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INTERNATIONAL PERSPECTIVES IN EMERGENCY, TRAUMA AND CRITICAL CARE NURSING

CENTRE FOR INTERNATIONAL HEALTH PARTNERSHIPS

CCNAZ
Critical Care Nurses Association of Zambia

Contents

Advancing the Specialist Nurse Agenda

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Welcome to the second issue of the International Perspectives in Emergency and Critical Care Nursing Journal. So much has happened in the six months since the inaugural edition in February 2023. Activities have included setting up a student and staff editorial board and an international team of peer reviewers, which will provide strategic direction to the journal and allow for the knowledge and skills of managing a peer review journal to be shared. When we established the journal, our aim was for BCU students to share knowledge and expertise to inform patient care and celebrate emergency and critical care nursing practice within the region. This issue has three sections:

- Research assignments from the first cohort of Bachelor of Science students to graduate in Zambia.
- An example of a quality improvement project from our Nursing Now Challenge Fellows.
- Sharing of best practice:
    - First ever Critical Care Nursing Conference organised by the Critical Care Nurses Association of Zambia (CCNAZ).
    - Representation and presentation at the British Association of Critical Care Nurses conference.

It is evident from all the authors and contributors the passion and enthusiasm for specialist practice in Zambia and the desire to advance best practice that informs high-quality nursing care. We are constantly amazed at when faced with barriers, professional dilemmas and adversities, emergency, trauma, and critical care nurses still come through and continue to deliver high quality care. We hope this issue, inspires, and energises readers to consider how to develop, enhance and innovate emergency, trauma, and critical care nursing practice.

Recognising and Releasing the Potential of Specialist Nurses

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Nurses comprise the largest part of the clinical workforce caring for patients 24 hours a day, seven days a week and 52 weeks a year, with a scope of practice ranging from providing fundamental aspects of care to making life saving clinical decisions. The importance of the qualified nursing workforce is well recognised in reducing patient mortality and morbidity; however, this concept is not acknowledged worldwide. To help address this and to improve population health, the World Health Organisation developed Global Standards for Nursing 2016-2020 to establish educational criteria where outcomes are based on evidence and competency, the promotion of lifelong learning and promoting positive health outcomes for populations.

This work and the development of nurses worldwide is supported by the World Health Organisation, International Council of Nurses, Florence Nightingale Foundation, and many more organisations who have worked collaboratively to improve healthcare by raising the profile of nurses internationally. There needs to be an ongoing campaign for greater investment in education and training, improvements in the dissemination of effective and innovative practice. We also need to aim to help nurses gain greater influence on national and global health policies, decision making groups and for more nurses to be in leadership positions, with the author to make decisions and implement change.

There is still a need to strengthen the profile of nurses worldwide as essential members of the healthcare workforce. However, we have to accept that for this we need recognition by other healthcare professionals. Only when this happens can nurses fully achieve their potential and embrace their contribution as competent practitioners leading and delivering high quality, evidence-based care for patients. The development of the specialist nursing workforce in Zambia is an example of how this work is coming to fruition. You are being supported to undertake the necessary education and training to enable you to become competent practitioners providing high quality, evidence-based care within a resource limited setting. You will play a key role in continuing to develop the emergency, trauma and critical care workforce in Zambia making a difference to patients and their families whilst raising the profile of nurses as an equal member of the multi-professional team. Birmingham City University are proud to be supporting this initiative and the outcomes that you, our students, have and will continue to achieve.

How can nurse compliance be increased in positioning mechanically ventilated patients 30º to 45º head up as part of the VAP bundle in the main ICU in Zambia?

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Abstract
Background: There is now increasing literature defining the appropriate positioning of 30° to 45°, as one of the core strategies in the prevention of Ventilator Associated Pneumonia (VAP) in Mechanically Ventilated patients in Intensive Care Unit (ICU). Nurses therefore have a crucial role in the achievement of the recommended position as their shifts span the patient total care period.
Aim: The aim of this critical review is to identify how can nurse compliance be increased in positioning mechanically ventilated patients 30º to 45º head up as part of the VAP bundle in the main ICU in Zambia?
Methods: Sources of evidence were accessed by conducting a computerised literature search using CINAHL, Medline and PubMed. These data bases were chosen because they are appropriate for nursing, allied health care, medical and health professionals.
Results: 3 articles met the inclusion criteria and were used in this critical review. Key themes included the requirement to use interventions and resources not readily available in low-income countries. All articles recognised the importance of critical care nurses in the prevention of VAP due to their unique role in the delivery of patient care.
Conclusion: ICU nurses with their vital role in the prevention of VAP must take responsibility for implementation of bundles to prevent VAP. It is crucial that they comply with the recommendations on positioning of Mechanically Ventilated patients with the head end elevated at 45° as this ultimately reduces health care costs.

Key words: *Care Bundle, Evidence Based Practice, Head of bed elevation, Ventilator Associated Pneumonia.*

This article critically discusses the positioning of mechanically ventilated (MV) patients. Appropriate positioning of 30° to 45° has been identified as one of the core strategies in the prevention of Ventilator Associated Pneumonia (VAP) in Intensive Care Unit (ICU) (Zhuo et al., 2021). Critical Care Nurses therefore have a crucial role in the achievement of the recommended position as their shifts span the patient total care period (Güner & Kutlutürkan, 2022). For their practice to be effective and for ICUs to achieve low rates of VAP, the consistency of positioning patients is paramount. Patients who are unable to position themselves are dependent on the expertise of the nurses for correct positioning. Observations of practice in one ICU led to a growing concern over the low level of compliance with patient positioning in the ICU. The lack of consistency in compliance meant that on every shift, beds needed to be re-set, therefore, changes in practice to redress are essential.

There is a wealth of literature affirming that MV patients are at risk of acquiring healthcare acquired infections (HAI), with VAP being one of the most commonly found HAIs in ventilated critically ill patients (Al-Sayaghi, 2021, Zhuo et al., 2021 and Saajida et al., 2017). VAP is defined as a nosocomial pneumonia in ventilated patients that develops more than 48 hours after initiation of mechanical ventilation (Zhuo et al., 2021). It is usually characterized by new or progressive infiltrate, fever, altered white blood cell count, and purulent tracheobronchial secretions (Bankanie et al., 2021). The presence of an endotracheal tube (ETT) is one of the main risk factors for developing VAP because it interferes with the normal protective upper airway reflexes, irritates the respiratory mucosa, increases the amount of mucus and promotes micro aspiration of contaminated oropharyngeal secretions (Bankanie et al., 2021).

