

ORIGINAL ARTICLE

Implementation of the Sepsis Six Care Bundle in ICU: Nurses' Perspectives from Kabwe Central Hospital

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ABSTRACT

Background: Sepsis remains a critical global health challenge, affecting 49 million people and causing 11 million deaths annually. It results from a dysregulated host response to infection, leading to life-threatening organ dysfunction. Timely diagnosis, evidence-based care, and appropriate treatment were essential for improving patient outcomes, particularly in intensive care settings. This study explored nurses' experiences with implementation of the Sepsis Six Care Bundle at Kabwe Central Hospital's Intensive Care Unit (ICU).

Methods: An exploratory phenomenological study design was employed, with ethical clearance and permission obtained prior to conducting the study. Data collection involved in-depth interviews with ten (n=10) conveniently selected intensive care unit nurses. Audio recordings and field notes were transcribed verbatim, and thematic analysis was performed to identify key themes. Data coding and organization were facilitated using NVivo software to ensure systematic analysis and rigor in theme identification.

Results: Four major themes emerged: Nurses'

Approach to Sepsis Care, Collaborative Efforts, Strategies for Improving Sepsis Outcomes, and Barriers to Effective Management. Many nurses had limited familiarity with the Sepsis Six Care Bundle, leading to inconsistent implementation. Resource constraints, including inadequate supplies, staffing shortages, and lack of continuous education, hindered its effective use. However, teamwork, leadership support, and access to protocols facilitated better adherence.

Conclusion: The study highlighted challenges and enablers in implementing the Sepsis Six Care Bundle at Kabwe Central Hospital's ICU. While some nurses were aware of the bundle, inconsistent application was evident due to resource constraints and limited training. Strengthening teamwork, leadership support, and structured education, along with optimizing resources, was crucial for sustainable implementation and improved patient outcomes. However, the study was limited by its small sample size and single-site focus, which could affect the generalization of findings. Further research with a larger, more diverse sample was recommended to gain broader insights.

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Keywords: Nurses perspective, sepsis, six care bundle, ICU, implementation

This article is available online at: <http://www.mjz.co.zm>, <http://ajol.info/index.php/mjz>, doi: <https://doi.org/10.55320/mjz.52.3.701>
The Medical Journal of Zambia, ISSN 0047-651X, is published by the Zambia Medical Association

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INTRODUCTION

Sepsis is defined as a syndrome of dysregulated host response to infection leading to life-threatening organ dysfunction.¹ It remains a major global health concern, with an estimated 49 million cases and 11 million deaths annually, accounting for one in five deaths worldwide.² Despite advancements in healthcare, high-income countries such as the United States, the United Kingdom, and Germany reported significant sepsis-related mortality, particularly among intensive care unit (ICU) patients.³ In the United Kingdom alone, sepsis accounted for approximately 44,100 deaths per year, with an estimated cost of £7.076 billion to the National Health Service (NHS).⁴ Low- and middle-income countries (LMICs), including Egypt, South Africa, and Algeria, faced high sepsis incidences due to healthcare-associated infections and antimicrobial resistance.⁵ In Zambia, Nigeria, and Uganda, the sepsis burden was disproportionately high, with delays in diagnosis and inadequate critical care infrastructure contributing to poor patient outcomes.⁶ In Zambia, sepsis was one of the leading causes of ICU admissions and was responsible for approximately 30% of ICU mortality.⁷ The lack of ICU infrastructure, limited diagnostic tools, delayed initiation of treatment, and high infection rates further exacerbated sepsis-related deaths, highlighting the urgent need for structured, evidence-based interventions to improve patient outcomes.

