobial therapy.
4. **Standardization of Protocols:** Develop and implement evidence-based clinical protocols and Standard Operating Procedures (SOPs) for sepsis management, ensuring consistency and quality in patient care.
5. **Multidisciplinary Collaboration:** Foster effective communication and teamwork among nursing staff, physicians, and allied healthcare professionals through joint educational sessions and collaborative care planning.
6. **Nursing Education and Training:** Provide targeted education on the pathophysiology, risk factors, clinical presentations, and evidence-based interventions for sepsis and septic shock, equipping nurses to take proactive roles in patient care.
7. **Monitoring and Evaluation:** Establish mechanisms for continuous monitoring of sepsis-related metrics, including mortality rates and compliance with sepsis bundles, to assess the effectiveness of interventions and identify areas for improvement.

By achieving these objectives, Apollo Hospitals aims to enhance the quality of care provided to patients, reduce sepsis-related complications, and improve overall patient outcomes. The initiative underscores the hospital's commitment to excellence in healthcare delivery and patient safety.

Quality Improvement Initiative: “Let’s Stop SEPSIS Together”

Conducted from November 1, 2024, to March 31, 2025, this initiative aimed to enhance sepsis management through a structured five-phase approach, emphasizing early recognition, timely intervention, and comprehensive patient education. (Figure- 1)