To prevent VAP, an internationally recognised set of evidence-based strategies, the VAP care bundle has been put in place (Zhuo et al., 2021). This has core measures which include elevation of the head end of the bed above 30°, deep vein thrombosis prophylaxis, peptic ulcer prophylaxis, managing sedation effectively (including a daily sedation hold as appropriate), oral care with chlorhexidine, and subglottic aspiration of the ETT (Agagah.

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et. al 2022). Both Coppadoro et al (2019), and Shahnaz et al (2018) supported the implementation of the VAP bundle, strongly recommended that patients who are MV be nursed with the head end of the bed elevated above 30°, as this is one of the most important preventive measures.

Positioning of patients is only effective when the guidelines are consistently followed by all nurses in the ICU, however, an initial literature search revealed that the observations made from practice in an ICU in Zambia matched international findings. These report that compliance regarding implementation of the VAP bundle by nurses in the ICU is variable, particularly in Low-income Countries (LICs) (Bankanie et al., 2021). Banakanie et al (2021) further discussed examples of reviews of practice which scored less than 95% compliance (the recommended level), arguing an urgent need to address the issue of poor compliance. Further search yielded no research articles based in Zambia, nor was there any documented evidence on the rate of VAP and compliance to VAP guidelines. For effective evidence-based practice the best possible evidence needs to be used, and in consequence the limited available literature was used to refine the question to be addressed in practice. For this, the Population, Intervention, Comparison and Outcome (PICO) tool was used (table 1).

Table 1: PICO			
Population	**Intervention**	**Comparison**	**Outcome**
ICU Nurses at a Tertiary Hospital in a LIC	Compliance in Positioning Mechanically ventilated patients above 30° head up. (Güner & Kutlutürkan, 2022, Al Sayaghi 2020)	Positioning patients less than 30° (Pozuelo-Carrascosa et al., 2022, Zhuo et al, 2021)	Mechanically Ventilated Patients in ICU will be nursed with the head end of bed elevated above 30°.

Using PICO, the research question developed into:

> How can nurse compliance be increased in positioning mechanically ventilated patients 30º to 45º head up as part of the VAP bundle in the main ICU in Zambia?

To check the research question and identify an approach to address it, a second, focused review was undertaken. Sources of evidence were accessed by conducting a computerised literature search using CINAHL, Medline and PubMed. These data bases were chosen because they are appropriate for nursing, allied health care, medical and health professionals. A preliminary search was conducted in Google scholar to assess for the type of literature available concerning compliance of ICU nurses in positioning mechanically ventilated patients above 30° to 45°. This helped with coming up with the key words for searching in the above mentioned data bases. Primary research was targeted as this is high level evidence. Systematic Reviews, Randomised Controlled trials and cohort studies were targeted. Key search words used included: Elevation of Head end of bed, Body position, VAP bundle, Ventilator associated Pneumonia, Mechanical ventilation, intensive care, compliance, evidence-based practice and evidence-based guidelines. Boolean operators such as and, with and or were used to connect the terms. All searches were limited to study articles between 2017 to present.

Box 1: Results of the literature search
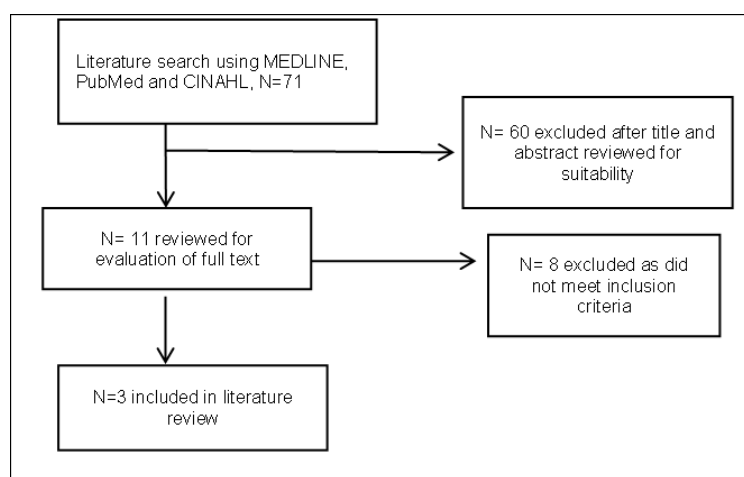
Articles were assessed by title, abstract and full text. Those that did not meet the inclusion criteria after the title and reading the abstract were excluded. The reference lists of retrieved articles were examined as potential sources. Data was extracted by sample and setting, study design, methodological quality, and reported outcomes. Inclusion criteria included peer reviewed articles written in English and focused on adult ICU, studies that included ICU nurses' compliance to VAP guidelines, compliance of positioning in Mechanically Ventilated patients. Exclusion criteria included populations of children, articles not in English or research not primarily related to ICU patients or VAP and dated later than the year 2017.This process of inclusion and exclusion can be seen in box 1.

From the final set of articles, two were systematic reviews and one a randomised controlled trial. However, the critical appraisal using CASP revealed that as table 2 below indicates, each one gave relevant information, but with some key points not addressed. In addition, one study was from a HIC and was therefore based on different parameters, with interventions and resources not readily available in LICs. The other two studies were from LMIC and while this did offer some comparative findings, it too did not address all the points needed.

The importance of correct positioning has been increasingly recognised, with international organisations consistently recommending the positioning of mechanically ventilated patients with the head end of the bed elevated to above 30° (Zhuo et al., 2021). Keeping the head end at above 30° is a no cost non-pharmacological intervention that nurses can independently implement (Güner & Kutlutürkan., 2022). Nevertheless, it is only in the last five years that   research studies have focused on positioning alone. Prior to this, studies tended to focus on the bundle as a whole, with positioning mentioned as one component (Mehdi & Claude., 2018). Currently, from the available research found, no clear consensus on the actual degree of elevation emerged, although the VAP guidelines state it needs to be between 30° and 45° (Nj et al., 2028). Güner & Kutlutürkan (2022) demonstrated in their randomised controlled trial (RCT) that positioning of mechanically ventilated patients above 30° reduces the risk of VAP, with a significant improvement in VAP rates when positioned at 45° compared to lower head end elevation. However, their study did not consider the supine, prone or Trendelenburg positions on the role they play in VAP prevention. Zhuo at al (2021), while agreeing with higher head end elevation, go on to argue that this position increases the risk of developing pressure sores in the sacral region, due to the higher head elevation exerting pressure on the sacrum. This finding was accepted by Pozuelo-Carrascosa et al., (2022) who then recommended further research to be conducted to avoid this complication. However, their research focuses on HICs that can offer solutions using resources not available in LICs, and all suggestions would need translating to resource limited settings.