The Sepsis Six Care Bundle was developed by The UK Sepsis Trust as a structured, time-sensitive approach to reducing sepsis mortality. It consists of three diagnostic and three therapeutic steps, all of which should be implemented within one hour of sepsis recognition. Studies have demonstrated that adherence to the Sepsis Six Care Bundle could reduce mortality by 50%, shorten hospital stays, and decrease the need for prolonged ICU admissions.⁸ However, limited research exists on the implementation of the Sepsis Six Care Bundle in Zambia, particularly from the perspective of front-line healthcare workers such as ICU nurses. Given

the high sepsis-related mortality rates in Zambian ICUs, it was essential to understand the challenges and facilitators of implementing the Sepsis Six Bundle within this context. Nurses play a crucial role in early sepsis recognition and management, making them key stakeholders in the successful implementation of sepsis protocols. Several international studies highlighted the importance of nurses' experiences and adherence to the Sepsis Six Bundle in improving patient outcomes. A systematic review found that while nurses generally had adequate knowledge and positive attitudes towards sepsis care, gaps persisted in areas such as antibiotic administration and the urgency of sepsis management.⁹ While another study emphasized that interdisciplinary collaboration and sepsis awareness programs improved early recognition and treatment outcomes.¹⁰ However, no published studies have explored ICU nurses' experiences with Sepsis Six care Bundle implementation in Zambia, representing a significant knowledge gap.

Understanding nurses' perspectives in Zambia was crucial, as they are the primary caregivers in ICU settings, directly involved in sepsis assessment, monitoring, and intervention, yet their ability to fully implement the Sepsis Six Bundle could be impacted by limited resources and staff shortages. Additionally, context-specific barriers such as supply chain issues, training gaps, and hospital policies could hinder adherence to the bundle, making their insights essential for informing policy adjustments and targeted interventions to enhance sepsis care in Zambian hospitals. Therefore, this study aimed to explore the experiences of ICU nurses with implementation of the Sepsis Six Care Bundle at Kabwe Central Hospital, to examine their perceptions of its effectiveness in improving patient outcomes, identify challenges and enablers in its implementation, and made recommendations and strategies to enhance adherence and compliance. By addressing these objectives, this research filled a critical gap in the literature and contributed to evidence-based sepsis management strategies in Zambia, helping to improve ICU nurses' training,

optimize resource allocation, and guided policy formulation, ultimately reducing sepsis-related mortality and strengthening critical care nursing in the country.

METHODS

This study employed an exploratory phenomenological research design to examine nurses' experiences with the implementation of the Sepsis Six Care Bundle in the Intensive Care Unit at Kabwe Central Hospital. Ethical clearance and permission were obtained before conducting the study and written informed consent was obtained from the respondents after explaining the purpose and nature of the study to them. Respondents were assured of anonymity and confidentiality. The participants were informed that they could withdraw from the study at any time without suffering any consequences. Anonymity and confidentiality of participants was considered as no names, but only serial numbers were recorded. The research was conducted at Kabwe Central Hospital, a major referral centre in Central Province, Zambia, with an eight-bed Intensive Care Unit. The target population comprised nurses directly involved in managing patients with sepsis using the Sepsis Six Care Bundle. A sample of ten nurses was selected through convenient sampling, and data saturation was reached at eight participants, indicating that additional interviews did not yield new themes or insights, thereby justifying the sample size as sufficient for achieving meaningful qualitative findings.

In-depth interviews were conducted using an interview guide structured into demographic characteristics and core questions with prompts. Each interview lasted 30-45 minutes, and all responses were audio-recorded and transcribed verbatim. Thematic analysis was employed for data interpretation, where transcripts were reviewed, coded and categorized into themes based on patterns emerging from participants' responses. A coding framework was developed inductively, ensuring that themes accurately reflected participants' experiences, with peer review enhancing the

reliability of the coding process. The use of convenience sampling could have introduced selection bias, as participants who were more available or willing to participate could have had different perspectives than those who did not volunteer. To mitigate this bias, the study ensured diverse representation by including nurses with varying levels of experience and shifts. Additionally, trustworthiness was reinforced through bracketing to minimize researcher bias, maintaining rigorous documentation, and conducting respondent validation to confirm the accuracy of interpreted findings.