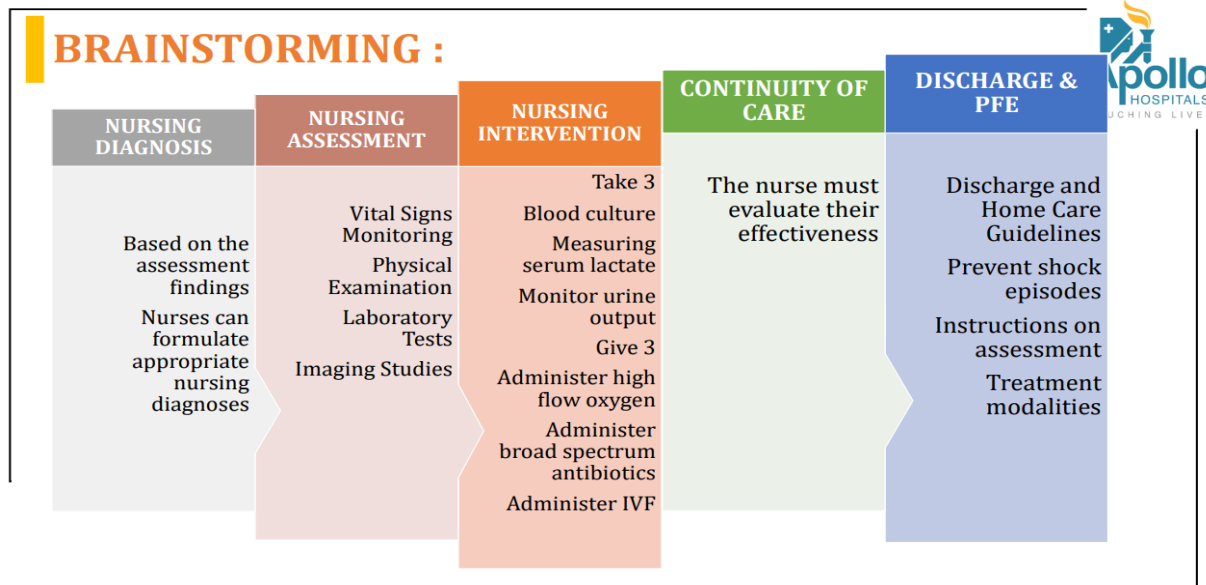
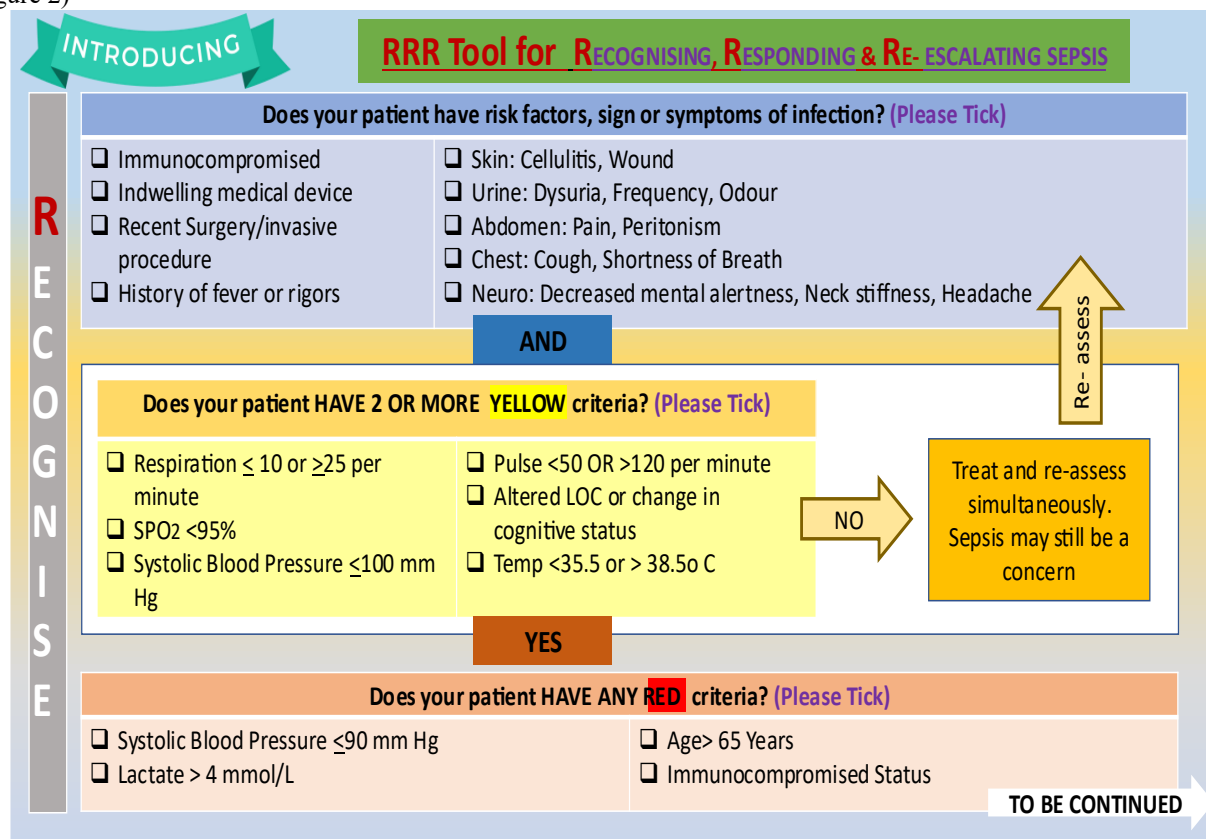


Figure 1: Flowchart of The Quality Improvement Initiative

PHASE 1: Enhancing Early Recognition and Response to Sepsis: The RRR Tool

The educational phase of our Quality Improvement initiative, conducted from November 1, 2024, to December 31, 2024, aimed to empower nursing staff with the knowledge and tools necessary for the early identification and management of sepsis. Central to this effort was the introduction of the "RRR Tool for Recognizing, Responding & Re-Escalating Sepsis," a structured approach designed to enhance sepsis care through systematic assessment and timely intervention. (Figure 2)