Similarly, to address the complications that come with head end elevation, Güner & Kutlutürkan (2022) illustrated the benefits of use of electronic beds that elevate the leg end at the same time as the head end is being elevated. This relieves pressure in the sacrum and prevents pressure sore formation, but these beds are unlikely to be available in most hospitals in LICs. In their RCT, the beds had electronic controls that altered bed setting to appropriately position the patient. This is much more accurate than the use of a physically adjusted backrest which has few specific positions (Thomas, 2019). In LICs, this can be challenging as the lack of electronic bed aids means nurses have to either guess or use an independent protractor to try to define an appropriate position. The lack of adequate equipment which makes the necessary compliance with recommendations for head elevation much more difficult to achieve, has been identified as contributing to high VAP rates in LICs, (John et al.; 2021; Al-Sayaghi, 2021; Bankanie et al., 2021). Additionally, electronic beds reduce the risk of shear injuries when moving patients, with some moves possible with only one nurse. In LICs where the nurse patient ratio is much higher in ICUs, this would be a considerable bonus, but currently, safely moving patients remains a challenge for LICs such as Zambia.
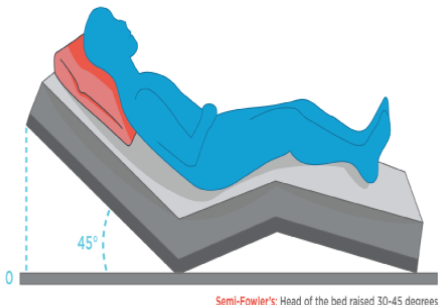
It is also crucial to note that in clinical practice, not all patients can be positioned at 30° to 45° as for some conditions this position is contraindicated, for example patients with spinal injuries and poly trauma (Coppadoro et al.,2019). Then too, diseases such as acute respiratory distress syndrome (ARDS) are gaining benefit from the prone position, but currently there is much less available research regarding the prone position and VAP (Pozuelo-Carrascosa et al., 2022, Mehdi & Claude, 2018). The benefits of the prone position gained attention as a result of the COVID 19 pandemic as research proved its effectiveness for this group. The positive outcomes in COVID 19 have led to the strengthening of guidelines and protocols for positioning patients with ARDS in the prone position. However, the initial research into these new guidelines did not show significant reduction of VAP compared to the Semi–recumbent position (Pozuelo-Carrascosa et al., 2022).

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Table 2 CASP

Study Title Author and year	Validity of study Results	What are the Results	Will the Results Help Locally
Role of Head of Bed elevation in preventing Ventilator associated Pneumonia, bed elevation and Pneumonia (Güner & Kutlutürkan, 2022)	• Results were clear. • The study had a clear focus. • Approved by Ethical Committee • Blinded Randomisation • Patients were allocated to 3 arms, <30°, 30° and 45° • All patients were accounted for.	• VAP occurred in 55%, 25%, and 20% of patients in the HOB elevation to <30°, 30°, and 45° study arms, respectively. • The frequency of VAP was significantly lower in the 45° compared with the <30° study arm (P = .022); there were no significant differences between the <30° and 30° as well as the 45° and 30° study groups. • Unlike the frequency of VAP, the timing of the VAP (early or late) was not dependent on the degree of HOB elevation. (P = .703).	• Results will help locally. • Study was conducted in LMIC country, Turkey. • The study was conducted in similar environment with nurse patient Ratio of 1:2, 1:3 with electronic beds. • Keeping the Head end elevated at 45° is a no cost intervention. • Nurses can independently implement to reduce risk of VAP. • Gaps – authors did not look at nurses' compliance levels. • No alternative measures to electronic beds suggested
Body positioning for preventing ventilator associated Pneumonia for critically ill patients: a systematic review and meta-analysis (Pozuelo-Carrascosa et al., 2022)	• The Review addressed a clearly focused question. • Results were clear • Authors looked for the Right Papers (RCTs) • Authors did enough to assess the quality of the included studies.	• Semi-recumbent and prone positions showed a risk reduction of VAP incidence (RR: 0.38, 95% CI: 0.25–0.52) and mortality (RR: 0.70, 95% CI: 0.50–0.91), respectively, compared to the supine position. • The semi-recumbent position showed to be the best to reduce the incidence of VAP (71.4%), the hospital length of stay (68.9%), and the duration of MV (67.6%); • The prone position decreases mortality (89.3%) and reduces ICU length of stay (59.3%).	• Results could help locally. • Study conducted in HIC. • Additional trials were recommended trials to be conducted to confirm the best angle for head elevation to reduce VAP incidence. • GAPS- Compliance was not addressed in the article. • Caution was recommended with regard to the benefit of semi recumbent position. • Further study needed to further review impact of prone position on VAP not just mortality and recovery time. • Research needed on increased risk of pressure ulcers.
"A Systematic Review on Compliance with VAP Bundle and The Reasons for Non-Compliance with VAP Bundle Among the Staff Nurse's Working In ICU" (John et al., 2021)	• The Review addressed a clearly focused question. • The review only had Descriptive studies from HIC. • The Review did not show rigour in quality of the studies included.	• The findings from this review support that nurses in the 6 studies out of 10 had a compliance rate higher than 50% with the VAP bundle and implementation of several teaching strategies can improve the practices and bring down the VAP rates in ICUs.	• Results may Help locally. • Study conducted in LMIC. • The low compliance rates of VAP are similar to those in LIC • Recommended interventions can be replicated locally. • The review looked at compliance of the VAP bundle as a whole. • GAP – the compliant rate to VAP was not specific. • Positioning of patients was not specific to the actual degree level.

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It has been increasingly recognised that ICU nurses play a vital role in the prevention of VAP as they are the backbone of any ICU (Al-Sayaghi, 2021; Güner & Kutlutürkan, 2022). They are always in contact with the patient and have the responsibility for implementation of bundles to prevent VAP, but in order to achieve VAP rate reduction, a compliance rate of ≥95% need to be achieved in the unit (Nj et al., 2018). Guidelines and protocols for prevention of VAP are available for use in the ICU, however, many of those found have been specifically designed for use in HICs. As Al-Sayaghi, (2021) argues, the presence of guidelines and protocols does not translate to implementation and a gap still exists between the current and ideal practice. After a refined search, very little literature for the protocols or guidelines for positioning mechanically ventilated patients in the Semi-Recumbent position were found.

To address the developed question, the lack of available research was such that it had to be accepted that for consistency there needs to be a group of specialist staff who could lead the necessary changes in practice, while maintaining consistency across all shifts. The first step therefore had to be a train the trainer approach through which a core of key specialist Critical Care Nurses (CCNs) could be trained to cascade the relevant information to their peers and junior colleagues. For this to be effective a set of training materials need to be developed, and the table below gives an essential document, a proposed guide for positioning of mechanically ventilated patients in the ICU that can be used with the equipment found in a LIC. For example, in table 3 an external protractor can be used as beds are unlikely to have built in aids to measure the angle. This guide could be reproduced in a format that could be used as either a pocket guide or a poster for wider access.