The data collection process adhered to ethical and methodological standards, ensuring participant confidentiality and voluntary participation. Trustworthiness was further strengthened through field notes, peer debriefing, and clear documentation of the research process. A pilot study was conducted at Kabwe Mine Hospital's High Dependency Unit to refine the data collection tool. Ethical and cultural considerations were emphasized, with permissions obtained from relevant authorities, including the University of Zambia's ethical review board and the National Health Research Authority. Participants were assured of confidentiality, anonymity, and their right to withdraw at any point. To disseminate findings, the study proposed scholarly publications, conference presentations, digital platforms, and collaborations with healthcare organizations. The results would also be used for policy advocacy, training initiatives, and public engagement to improve sepsis management. Implementation plans included integrating the Sepsis Six Care Bundle into clinical guidelines, developing training programs, incorporating protocols into electronic health records, and launching quality improvement initiatives. Monitoring performance metrics, fostering multidisciplinary collaboration, and establishing an audit and feedback mechanism were key strategies for sustaining improvements in sepsis care could be maintained.

RESULTS

A total of 10 Nurses from the ICU, at Kabwe Central Hospital Participated in the study, the fundamental themes emerged from depth interviews with these Nurses.

Table 1: Demographic Characteristics of Participants (N=10)

Code	Gender	Age	Role in ICU	Average years of Experience in ICU
P1	M	50	Staff Nurse	5 years and above
P2	F	55	Charge Nurse	5 years and above
P3	F	29	Staff Nurse	4-5 years
P4	F	30	Staff Nurse	Below 1 year
P5	F	28	Staff Nurse	4-5 years
P6	F	29	Staff Nurse	2-3 years
P7	F	28	Staff Nurse	1-2years
P8	F	33	Nurse Practitioner	1-2years
P9	M	25	Staff Nurse	2-3 years
P10	F	32	Staff Nurse	Below 1 year

P=Participant, F=Female, M= Male

Presentation of Themes and Sub-Themes

Through in-depth interviews, three themes were identified that reflected the ICU nurses experience with implementation of the sepsis six care bundle on nursing practice. Themes covered Nurses' Approach to Sepsis Care, Collaborative Efforts in Sepsis Care, Strategies for Improving Sepsis Outcomes, Barriers to Effective Sepsis Management. Each theme was presented with verbatim quotes from participants to capture their lived experiences.

Table 2: Themes, Subthemes and Description

Theme	Subtheme	Description
Nurses' Approach to Sepsis Care	- Initial assessment and triage	- Nurses emphasized rapid identification and prioritization of sepsis cases.
	- Administration of life-saving interventions	- Timely initiation of Intravenous fluids, oxygen therapy, and antibiotics was crucial.
	- Monitoring and documentation	- Continuous patient monitoring and record-keeping guided treatment decisions.
Collaborative Efforts in Sepsis Care	- Interdisciplinary teamwork	- Cooperation between nurses, doctors, and laboratory staff was essential.
	- Communication and handover protocols	- Effective information sharing improved continuity of care.
	- Support from hospital administration	- Nurses highlighted the importance of leadership support in addressing challenges.
Strategies for Improving Sepsis Management	- Implementation of standardized protocols	- Establishing clear guidelines would enhance efficiency in care delivery.
	- Strengthening infection prevention measures	- More emphasis on hygiene practices and proper wound care was needed.
	- Continuous professional development	- Regular workshops and refresher courses would keep nurses updated on best practices.

Theme 1: Nurses' Approach to Sepsis Six Care Bundle

This theme aligns with the study objective of assessing ICU nurses' understanding and application of the Sepsis Six Care Bundle in clinical practice. This theme highlighted the ICU nurses' engagement with sepsis six care bundle, specifically focusing on their knowledge, understanding, and application of the Sepsis Six Care Bundle. While nurses actively participated in managing sepsis, many expressed uncertainties about the complete application of the Sepsis Six. Despite this, their dedication to sepsis management and their swift response in clinical settings were clear.