R E S P O N D A N D E S C A L A T E	N O	<p>The patient may have SEPSIS:</p> <p>Followed measures taken (Please Tick) -</p> <ul style="list-style-type: none"> <input type="checkbox"/> Inform the doctor <input type="checkbox"/> Monitor vital signs & fluid balance <input type="checkbox"/> Obtain blood culture X 2 sets (Preferably by the phlebotomist) <input type="checkbox"/> Investigate source of infection <input type="checkbox"/> Obtain IV access and start IV fluid (Follow Doctor's orders) <input type="checkbox"/> As per the doctor's order administer the empiric antibiotic within 1 hour <input type="checkbox"/> Refer and communicate to the charge nurse and doctor and provide PFE, accordingly. 	Y E S	<p>The patient has SEVERE SEPSIS OR SEPTIC SHOCK (until proven otherwise):</p> <p>Followed measures taken (Please Tick) -</p> <ul style="list-style-type: none"> <input type="checkbox"/> Immediately Inform the doctor <input type="checkbox"/> Expedite transfer (if needed and ordered by the doctor) to a resuscitation area <input type="checkbox"/> Refer and communicate to the charge nurse and patient/ patient attendant. 															
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Figure 2: RRR Tool for Recognising, Responding & Re- Escalating Sepsis

1. The Role of the RRR Tool: Early recognition of sepsis is critical in preventing progression to severe sepsis or septic shock. The RRR Tool provides nursing staff with a clear framework to identify potential sepsis cases promptly. By integrating this tool into routine assessments, nurses can systematically evaluate patients for signs and symptoms of sepsis, ensuring that no subtle indicators are overlooked. Studies have demonstrated that nurse-led protocols and screening tools significantly improve early sepsis identification. For instance, a nurse-driven sepsis protocol resulted in increased compliance with sepsis care bundles, including timely blood culture collection and lactate measurement, leading to improved patient outcomes.^{3,4}

2. Standardizing Diagnostic Approach: The RRR Tool standardizes the approach to sepsis assessment, ensuring that all nursing staff utilize consistent criteria and procedures when evaluating patients. This standardization reduces variability in clinical judgment and enhances the reliability of sepsis detection. Implementing standardized sepsis screening tools has been associated with improved timeliness in initiating sepsis interventions. For example, the use of a sepsis screening tool in the emergency department decreased the time to antibiotic administration by over 100 minutes, thereby improving patient outcomes. (Figure 3)⁵

3. Improving Patient Outcomes: The RRR Tool not only aids in the initial recognition of sepsis but also provides guidance on appropriate responses and re-escalation when necessary. By following the tool's structured approach, nursing staff can ensure that patients receive timely interventions, such as fluid resuscitation, antibiotic administration, and appropriate monitoring. Empowering nurses to initiate and manage sepsis care has been shown to improve compliance with sepsis care bundles and reduce mortality rates.⁶ A study revealed that nurse-led sepsis protocols led to a significant decrease in sepsis-related mortality, highlighting the critical role of nursing in sepsis management.⁷

4. The Impact of the RRR Tool on Sepsis Care: The integration of the RRR Tool into nursing practice has significantly enhanced the early recognition, standardized assessment, and timely intervention of sepsis. By providing a structured framework, the tool empowers nursing staff to deliver high-quality care, leading to improved patient outcomes. Continued education and adherence to the RRR Tool are essential in maintaining and further advancing sepsis care standards.

PHASE 2: Training and Reinforcement

Effective nursing assessment is paramount in the early identification and management of sepsis. Prompt and accurate assessment enables timely interventions, which are crucial for improving patient outcomes. Nurses play a pivotal role in the early detection of sepsis. Their comprehensive assessments facilitate the identification of subtle changes in a patient's condition, allowing for prompt intervention. Early recognition and treatment are associated with improved survival rates and reduced complications. Moreover, continuous monitoring enables the evaluation of treatment efficacy and the timely adjustment of care plans.^{2,3}