Table 3 Positioning Mechanically Ventilated patient in Semi-Recumbent		
Mechanically ventilated patient	Semi Recumbent	Contraindications
	- After Intubation, assess patient for eligibility of positioning. - Electronic beds – elevate the head end up to 45° angle with Knees elevated 10°. - Use a Protractor to measure the Correct angle for non-Electronic beds	- Patients with Spinal Injuries - Patients with Poly Trauma - Haemodynamically unstable Patients - Femoral arterial lines - Recent Abdominal and thoracic surgery (Soetanto et at., 2022, Bambi & Elli, 2018 Dakshinamoorthy, S. 2018)

Involving nursing staff in the unit from the beginning of implementation increases ownership and reduces resistance to change (Galli et al., 2018). The planning step provides an opportunity to identify barriers to compliance with positioning of patients. The barriers to compliance identified in literature can be addressed during the train the trainer. These barriers include lack of knowledge about VAP, lack of proper equipment, ambiguous guidelines, high nurse to patient ratio and nurses forgetting to place the patient back in the appropriate position after performing nursing activities (John et al., 2021, Bankanie et al., 2021, Al-Sayaghi, 2021, Thomas, 2019).

It is essential that nurses at the bedside recognise that mechanically ventilated patients are at risk of acquiring HAI. They also need to know the strategies to prevent VAP, one of the most common HAIs seen in the ventilated critically ill globally and particularly in LICs. ICU nurses with their vital role in the prevention of VAP must take responsibility for implementation of bundles to prevent VAP. It is crucial that they comply with the recommendations on positioning of Mechanically Ventilated patients with the head end elevated at 45°. They need to actively work to reduce VAP rates in ICUs and to accept that with increased compliance by ICU nurses ultimately also reduces health care costs.

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Implementing Oral Care Guidelines to Improve Oral Hygiene for Mechanically Ventilated Patients in the Adult Intensive Care Units

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Abstract

Background: Mechanically ventilated patients in the intensive care unit are at high risk of developing nosocomial infections such as ventilator associated pneumonia (VAP). Oral care practices are essential in the reduction of microorganisms in the oral cavity. This article reviews how critical care nurses can implement oral care guidelines to improve oral hygiene for mechanically ventilated adults in the intensive care unit.

Aim: The aim of this critical review of the literature was to identify how critical care nurses in intensive care units (ICU) in Zambia can improve oral care in mechanically ventilated patients?

Methods: A literature search was conducted using articles published between 2018-2022 from CINAHL and MEDLINE. The inclusion criteria comprised of all articles in English, adult patients 18 years and more, systematic studies, and randomised controlled trials.

Results: Three articles met the inclusion criteria and were critically reviewed. Themes included knowledge and skill of critical care nurses, recognition of the importance of oral care, use of validated tools and oral care techniques.

Conclusion: Oral care practices reduces the incidence of health acquired infections the mechanically ventilated patients in the ICU and need to be implemented as part of routine critical care nursing practice.

Key words: critical care, *mechanical ventilation, oral care, ventilator associated pneumonia*

Oral care is a fundamental aspect of patient care, particularly for mechanically ventilated patients which is often undervalued (Khasanah, Sae-Sia & Damkliong, 2019). Observations from clinical practice in a referral hospital in Zambia support this view, with an audit of patient records and practice found little documentation of oral care being given, and poor oral hygiene (He et al., 2021). This situation is not unique to Zambia, as Munro et al (2018) point out, it is an international issue. Critical Care Nurses need to recognise the importance of high quality, effective oral care in critically ill patients. This decreases microbial colonization in the oropharynx and reduces dental plaque, both of which have been found to contribute to the development of healthcare acquired infections (HAIs) (Munro et al., 2018). As Munro et al (2018) go on to argue that it contributes to approximately 10%-28% of ventilated patients acquiring ventilator associated pneumonia (VAP), a common, serious HAI in critical care patients. It is therefore essential that critical care nurses use every preventive method possible, with oral care being a key strategy.

Aims:

The aim of this critical review of the literature was to identify how critical care nurses in intensive care units (ICU) in Zambia could improve oral care in mechanically ventilated patients?

Methods

To research the subject area, and through that develop and finalise the question for this study, a literature search was completed based on key themes from within the subject area. The themes were focused down into key words including oral care, mechanical ventilation, patients, guidelines, critical care HAIs. The literature was accessed through the electronic databases using CINAHL and MEDLINE, with studies looking at oral care guidelines included provided they were published between 2018-2022.

The inclusion criteria comprised of systematic studies, randomised controlled trials, cohort studies, adult patients ($\geq$18 years), admitted in ICU and mechanically ventilated. Exclusion criteria were non ventilated patient, patients under 18 years and studies not written in English.

Results

Initially a total of 181 studies were identified, however, after screening only 3 articles met the inclusion criteria and were used in this review. The information in the articles was critically appraised and analysed for relevance. The results of the search and reasons for inclusion are shown in figure 1. As three studies had been identified as having relevant information on population, intervention, comparisons, inclusion, and exclusion criteria as well as the study design. The decision was made to include all three. This enhanced appraisal revealed that each

one was based upon different guidelines for oral care interventions for mechanically ventilated patients, compounding the challenge of developing good oral care guidelines.

Figure 1: Showing three of the studies that did contain detailed information/ findings regarding oral care guidelines in mechanically ventilated patients.