Initial Assessment and Triage

Nurses emphasized the critical importance of early sepsis detection. However, while they understood the signs to look for, including fever and changes in vital signs like blood pressure and temperature, there was some uncertainty about the full application of the Sepsis Six during the initial assessment. Nurses consistently highlighted the importance of swift sepsis identification. Participants explained that:

"Early detection is crucial. We first check for fever, observe wounds, and identify the source of infection." (P5)

"When we suspect sepsis, we act fast because any delay can lead to deterioration." (P1)

"I'm not always sure if I'm following the full Sepsis Six protocol during the first assessment." (P3)

"The challenge is that we're often unsure if we're doing all the steps correctly, but we prioritize the most critical ones." (P8)

"When we have a clear diagnosis, it's easier to follow the Sepsis Six, but in unclear cases, we're more cautious." (P4)

This highlighted the nurses' instinctive response to sepsis while also revealing uncertainty in fully applying the Sepsis Six at the triage stage. Although their approach aligned with clinical practice, there were concerns about whether every element of the Sepsis Six protocol was being followed during

patient assessments. The urgency of early intervention was evident, with clinical parameters guiding the identification of sepsis risk. Vital signs were consistently monitored, yet there was uncertainty about whether this approach fully adhered to the Sepsis Six care bundle. While there was a strong understanding of early detection, integrating the full protocol into initial assessments remained a challenge.

Administration of Life-Saving Interventions

Nurses emphasized the timely administration of interventions such as fluid resuscitation, antibiotics, and oxygen therapy, recognizing their critical role in sepsis management. Despite carrying out these interventions, there was uncertainty about whether they were fully implementing the Sepsis Six care bundle in a structured manner. They explained that:

"Once we confirm sepsis, we immediately start fluid resuscitation and initiate antibiotics based on sensitivity tests." (P5)

"I'm not sure if we are fully following all the Sepsis Six steps when it comes to antibiotics and fluids, but we prioritize these actions anyway." (P8)

"Administering IV fluids early prevents shock, which is why we prioritize it." (P10)

"I know we give fluids, but I don't always think about other Sepsis Six components like blood cultures or the timing of other interventions." (P2)

"We make sure oxygen therapy is provided as needed to support breathing and organ function." (P4)

This highlighted the nurses' commitment to life-saving interventions while revealing uncertainty about their adherence to the complete Sepsis Six protocol. Although their approach prioritized immediate patient needs, there were concerns about whether all components of the bundle were systematically followed. The emphasis on fluid resuscitation, antibiotics, and oxygen therapy demonstrated a strong clinical response to sepsis, yet a lack of structured guidance on the Sepsis Six care bundle created doubt. While nurses played a crucial role in preventing shock and supporting

organ function, their confidence in fully implementing the bundle remained limited.

Monitoring and Documentation

Continuous monitoring and thorough documentation were recognized as essential in managing sepsis patients. However, there was uncertainty about whether documentation practices fully aligned with the Sepsis Six Care Bundle. They explained that:

"We monitor temperature, urine output, and response to antibiotics closely." (P3)

"We focus on temperature and urine output, but I'm not sure if we monitor everything outlined in the Sepsis Six care bundle." (P9)

"Keeping accurate records helps us track progress and adjust treatment accordingly." (P1)

"However, I sometimes wonder if we are documenting everything required by Sepsis Six, or if we miss some important points." (P5)

This highlighted the nurses' commitment to life-saving interventions while revealing uncertainty about their adherence to the complete Sepsis Six protocol. Although their approach prioritized immediate patient needs, there were concerns about whether all components of the bundle were systematically followed. The emphasis on fluid resuscitation, antibiotics, and oxygen therapy demonstrated a strong clinical response to sepsis, yet a lack of structured guidance on the Sepsis Six care bundle created doubt. While nurses played a crucial role in preventing shock and supporting organ function, their confidence in fully implementing the bundle remained limited.