Figure 3: Training Session on Early Nursing Diagnosis

1. Vital Signs Monitoring: Regular monitoring of vital signs—temperature, heart rate, respiratory rate, blood pressure, and oxygen saturation—is essential. Deviations from baseline values can indicate the onset of sepsis or its progression. For instance, a persistent fever or hypotension may suggest systemic infection, necessitating immediate clinical attention. (Figure 4) A study by Nagalingam (2017) emphasizes the importance of early recognition and treatment of sepsis and septic shock. The author discusses the challenges in diagnosing sepsis due to its non-specific symptoms and the need for healthcare professionals to be well-equipped to detect sepsis promptly. The article highlights the necessity of clear and simple-to-use assessment tools to aid in the early recognition of sepsis, thereby minimizing mortality and morbidity.⁸

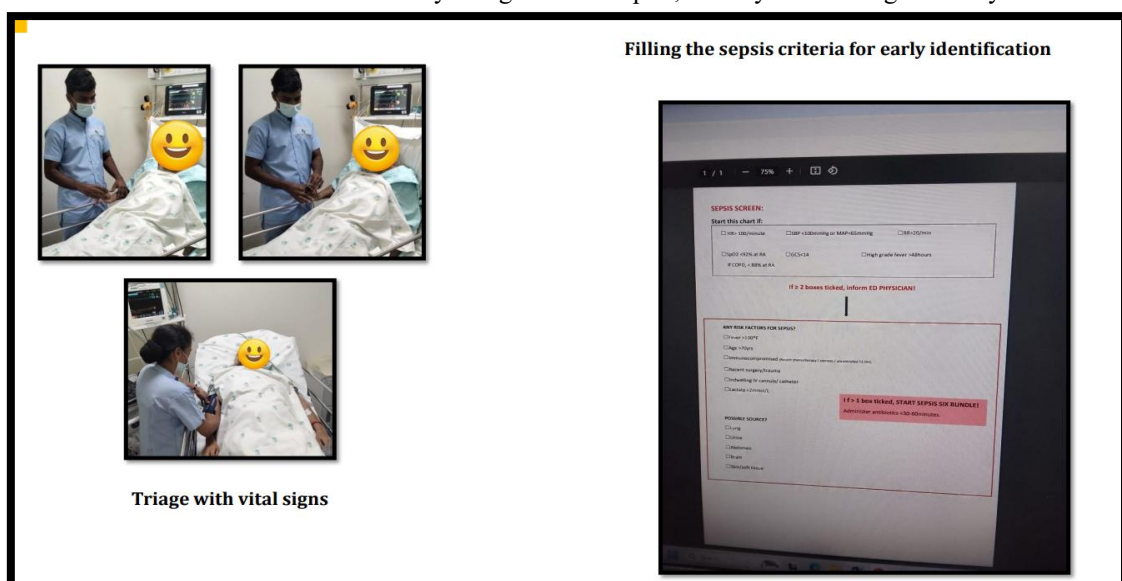


Figure 4: Training Session on Triage with Vital Signs

2. A thorough physical examination helps identify signs of sepsis, such as Altered mental status (e.g., confusion or agitation), Skin changes (e.g., mottling or cyanosis), Delayed capillary refill time, Edema, Reduced urine output (oliguria). These findings can guide further diagnostic testing and therapeutic interventions. The American Nurse article "Sepsis identification: a race against time" discusses the importance of a comprehensive assessment in identifying sepsis. It outlines a head-to-toe approach, including evaluations of neurologic, respiratory, cardiovascular, gastrointestinal, and genitourinary functions, as well as skin and invasive catheters. This thorough assessment aids in the early detection of sepsis and septic shock, which is crucial for improving patient outcomes.⁹

3. Laboratory investigations are critical in confirming sepsis and identifying its source:

- Complete Blood Count (CBC): Elevated white blood cell count may indicate infection.
- Blood Cultures: Essential for identifying the causative organism.
- Lactate Levels: Elevated levels can signify tissue hypoxia and poor prognosis.
- Procalcitonin: A biomarker that helps differentiate bacterial infections from other causes of inflammation.
- Coagulation Studies: Assess for disseminated intravascular coagulation (DIC).
- Arterial Blood Gases (ABG): Evaluate respiratory function and metabolic status.
- Comprehensive Metabolic Panel: Monitor electrolyte balance and organ function.