Authors	(Özdemir and Türk, 2022)	(Kord et al.,2020)	(Haghighat,2022)
Study	Randomized controlled double blinded experimental	Single blinded trial	Randomised clinical trials
Study settings	Intensive care unit	Intensive care unit	Intensive care unit
Population	116 intubated and mechanically ventilated ICU patients (pts) and size	90 intubated and mechanically ventilated (MV) ICU patients	60 mechanically ventilated adult patients admitted in ICU
Inclusion criteria	Adult patients admitted to ICU within the study dates was conducted who were mechanically ventilated for 24hrs and remained intubated for 4 days	Adult pts 18-65yrs, 48hrs post intubation, no severe facial and oral injuries, on chronic disease, no movable dentures, normal coagulation status and no pregnancy	Pts had teeth, no inflammation of the mucosa, or severe trauma, no coagulation disorder, a maximum of 24hrs post intubation
Exclusion criteria	Pts who had any kind of intraoral surgery or who had thrombocytopenia, leucopoenia, mouth ulcer, gingivitis, stomatitis, and candidiasis	Preforming a tracheostomy procedure during the study, sensitive to chlorhexidine, patient death and guardian's unwillingness to continue in the study	Pts diagnosed with pneumonia within 48hrs, pts with pre-intervention extubating and tracheostomy
Intervention	To compare the effects of different concentrations chlorhexidine solutions on microbial colonization	To compare the effects of a comprehensive oral care programme & a combined toothbrush & mouth wash programme with chlorhexidine 0.2% oral health in MV	To compare and evaluate the effect of 3 oral care protocols on the incidence of ventilator association pneumonia
Comparison	Patients were divided in 4 groups: group using 1%,2%,0.2% and 0.12% chlorhexidine solutions	Comprehensive oral care programme (Group A), combined toothbrush & mouth wash programme with chlorhexidine (Group B), with control group (Group C) who remained on usual care	Pts were divided into 3 groups:(group 1) a 7-day oral care using swabs (group2) toothbrushing twice daily, (group3) four-times daily brushing using chlorhexidine
Outcome	Study showed that in the intervention groups there was a statistically significant difference in oral mucus membrane integrity in pts using 1% chlorhexidine gluconate oral solution (p<0.001) compared to other groups	Study showed the mean oral health score in 3 groups was not significantly different before the intervention. However, on the second day of the study (p>0.05), the third- & fifth-day oral health scores in the 2 intervention groups showed significant improvement in the oral health (p=0.01) compared to the control group	The incidence of pneumonia on the fourth day of intervention in group 1 35.00% was significantly higher than that of the other two intervention groups (10.00%) (p=0.03)

Detailed Review

The WHO (2021) guidelines and recommendations for oral care have been developed for integration into nursing care plans for improving oral health. In critical care the importance of oral care is also linked to the prevention of VAP, while maintaining and promoting oral health and comfort. The 3 studies identified were reviewed in depth. The first study by Özdemir and Türk,(2022) focused on comparing the effects of different concentrations of chlorhexidine gluconate solutions (1%, 2%, 0.2% and 0.12% respectively). According to their study, the 1% chlorhexidine gluconate solution was found to be more effective in the maintenance of the oral mucosa than the other groups. The study by Kord et al., (2021) compared the effects of a comprehensive oral care guideline with an approach which utilised a combination of toothbrush and a mouthwash containing chlorhexidine 0.12% with a routine mouthwash of chlorhexidine 0.12% in the maintenance of oral health. The comprehensive oral care guidelines showed a positive effect on the oral health of the mechanically ventilated patients when compared with the other two interventions. In the third study selected, Haghighat, Mahjobipoor and Gavanti (2022) compared and evaluated the effect of three different oral care protocols, these ranged from once daily to four-times daily, with each using a different approach. The incidence of VAP was then compared across the groups. The four-time daily oral care intervention was found to reduce the risk of VAP more than the other two.

The study by Kord et al., (2020) was chosen for review because it contained appropriate evidence-based information for critical appraisal and analysis. The interventions discussed in the study were relevant for the research question. The results regarding comprehensive oral care programmes showed positive effects in improving the oral health status of patients. Their intervention was performed three times daily for 5 days with key steps being consistently followed. Therefore, if this intervention was to be adopted and implemented in critical care, nurses could change and improve the current interventions observed in clinical practice. Further, the study by Causey et al., (2022) also included oral care assessment using the Modified Becky Oral Care Assessment Tool (MBOAS) which was carried out once before the interventions commenced. Initial study of Kord et al's (2020) review suggested that if adapted for the Zambian health system and limited resource, this combination could be used to change the current oral care practices in Zambian hospitals.

Discussion

It was important to consider the outcomes of this critical review with another research in this field. For example, Nascimento et al (2018) reported that when a consensus committee of the critical care nursing experts met, they identified, evaluated, and prioritized the existing oral care practices. Practices where the frequency, assessment strategy, clinical practice solutions, and techniques used in oral care protocols for mechanically ventilated (MV) patients were standardised, findings were similar to those of Kord et al., (2020) and resulted in improved oral health in MV patients. The adoption and implementation of such evidence-based guidelines by the ICU nurses in Zambia would therefore be expected to improve oral care practices in mechanically ventilated patients. However, according to Nascimento et al., (2018), while the consensus committee did agree that many oral care assessment tools exist, they also acknowledged that most have not yet been validated. Therefore, selection of oral assessment tools or guidelines needs to be locally approved and/or adopted with all ICU nurses trained on their implementation in practice. The challenge is that as recognised by Jong's, (2020) study, despite the rhetoric regarding endorsement of oral care guidelines, there remain inconsistent recommendations in the literature, making it difficult to determine the most effective oral care interventions for intubated MV patients in any given setting.

Winning et al (2021) focused on specific interventions rather than developing guidelines, following Munro et al's (2018) review which stated that, optimal frequency of tooth-brushing with chlorhexidine 0.1% or 0.2% using a smooth paediatric toothbrush for effective removal of dental plaque was two or three times daily. It also reduces oral inflammation, improves patients' comfort, and reduces VAP. Winning et al (2021) go on to point out that a combination of tooth-brushing with other antiseptics such as povidone 0.1%, Listerine as well as non-antiseptics sodium bicarbonate and saline showed efficacy in preventing dental plaque and periodontal disease. Al-Zuru et al., (2020) also recommended the use of named solutions, such as chlorhexidine, sodium bicarbonate, normal saline cleaning solution but differs from the others in that it suggests that a paediatric, rather than adult, toothbrush is the most effective tool for dental plaque removal. However, nurses need to be aware that care needs to be taken with using toothbrushes, as while it has the benefit of removing biofilms, it has been suggested if not performed correctly, it could dislodge bacteria from dental plaque into the lungs increasing the incidence of VAP (Jong,2020; Silva et al., (2021). Other studies, such as that by Haghighat, Mahjobipoor and Gavanti, (2022) point out the need to adding other strategies such as moisturising the mouth and lips, to maintain the integrity and moisture of tissue lips and gums.

A challenge with oral hygiene is that most oral care interventions are performed post intubation, ignoring the fact that, bacteria colonisation can begin before, or even during intubation (Shen et al., 2020). Thus, it is imperative for critical care nurses to commence oral care practices prior to intubation improve the oral health status of the patient and reduce the incidence of HAIs such as VAP (Takahama et al., 2021). However, it has to be recognised that this may not be feasible due to the patient's clinical condition.