Theme 2: Collaborative Efforts in Sepsis Care

This theme aligned with the objective of exploring interdisciplinary collaboration in implementing the Sepsis Six Care Bundle. This theme explored how ICU nurses at Kabwe Central Hospital experienced collaboration in sepsis care, focusing on interdisciplinary teamwork, communication, handover protocols, and support from hospital administration. While nurses acknowledged that teamwork was essential in sepsis management, they

also expressed challenges in coordination, communication gaps, and varying levels of support from hospital leadership.

Interdisciplinary Teamwork

Nurses emphasized the importance of collaboration among doctors, laboratory staff, and fellow nurses in sepsis management but reported delays and coordination challenges. Nurses emphasized the critical role of collaboration among healthcare professionals, including doctors, laboratory staff, and fellow nurses, in ensuring effective sepsis management. While teamwork facilitated patient care, inconsistencies in coordination and occasional delays in response were reported. They explained that:

"Sepsis management is not a one-person job. We work together with doctors, lab technicians, and other staff to make sure patients get the right treatment on time."p5

"Sometimes, there are delays in getting lab results or orders from doctors, which can slow down treatment."p3

"Doctors may be handling multiple emergencies, so we have to keep following up to get sepsis cases prioritized."p2

"We depend on the lab for blood cultures and other tests, but sometimes there are delays, and we have to start antibiotics before results come back."p9

This highlighted the importance of interdisciplinary teamwork while also revealing challenges in coordination. Although nurses worked closely with doctors and laboratory staff to ensure timely treatment, delays in laboratory results and medical orders created barriers to prompt sepsis management. Differences in priorities among healthcare team members sometimes affected the efficiency of interventions, underscoring the need for a more structured approach to collaboration. Nurses recognized that timely laboratory results were crucial for guiding treatment decisions, and improved coordination between nursing and laboratory teams was necessary to enhance the

effectiveness of sepsis care. While teamwork was valued, a more systematic approach was needed to fully support timely and efficient sepsis interventions.

Communication and Handover Protocols

Effective communication among healthcare professionals was essential in ensuring continuity of care for septic patients. However, inconsistencies in handovers and unclear communication sometimes led to gaps in patient management. They explained that:

"During shift changes, we make sure to update the next team about septic patients, including their vitals, fluids, and antibiotics."p10

"Not everyone provides the same level of detail in handovers, and sometimes we have to go back and check the records ourselves."p8

"There are times when lab results are ready, but we don't get informed on time, so treatment is delayed."p6

"Sometimes, verbal instructions from doctors are not clear, and we have to ask multiple times for clarification."p3

"If we had an electronic system for patient records, it would be easier to track what has been done and what still needs attention."p1

This highlighted the role of effective communication in ensuring seamless patient care while also revealing challenges in handovers and information-sharing. While patient updates were a routine part of shift changes, the level of detail varied, sometimes requiring nurses to verify information independently. Breakdowns in communication occasionally led to treatment delays, particularly when laboratory results were not relayed in a timely manner or when verbal instructions lacked clarity. Some nurses suggested that an electronic patient record system could enhance communication and streamline handovers, ensuring better coordination of care. While effective communication contributed to improved patient outcomes, inconsistencies in handover practices and delays in information-sharing hindered the smooth delivery of sepsis care.

Theme 3: Strategies for Improving Sepsis Management

This theme aligned with the objective of identifying areas for improvement in sepsis management, including standardized protocols and training. This theme explored the strategies ICU nurses at Kabwe Central Hospital identified as essential for improving sepsis Management. The focus was on implementing standardized protocols, strengthening infection prevention measures, and enhancing continuous professional development. While nurses actively participated in sepsis care, some expressed uncertainty regarding the structured implementation of the Sepsis Six Care Bundle, highlighting the need for clearer guidelines, improved infection control practices, and ongoing education.