The Stat Pearls article "Laboratory Evaluation of Sepsis" highlights the importance of laboratory evaluations in managing sepsis and septic shock. It discusses the role of various laboratory tests in diagnosing sepsis, assessing its severity, and guiding treatment decisions. The article emphasizes the need for a collaborative effort among healthcare professionals to enhance patient-centered care and improve outcomes.¹⁰ (Figure 5)



Figure 5: Hands on Training

4. Imaging Studies

- Chest X-ray: Detects pneumonia or other pulmonary infections.
- CT scans: Useful for identifying intra-abdominal infections, abscesses, or other sources.

The American Nurse article "Sepsis in the hospital setting: A case study" discusses the importance of identifying signs and symptoms of sepsis or septic shock, including changes in blood pressure, heart rate, skin condition, and respiratory rate. It also emphasizes the need for healthcare professionals to be vigilant in recognizing these signs to ensure timely intervention and improve patient outcomes.¹¹

5. Determining the source of infection is crucial for targeted therapy:

- Wounds or Surgical Sites: Inspect for signs of infection.
- Indwelling Catheters or Devices: Assess for potential entry points for pathogens.
- Urinary Tract: Evaluate for symptoms of urinary tract infections.
- Respiratory Tract: Listen for abnormal lung sounds or signs of respiratory distress.

The American Nurse article "Sepsis identification: a race against time" emphasizes the importance of identifying the source of infection in patients with sepsis. It outlines various assessments, including evaluating wounds, catheters, and respiratory and urinary tracts, to determine the origin of the infection. This information is vital for initiating appropriate treatment and improving patient outcomes.⁹

Phase 3. Timely Implementation of the Sepsis-6 Protocol: A Nursing Perspective

Sepsis remains a leading cause of mortality in hospitalized patients, with each hour of delayed treatment increasing the risk of death by approximately 7.6%. The Sepsis-6 protocol, comprising six critical interventions to be initiated within the first hour of suspected sepsis, is vital in mitigating this risk (Figure 6).

- Administer Oxygen to Maintain Saturation $\geq 94\%$: Early oxygen supplementation ensures adequate tissue oxygenation, preventing hypoxia-induced organ dysfunction. Nurses play a pivotal role in monitoring oxygen saturation levels and administering supplemental oxygen as needed. Maintaining oxygen saturation between 94% and 98% is recommended.¹²
- Take Blood Cultures Before Administering Antibiotics: Collecting blood cultures prior to antibiotic administration is essential for identifying the causative organism and tailoring antibiotic therapy. Nurses facilitate this process by ensuring timely collection and labelling of specimens. However, obtaining cultures should not delay the initiation of antibiotics.¹³
- Administer Broad-Spectrum Intravenous Antibiotics: Initiating broad-spectrum antibiotics promptly is crucial in combating the infection. Nurses are responsible for verifying physician orders, preparing medications, and ensuring timely administration. Delays in antibiotic administration are associated with increased mortality.¹⁴
- Measure Serum Lactate Levels: Elevated lactate levels indicate tissue hypoperfusion and are associated with poor prognosis. Nurses assist in obtaining blood samples for lactate measurement and monitor results to guide treatment decisions. Lactate levels should be rechecked if initially elevated.¹⁵
- Start Intravenous Fluid Resuscitation: Administering intravenous fluids helps restore circulatory volume and blood pressure. Nurses monitor fluid intake and output, assess for signs of fluid overload, and adjust administration rates accordingly. Early fluid resuscitation is critical in managing sepsis.
- Commence Accurate Urine Output Measurement: Monitoring urine output provides insight into renal function and fluid balance. Nurses ensure accurate measurement and documentation of urine output, alerting the healthcare team to any significant changes. Urine output is a key indicator in assessing the severity of sepsis¹⁶.