One of the challenges for oral care in Zambia, is that there are no standardised guidelines or procedures and no suggestion of the need to commence full oral care on admission, not after intubation, in the ICU. Zambia is no different to other nations, with Labeou, Conoscenti and Blot (2021) reporting that they to found no clear guidelines or procedures for ICU nurses to adhere to, instead care delivered was dependent upon the nurses' preferences for oral care. Additionally, Madvu et al., (2022) pointed out that even where ICU nurses have the knowledge on what constitutes good oral care or preventive measures of VAP, inadequate staffing was deemed a major barrier to implementation. In their study, nurses openly stated that their high workload, meant they had to prioritize immediate life-saving interventions over other evidence-based practices. This approach exposed patients to the risk of MV complications and failed to acknowledge the increased mortality that occurs with VAP (Garegnani et al., 2022). Wolfersberger, (2018) and Madvu, (2022) identify other barriers to implementation of the evidence-based practices including lack of knowledge on the importance of oral hygiene in MV patients, limited availability of equipment, attitudes to oral care, and culture of the ICU. Recognising these factors Madvu

et al., (2020) point out that some experienced ICU nurses inclined to continue to use outdated interventions for oral care despite of the availability of current evidence- based practices.

Reviewing the literature it is evident that critical care nurses in Zambia need to accept the challenges and complications of poor oral hygiene if they are to work to improve oral care practices in MV patients. They need to follow evidence-based guidelines, and where none are in place seek to develop them, determining from the literature which are the most appropriate for their own setting. There needs to be a move to develop continuing professional development, which includes identifying nurses willing to become champions for oral care. Educating these champions needs to include change management strategies (Knudsen's., et al., 2018), if they are to lead innovation and change in practice. This is supported by Al-Bdairy and Hasan, (2021) who pointed out that nurses who held a bachelor's degree in nursing, demonstrated more knowledge of the importance of and evidence for oral care than diploma level nurses. This fits with Thapa and Shestha, (2019) and Aloush and Rawaifa's (2020) studies which found that nurses who had undertaken bachelor's level study had a positive impact on the improvement of nursing staff's knowledge of the need for, and techniques to use for oral care of MV patients and reduced VAP. As Khasanah et al., (2019) argue, up to date evidence-based knowledge is imperative in maintaining adherence to evidence-based guidelines on oral care for intubated patients.

Recommendations
To successfully address the research question it is suggested there needs to be recognition in all ICUs that oral care is an integral, and essential element of the care provided for MV patients. In the light of the evidence should be specifically designed and implemented programmes for all nurses working with MV patients. These should be led by designated nurses with specialist practice education, preferably at bachelors' level or above. In Zambia, where there are both and advanced diploma and bachelors critical care education programmes, recent assessment of course documents there is no detailed guidance or tool for oral care in MV patients. It is therefore recommended that their curricula should include a specific course on oral care which includes strategies for teaching oral care at different education levels.

It is also recommended that in the ICU's, a team be convened, and a quality improvement project (QIP) be developed based on Kord et al study (2020). This needs to consider how oral care practice could be modified for implementation in Zambia's health care system. The QIP should illustrate the strengths and limitations of this approach, enabling the team to revise and adapt it to develop their own ICU specific guidelines for oral care for MV patients, thereby improving patient care and nursing outcomes. Once formulated these local guidelines should be incorporated into the training manuals for both advanced diploma and bachelors critical care manuals. This follows Aloush and Rawaifa's (2020) study which points out that updating nursing curriculum has been identified as a starting point for improving nurse's compliance in using evidence based oral care practice.

In conclusion, the next steps need to be negotiation with both management and education leaders to address the current limited education and practice in this field, through the design and implementation of QIPs as suggested above. This will alert the institution to the current problems with oral care, offering an evidence-based approach to urgently develop their own defined local guidelines or protocols for oral care practices in the mechanically ventilated patients.

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Early Recognition of Sepsis in Critically Ill Patients in the Critical Care Unit (CCU) Zambia

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Abstract
Background: Sepsis is a global health problem, and one of the most common complications for critically ill patients and is associated with significant morbidity and mortality particularly in Low and Low-Middle Income Countries. Sepsis Screening Tools (SST), specifically those that aid early recognition of sepsis as time is critical.
Aim: To assess the accuracy and timeliness of diagnostic procedures for recognising sepsis in Critical Care Unit (CCU) in a low-income country.
Methods: A critical review of the literature was conducted by using CINAHL Ultimate and Medline. An inclusion and exclusion criteria were used to guide the search. A total of 15 articles were included in this review.
Results: There are no available tools for sepsis recognition and nurses have inadequate knowledge on sepsis recognition. All published studies were conducted in high income countries.
Conclusion: Early recognition of sepsis remains a global cause for concern. Incorporating SST into clinical practice improves recognition and treatment. qSOFA was identified a simple bedside nurse driven SST has been considered suitable and reliable for adaptation especially for financially constrained countries like Zambia. There is urgent need for further research in this area of practice in Zambia.

Key words: Sepsis, Sepsis Screening Tools, qSOFA

Sepsis is a life-threatening organ dysfunction caused by an exaggerated host response to an infection resulting in inflammatory response; vasodilation, coagulopathy and multi organ failure (World Health Organization [WHO], 2020). Identifying sepsis, administering treatment, and assessing response, limiting sequelae, and supporting patients and families are all nursing roles in sepsis care. (Bleakley and Cole, 2020) Evidence based Sepsis Screening Tools (SST), specifically those that aid early recognition of sepsis is vital for critical care nurses to efficiently execute their nursing duties (Rababa, 2022), however, there is no accepted SST in practice in Zambia. Therefore, the focus of this article is on the importance of early recognition of sepsis in critically ill patients.

Sepsis is a global health problem, and one of the most common complications for critically ill patients and is associated with significant morbidity and mortality particularly in Low and Low-Middle Income Countries (LIC/LMIC) (Keeley et al., 2021). Approximately, 8.9 million cases of sepsis and 11 million sepsis related deaths were documented in 2017 (WHO, 2020). The global mortality rate is about 30 million deaths per year (Christa et al., 2021) and LMIC/LICs this accounted for 84.8% sepsis related deaths (WHO. 2020). Every hour sepsis treatment is delayed, the risk of mortality increases by 7.6% (Macias et al., 2021). Among those who survive, 17% end up with Post Sepsis Syndrome (PSS) and severe impaired quality of life (Gritte et al., 2020). Fernando et al (2022) argue that up to 42% of admitted critically ill patients are at risk of committing suicide after hospital discharge, due to lack of support and low income. Internationally, every year sepsis costs approximately $24 billion worldwide and is the number one budget utilisation in many countries (WHO. 2020). Mayr et al (2017) indicates that readmission due to sepsis is between $3.7 and $27 billion per year in the United States. According to WHO (2020), the actual cost for LMIC/LIC may be higher as reporting of sepsis, recognition and recording are inaccurate.