Implementation of Standardized Protocols

Nurses emphasized that establishing clear, standardized protocols would improve the consistency and efficiency of sepsis management. While they were familiar with general sepsis care principles, some admitted uncertainty about the full details of the Sepsis Six Care Bundle, reinforcing the need for structured hospital guidelines. They explained that:

"We follow general sepsis management steps, but having a written protocol specific to our hospital would help us provide more structured care." P9

"A standardized protocol would help us ensure that we're all on the same page, reducing confusion and delays in treatment." P3

"Clear guidelines would make decision-making quicker, especially when we're under pressure and need to act fast." P7

"Everyone tries their best, but sometimes we do things differently because there's no single guideline, we all follow."p1

"If all departments followed the same protocol, it would make communication with doctors and lab staff easier."p6

This highlighted the importance of standardized hospital policies to enhance decision-making and ensure uniformity in sepsis management. While nurses applied general sepsis care principles, they believed that a structured protocol would improve consistency in patient care. Some nurses noted that variations in practice among staff members led to differences in sepsis management approaches. The absence of a unified guideline meant that individual staff relied on personal experience, which sometimes resulted in inconsistencies. This underscored the need for a hospital-wide standardized protocol to ensure all healthcare providers followed the same approach to sepsis care. Additionally, nurses emphasized that clear protocols would enhance interdisciplinary teamwork. They believed that if all departments adhered to the same structured guidelines, communication and coordination with doctors and laboratory staff would improve, reducing delays in treatment. While nurses at Kabwe Central Hospital understood key aspects of sepsis care, they felt that standardized hospital protocols would strengthen their ability to implement the Sepsis Six Care Bundle effectively. Implementing clear, written guidelines would not only improve consistency in patient care but also enhance collaboration across healthcare teams.

Continuous Professional Development

Nurses highlighted that regular training sessions and refresher courses would improve their confidence and competence in sepsis management. Many acknowledged gaps in their knowledge of the Sepsis Six Care Bundle and emphasized the need for ongoing education. They explained that:

"Most of us learned about the Sepsis Six in school, but we need regular training to reinforce and update our knowledge." P1

"If we had more practical training sessions, like mock sepsis scenarios, we would feel more confident in handling real cases." P10

"Sepsis management keeps evolving, and we need ongoing education to keep up with the latest guidelines and treatments." P2

"Regular workshops would help us stay sharp and ensure we are following the best practices in sepsis care." P6

"I feel more prepared to handle sepsis cases after a hands-on training session, especially when I can practice with real-life scenarios." P4

This indicated that structured workshops and refresher courses would enhance their understanding of sepsis protocols. Continuous education was seen as essential in bridging existing knowledge gaps and ensuring the effective application of the Sepsis Six Care Bundle. Some nurses recommended hands-on training methods, such as simulations, to improve their clinical decision-making skills. They emphasized that interactive learning, including mock sepsis scenarios, would better prepare them for real-life patient care situations. Additionally, nurses recognized the need to stay updated with new developments in sepsis care. They expressed that ongoing education was crucial in keeping pace with evolving guidelines and treatment strategies to ensure the best patient outcomes.

DISCUSSION

The findings of this study indicated that while ICU nurses at Kabwe Central Hospital had a fundamental understanding of sepsis and recognized the urgency of early detection, they remained uncertain about the comprehensive implementation of the Sepsis Six Care Bundle. This uncertainty could stem from multiple factors, one possible explanation was the lack of structured training programs,¹¹ which aligned with study findings by indicating that continuous professional development improved knowledge retention and practical application. Alternatively, systemic barriers such as inadequate staffing, delayed laboratory results, and a lack of institutional support could hinder effective implementation, despite nurses' awareness of best practices. Compared to study findings in well-resourced settings that reported high adherence to the Sepsis Six Bundle.¹³ This study highlighted persistent knowledge gaps and execution challenges among