Figure 6: Take and give “3”: Timely implementation of the Sepsis-6 protocols, aiming to reduce mortality associated with sepsis.

The Sepsis-6 protocol emphasizes the importance of early, coordinated interventions in the management of sepsis. Nurses, as frontline caregivers, are integral to the successful implementation of this protocol. Their vigilance, prompt action, and continuous monitoring are essential in improving patient outcomes and reducing sepsis-related mortality.

Phase 4. Continuity of Care – Post-Intervention Evaluation

Following the initiation of sepsis interventions, nurses play a pivotal role in evaluating the patient's response to treatment. This ongoing assessment is crucial for identifying complications early and ensuring optimal recovery.

- **Monitoring Hemodynamic Stability:** Nurses continuously assess vital signs, including heart rate, blood pressure, respiratory rate, and oxygen saturation, to ensure the patient's hemodynamic status remains stable. Any deviations from normal ranges may indicate complications such as shock or organ dysfunction, necessitating prompt intervention. Additionally, monitoring urine output provides insight into renal perfusion and function. A decrease in urine output can be an early sign of worsening condition. Hemodynamic monitoring, including the use of invasive techniques like central venous pressure measurement and pulmonary artery catheterization, can aid in determining the adequacy of hemodynamic support interventions.¹⁷
- **Assessing Patient Understanding of the Disease Process:** Effective communication is vital in the recovery phase. Nurses assess the patient's and family's understanding of sepsis, its causes, treatment, and prevention strategies. This assessment guides the development of tailored education plans to address knowledge gaps and promote adherence to post-discharge care. Educating patients about potential complications, signs of infection, and when to seek medical attention empowers them to take an active role in their recovery. The Surviving Sepsis Campaign: International Guidelines for Management of Sepsis and Septic Shock 2021 highlight the importance of nursing contributions in delivering timely and evidence-based care to patients with sepsis.¹⁸

Nurses are integral to the continuity of care for sepsis patients. Through vigilant monitoring and comprehensive education, they ensure that patients recover effectively and are equipped to manage their health post-discharge, thereby reducing the risk of readmission and promoting long-term well-being.^{17,18}

Phase 5. Discharge and Home Care Guidelines

Even after hospital discharge, nurses play a vital role in ensuring patients continue to receive appropriate care at home and within the community. Effective nursing education and guidance empower patients and their families to manage recovery safely and prevent complications. (Figure 7)

- **Preventing Shock Episodes:** Nurses must educate patients and caregivers on strategies to prevent recurrent shock episodes by identifying and managing contributing factors. Key teachings include maintaining adequate hydration, effectively managing chronic health conditions, avoiding trauma, and practicing proper wound care. This proactive approach helps reduce the risk of deterioration at home. The Sepsis Clinical Care Standard emphasizes the importance of care after hospital discharge and survivorship, highlighting the role of nurses in providing education and support to patients with sepsis.^{19,20}
- **Instructions on Ongoing Assessment:** Nurses instruct patients and families on how to monitor for signs of potential complications post-discharge. Education should cover recognizing symptoms such as fever, increased pain, wound discharge, or urinary discomfort (e.g., burning micturition). Prompt identification of these warning signs is crucial for timely medical intervention. The Sepsis Clinical Care Standard provides guidance on discharge planning and the importance of educating patients and families about the signs and symptoms of sepsis.
- **Guidance on Treatment Modalities:** Nurses provide comprehensive education on necessary treatment modalities to support continued recovery. This includes proper administration of emergency medications, management of intravenous therapy if required, nutritional support via parenteral or enteral routes, skin care practices, and the importance of regular exercise and ambulation. Through tailored teaching, nurses enhance patient confidence and adherence to prescribed care regimens. The Sepsis Clinical Care Standard emphasizes the importance of providing education and support to patients with sepsis to improve outcomes and reduce the risk of readmission.¹⁹⁻²¹