Therefore, SST are crucial for screening patients at risk, and important, because 80% of sepsis deaths could be prevented by early recognition and prompt treatment (Paruk, 2021). To be effective, an SST must be easy to use, with clear instructions on actions. Savarimuthu et al (2020) indicates that the use SST must be used in combination with other tools. However, with a variety of tools, this indicates the lack of consensus regarding which one to use as there are limitations with all of them (Savarimuthu et al., 2020).

The subject area for the question was clear; sepsis should be recognised early and treated promptly (Walters et al., 2018). However, a review of the current documentation of nursing care of patients with sepsis, revealed a discrepancy in documentation in care planning and care given. This included inadequate evidence of any

screening for sepsis. WHO (2020) argue that, for critically ill patients, the approach should be to assume sepsis could be present, and use tools to rule out sepsis, rather than waiting for further progression.

The hospital, in which the review took place, showed a recurrent pattern in documentation lacking early assessment and recognition of changing condition and symptoms associated with sepsis. This narrowed down the question to focus on how to change practice and implement an SST. Therefore, a systematic approach to developing an answerable research question was sought, and the Population, Intervention, Comparison and Outcome (PICO) framework was identified as appropriate (Othman et al., 2020).

The target group were Critical Care Nurses (CCNs) who are in the front line of acute care delivery, spend the most time with the patient and are responsible for recognising sepsis (Rylance et al., 2018). Zambia being a LIC with a constrained budget requires a low-cost SST for early recognition of sepsis to prompt early treatment in order to reduce mortality and long-term sequelae for sepsis survivors (Bishop at al. 2021). The literature identified that nurses have limited knowledge and skills in recognising sepsis. Literature suggests quick Sequential Organ Failure Assessment tool (qSOFA) could be adapted for LMIC/LIC, and therefore the question was refined to include this tool (table 1).

Table 1 PICO	
Item	**Description**
Population	Critical care nurses
Intervention	Staff development training programme and implementation of qSOFA
Comparison	Use of evidence-based nurse driven SST in HICs such as qSOFA, Early Warning Score (EWS) and Systemic Inflammatory Response Syndrome (SIRS) in relation to no SST in clinical practice
Outcome	Implementation of qSOFA tool for early identification and management of sepsis, reduction in development of severe sepsis, post-traumatic stress disorders (PTSD) in sepsis survivors, mortality, length of hospital stay and overall hospital costs

Research Question

Using PICO, the research question was developed into:

> How can the nurses in critical care units in Zambia implement the qSOFA SST for the early identification of sepsis?

Methodology

A review of the literature was carried out using available data bases; these included the Cumulative Index to Nursing and Allied Health Literature (CINAHL) ultimate and MEDLINE electronic databases. To facilitate the search, keywords were identified and used in the search; these included early recognition of sepsis in critically ill adults, assessment, and management of sepsis. Following an initial search using these terms, a combination of keywords was used to refine the search, WITH AND Boolean/phrase search modes being used, and then a third search was completed using focused phrases. Inclusion Criteria were adults (>18 years), sepsis-related articles specific to topic, peer reviewed articles published in English in the last 5 years, as research and management of sepsis have evolved in the last 5 years. Exclusion Criteria included non-English publications which may have had significant information but were excluded because translation was only for the abstract, so accuracy of the articles could not be verified. Duplicate results, neonatal, paediatric and articles published more than 5 years were eliminated from the search.

Final results were manually refined after reading the abstract to exclude articles which did not specifically address the research question. Having initially found over 1300 articles, the refining process reduced these to 15 articles which were considered, and one systematic review was appraised because it demonstrated and accurately answered the research question (figure 2).
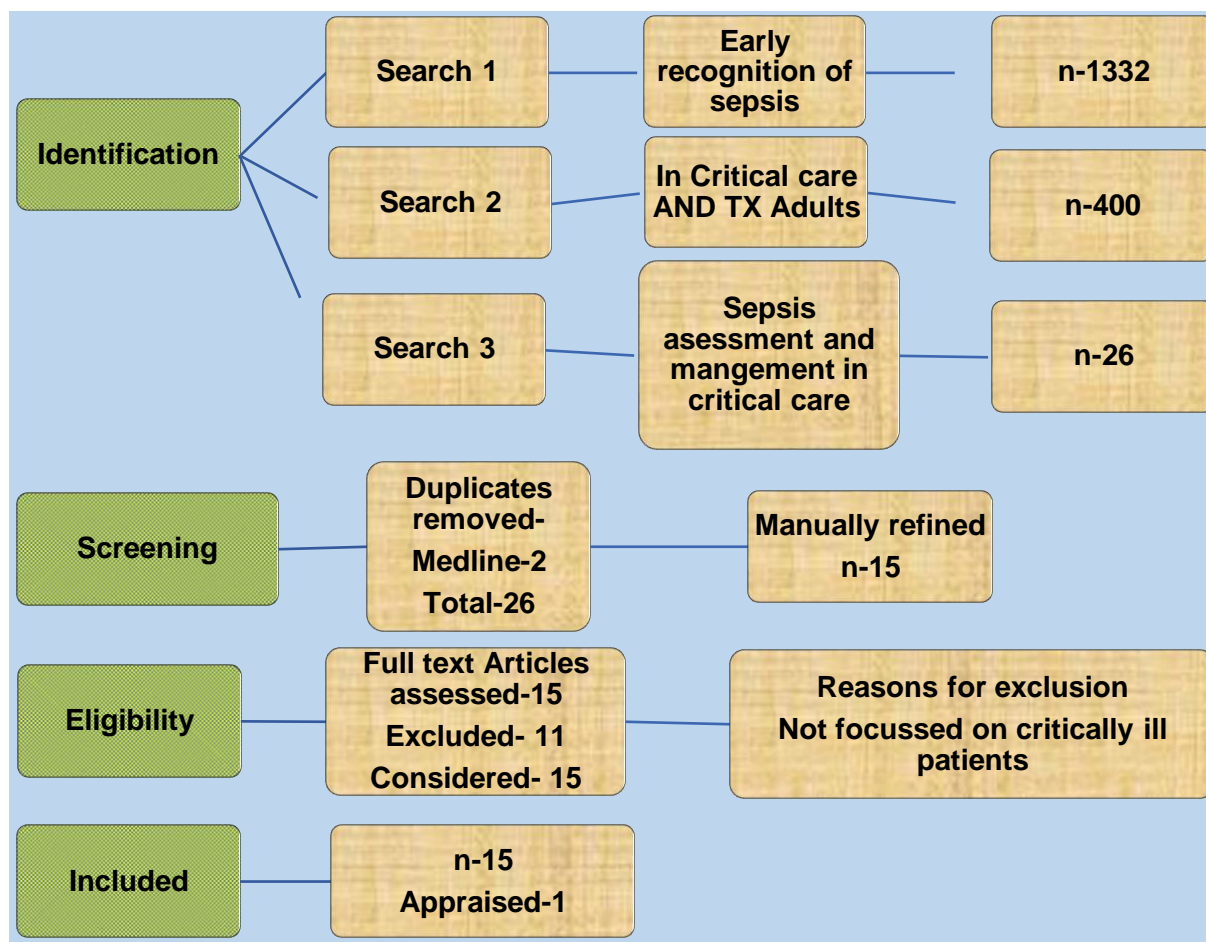
Figure 2: Search Strategies