nurses in low-resource environments, a similar study¹⁴ in African healthcare settings had reported comparable trends, where nurses recognized sepsis indicators but struggle with consistent bundle adherence due to resource constraints. For example, a study in Kenya¹⁵ found that although nurses understood early sepsis management principles, limited access to diagnostic tools and inconsistent training impeded full protocol implementation. These parallels suggested that challenges in low-resource ICUs extended beyond individual competency and were deeply rooted in infrastructural and systemic inefficiencies. Additionally, this study underscored the importance of interdisciplinary collaboration in executing the Sepsis Six Bundle effectively. However, challenges such as delayed laboratory results and inadequate prioritization of sepsis cases hindered timely interventions. These operational inefficiencies aligned with study findings, which identified healthcare team dynamics as being critical in influencing early sepsis recognition and management.¹⁶ The lack of standardized hospital protocols further exacerbated these inconsistencies, reinforcing prior evidence that merely disseminating guidelines was insufficient without structured implementation frameworks. Given these findings, targeted policy interventions could significantly enhance adherence to the Sepsis Six Care Bundle. One potential recommendation was the introduction of mandatory ICU training programs on sepsis management, incorporating simulation-based learning and periodic refresher courses to reinforce best practices. Additionally, implementing standardized hospital protocols tailored to specific resource settings could improve adherence by providing clear guidelines and accountability measures.

The study also highlighted logistical challenges, such as limited diagnostic tools and staffing constraints, that affected sepsis management. The necessity for rapid diagnostic support, particularly point-of-care testing, emerged as a key recommendation by the participants. Delays in appropriate therapy significantly increase sepsis-

related mortality, further emphasizing the need for infrastructural improvements.¹⁷ Enhancing digital record-keeping systems could also aid in tracking adherence to the bundle and identifying areas for improvement, as electronic documentation had been shown to improve compliance with evidence-based intervention.¹⁸ Despite these barriers, ICU nurses in this study affirmed the effectiveness of the Sepsis Six Care Bundle in improving patient outcomes, particularly in preventing deterioration. However, inconsistencies in structured care bundle adherence were noted, which aligned with findings that front-line healthcare workers recognized the importance of early sepsis management but struggled with implementation due to workload pressures and resource limitations.⁵ Addressing these issues through hospital-wide adoption of standardized sepsis protocols and improved communication frameworks could significantly enhance patient outcomes. Furthermore, infection prevention was identified as a critical area for improving sepsis outcomes. Nurses highlighted lapses in hygiene and wound care, echoing findings that inadequate infection control measures significantly contributed to sepsis incidences.¹⁹ This reinforced global recommendations advocating for continuous infection prevention efforts, including regular audits and staff training.²⁰ Additionally, high patient-to-nurse ratios were cited as a significant challenge, impacting the ability to monitor sepsis patients effectively. This finding aligned with findings by Steinmo *et al.*, which established a direct correlation between nurse staffing levels and patient outcomes.¹³ Addressing these workforce constraints through policy-driven staffing solutions could substantially enhance sepsis management and improve patient prognosis in low-resource ICU settings.

The study revealed that implementing the Sepsis Six Care Bundle improved early recognition and management of sepsis, but adherence was affected by workload constraints and resource limitations. Strengthening workflow strategies and providing structured protocols with supportive supervision could optimize sepsis care. In nursing education, integrating the bundle into curricula and using

simulation-based training would enhance nurses' ability to recognize and manage sepsis effectively. Continuous professional development programs could be reinforced to keep nurses updated on best practices. Nursing administration plays a vital role in ensuring adherence by enforcing policies, allocating resources, and conducting routine audits to assess compliance and improve sepsis interventions. Ongoing nursing research would be essential for evaluating the impact of the Sepsis Six Care Bundle on patient outcomes. Future studies should explore the long-term effects of early sepsis interventions, institutional challenges, and best practices across different healthcare settings. Research should also focus on barriers to implementation, including nurses' perspectives on workload, training, and institutional support. Strengthening nursing research in sepsis management would contribute to improved policies, enhanced patient care, and better overall adherence to sepsis guidelines.