Sample PFE on the Sepsis prevention at home		
S. No	Education given on	Given
1	Maintaining skin hygiene and keeping the wound clean and dry.	
2	Taking plenty of oral fluids, maintaining hydration, and healthy diets.	
3	Taking the medicines as explained.	
4	Maintaining Sugar level and Blood pressure level (If applicable)	
4	Ambulation and exercises as advised	
5	Inform the doctor immediately, in case of- <ul style="list-style-type: none"> Any change in body temperature (<36 C or >39 C), shivering or cold extremities Difficulty in breathing Any continuous pain, persistent headaches & / body aches Confusion or dizziness Any discharge from the wound site. Burning micturition or less urine output. 	
	Patient attendant name & Sign.....	
	Name of the staff	

Figure 7: Patient Family Education on the Sepsis Prevention at Home.

In summary, nurses are essential in bridging the transition from hospital to home care, ensuring patients and families are well-informed, vigilant, and prepared to maintain health and prevent readmission. Collectively, this structured approach ensures comprehensive sepsis management, aiming to improve patient outcomes and reduce the risk of complications.

Results

- Impact of the "RRR Tool for Recognizing, Responding & Re-Escalating Sepsis" on Sepsis Management:** The educational phase of our Quality Improvement initiative, conducted from November 1, 2024, to December 31, 2024, aimed to empower nursing staff with the knowledge and tools necessary for the early identification and management of sepsis. Central to this effort was the introduction of the "RRR Tool for Recognizing, Responding & Re-Escalating Sepsis," a structured approach designed to enhance sepsis care through systematic assessment and timely intervention.
- Enhanced Nurse Competence and Confidence:** Post-education data indicated a significant improvement in nurses' confidence and competence in managing sepsis. Approximately 69.3% of staff reported feeling "very confident" or "extremely confident" in their care of sepsis patients after completing the education program. This increase in familiarity and confidence was statistically significant ($t(22) = 10.35, p < 0.001$).²²
- Improved Adherence to Sepsis Protocols:** The implementation of the "RRR Tool" led to a notable enhancement in adherence to sepsis management protocols. A study conducted at a tertiary medical center found that after the introduction of a nurse-initiated sepsis protocol, the median time to initial antibiotic administration was reduced from 135 minutes to 108 minutes, and compliance with serum lactate measurement improved from 83.9% to 98.7%.²³
- Reduction in Sepsis Mortality Rates:** The integration of the "RRR Tool for Recognizing, Responding & Re-Escalating Sepsis" into our clinical practice, coupled with targeted nursing education, has significantly enhanced the early identification and management of sepsis. A study published in Critical Care Medicine²⁴ demonstrated that an institutional educational program based on the Surviving Sepsis Campaign guidelines led to improved compliance with sepsis management protocols and a notable reduction in hospital mortality rates. Specifically, the study reported a decrease in hospital mortality from 45.3% to 36.7% ($P = 0.06$) following the implementation of the educational program. Furthermore, a multicentre study in Spain highlighted the positive impact of an educational program on sepsis care. The study found that after the program, there was a significant improvement in compliance with sepsis management bundles, and a reduction in hospital mortality rates was observed. These findings underscore the importance of continuous education and structured protocols in improving patient outcomes in sepsis care. Collectively, these studies affirm that enhancing nursing education and implementing structured sepsis management tools, like the "RRR Tool," are pivotal in reducing sepsis-related mortality and improving patient outcomes.

Conclusion

The integration of the "RRR Tool for Recognizing, Responding & Re-Escalating Sepsis" into our nursing practice has proven to be a valuable asset in the early identification and management of sepsis. Through targeted education and the adoption of a structured approach, nursing staff have demonstrated improved competence, adherence to protocols, and a positive impact on patient outcomes. This initiative underscores the critical role of nursing in sepsis care and highlights the importance of continuous education and structured protocols in enhancing patient safety and quality of care.

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