STUDY LIMITATIONS

While the study provided the latest data on the actual experiences of nurses with the implementation of the Sepsis Six Care Bundle, it was not without any limitations. The study had several limitations. Firstly, the research was conducted at a single healthcare facility, Kabwe Central Hospital, which limited the generalizability of the results to other settings with different resource levels or care protocols. To enhance the breadth of the findings, future research could explore the experiences of healthcare professionals across multiple hospitals, providing a more comprehensive understanding of the Sepsis Six Care Bundle implementation. Secondly, the study relied on self-reported experiences from participants, which could be subject to recall bias or social desirability bias, potentially affecting the accuracy of the reported data. To address this limitation, future studies could incorporate direct observational methods to gather more objective data on protocol adherence and clinical practice. Additionally, while qualitative research offers in-depth insight, it does not allow for quantifiable measurements of the extent of adherence to the

Sepsis Six Bundle or its impact on patient outcomes.

Future research could adopt a mixed-methods approach, combining qualitative interviews with quantitative metrics to provide a more comprehensive evaluation of the Sepsis Six Care Bundle's effectiveness and adherence rates. Lastly, there is a potential response bias in the willingness of participants to discuss administrative shortcomings or challenges openly. Including a broader sample, such as hospital leadership or administrators, in future research could provide a more holistic view of the factors influencing Sepsis Six Care Bundle implementation, highlighting both clinical and systemic challenges.

CONCLUSION

This study provided valuable insights into nurses' experiences with the implementation of the Sepsis Six Care Bundle at Kabwe Central Hospital, highlighting both successes and challenges. It emphasized the importance of timely interventions, adequate staffing, and resource availability while identifying critical areas for improvement, such as training, communication, and institutional support. A key contribution of this research was its focus on practical realities, moving beyond the assumption that evidence-based guidelines alone ensure successful implementation. By analysing nurses' perspectives, the study uncovered factors influencing adherence, including interdisciplinary collaboration, communication structures, administrative support, and resource constraints. To enhance sepsis management, the study recommends continuous ICU training programs, including simulation-based and refresher courses to strengthen nurses' competency. Policy updates should focus on standardizing sepsis care practices through clear escalation protocols and accountability measures. Quality improvement initiatives, such as real-time feedback systems and ensuring the availability of essential resources like antibiotics and fluids, could also be crucial. These interventions would help create a supportive clinical environment, fostering better adherence to the Sepsis Six Care protocol and improving patient

outcomes. Future research should incorporate mixed-methods studies that would assess both qualitative nurse experiences and quantitative patient outcomes to determine the impact of the Sepsis Six Care Bundle on morbidity and mortality. Additionally, exploring the scalability of sepsis care interventions in similar low-to-middle-income settings would provide valuable insights into cost-effectiveness and sustainability. Further studies should also investigate digital health solutions, such as electronic alerts and decision-support systems, to enhance early sepsis recognition and intervention, ultimately strengthening sepsis care strategies in resource-limited settings.

What is already known on this topic?

- The **Sepsis Six Care Bundle** is a standardized protocol designed to improve sepsis management by ensuring early and effective interventions within the first hour of recognition.
- Nurses play a **crucial role** in the implementation of the Sepsis Six Care Bundle, including timely administration of antibiotics, fluid resuscitation, and patient monitoring.
- Challenges such as **limited resources, staff shortages, and knowledge gaps** could hinder the effective implementation of sepsis protocols in ICU settings.

What this study adds

- This study Provides **insights into the real-world experiences** of ICU nurses in implementing the Sepsis Six Care Bundle at Kabwe Central Hospital.
- The study also identifies **barriers and facilitators** that influence adherence to the protocol, including institutional and individual factors.
- The study Offers **recommendations for improving training, resources, and support systems** to enhance sepsis care and patient outcomes in ICU settings.

ACKNOWLEDGEMENT

May I extend my appreciation to:

1. All the Lecturers at UNZA School of Nursing Sciences.
2. Management and staff of Kabwe Central Hospital for their co-operation during data collection.
3. Strengthening Health Professional Workforce Education Programs for Improved Quality Health Care in Zambia (SHEPIZ).

Competing interest

The authors maintain that their financial and interpersonal connections did not unintentionally influence the development of this article.

Author's contribution

All participants played a crucial role in the successful accomplishment of this project. The ultimate rendition of the text underwent a comprehensive evaluation and obtained the endorsement of all the authors.

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