The Critical Appraisal Skills Programme (CASP) was chosen because it has a checklist for appraising qualitative evidence in informing healthcare policy and practice within evidence-based medicine (Long et al. 2020). Therefore, it offers a standardised approach to critically appraise the literature. For quantitative data sets, it has criteria for assessing the reliability and validity of the processes used, the results and outcomes, so can be used to help review the relevance/ appropriateness of published papers for specific clinical settings. Therefore, this specific systematic review was chosen because of its high level of scientific evidence (gold standard) taking into account all relevant studies included (Turnbull. 2023), which used PRISMA (Page, 2021), in identifying, screening and eligibility for inclusion. The review appraised and synthesised the individual peer reviewed studies which met specific inclusion criteria. Further, the highly focussed clinical question was answered, presenting a balanced important summary of findings with due consideration of any limitations or constraints in the evidence they reviewed.

Table 2: Rababa et al. (2022) Sepsis assessment and management in critically ill adults: A Systematic Review

Are the results of the study valid?	What are the results?	Will the results help locally?
Yes. Systematic review chosen due to the level of accuracy and highest level of data. Relevant articles specific to sepsis assessment and management in critical care addressing the research question were included. Non-English articles related to the topic were excluded and may have limited the information retrieved. Results from all the studies included were similar and addressed the research topic and supported the appropriateness of the paper for the clinical question identified. Ethics approval required to maintain ethical standards was not required because individual articles included had ethics approval.	Nurses had poor knowledge (<50%) in assessment tools for early diagnosis, however, the review gives no evidence linking nurses` knowledge in early recognition and management of sepsis in adult critical care patients (bias) Inadequate skills in aseptic techniques during blood collection. Inadvertently, inadequate knowledge and skills were attributed to heavy workloads, poor teamwork skills and inexperienced emergency room (ER) doctors. Nurses over 50 had lower scores related to sepsis criteria than younger nurses.	Yes. Sepsis is a global problem affecting all the CCUs especially LICs such as Zambia. Due to high mortality associated with sepsis, SST for early goal directed therapy (EGDT) consideration. All articles in the review had similar findings which are appropriate for a LMIC/LIC. These included: • A range of challenges many of which are evident in both HICs and LMIC/LICs. Some of these fit within the remit of the nurse and need to be considered when planning implementation. • Lack of knowledge and skills -but this can be addressed in an LMIC/LIC, although not formally linked to critical care in the review. The finding fits with the review of documentation undertaken prior to this article.
	All studies used in the review showed a reduction in the mortality after implementation of the SST ranging between 24% and 53% a reduction in re-admission of 36.28% and 25% for patients who received EGDT as a result of SST implementation.	A positive outcome supports this research question. Delay in recognition of sepsis results in multi organ failure, PTSD, increased hospital costs, readmissions and highly contributes to mortality. An adaption of the protocols needs to be considered.
	Nurses completed 75% of assessment and screening within one hour of notification. Accuracy in making a diagnosis using SST led to early identification and timely management	The reviewers argue that 75% completion of SST within one hour indicates that it is feasible for use in different settings. Review of SST needs to be completed to check which aspects were not completed and that adaptation will not adversely affect effectiveness.
	Nurses showed marked improvement in the ability to recognise sepsis after an educational program. Use of SST led to nurses becoming autonomous in making decisions related to sepsis. The difference in the quality of care rendered by ER nurses who received education programme and those nurses who did not was evident	Staff development training programmes and assessment were effective, this suggests that the approach used can: • Improve recognition of sepsis -a key outcome • Enable nurses to use SST. • Enable nurses to be autonomous. • Improve quality of care
	The reviewer showed the barriers related to poor recognition of sepsis which was highlighted and concurrent in all the articles as indicated below. • Patient related. • Nurse related. • System related.	All articles identified similar barriers which affect both LMIC and HIC • Use of multi component interactive teaching method in LIC/ LMIC which can be addressed through the provision on ongoing mentorship training and implementation of a multidisciplinary sepsis recognition and treatment protocols.
	Quality Improvement	The reviewer argues that a decline of 33.3% adherence to the tool is feasible in any setting in improving the quality of practice with regard to sepsis care bundle

Discussion

The challenge in practice is that there are no available SSTs adopted for use. Most of the tools identified available in the literature are in use in HICs, therefore, adaptation will be necessary before implementation. Also, this process is urgently needed as the introduction of SST will help in early recognition of sepsis and positively influence patient`s outcome. The search focused on finding evidence to address the question, and from the final selection of evidence, the systematic review was critically appraised as giving the best overall information (table 2).

The review analysed the knowledge and skills of nurses in the use of SST to recognise sepsis, the score was less than 50% particularly those above age 50. Resistance to change in some older nurses and those who trained some years ago is not uncommon in practice because over the years, they become accustomed to a particular pattern and also a common practice in Zambia (Cho, 2021). Kurt Lewin`s change model by Hussain et al. (2018) indicates the need to include all nurses in the change and explain the benefits for change to be accepted (Tracey, 2020). Therefore, pedagogical strategies to address resistance by analysing case reported in the third person can support change (Bordoni et al., 2019). Using this approach, post mentorship orientation and protocol implementation showed an improvement in knowledge and a downward trend in mortality. Barriers identified relating to patient, nurse and systems are all interlinked in practice and can also be addressed using this approach.

Limitations with this review included not considering articles written in languages other than English, those articles may have contained valuable information. Also, due to heterogeneity between the selected studies, a meta-analysis was not performed which would have increased the accuracy of the study by combining smaller studies making them into one big study and providing a more complex analysis of harms safety, data, and benefits. Nevertheless, the review was thorough and detailed. This review's strength was that most studies included, were carried out in multi-centre settings covering larger geographical areas with a very large sample size for ascertainment and to reduce bias.

Rababa et al. (2022) clearly indicates that limited SST results in delayed recognition of sepsis and management which in turn results in increased mortality. This is supported by the article, and also identified both enabling factors and barriers which have been used as a basis for working towards addressing the question identified.

Table 3: Why quick Sequential Organ Failure Assessment (qSOFA) for LIC? Wang et al. (2022)			
SST	**Parameters**	**Accuracy**	**Remarks**
qSOFA	Monitor the clinical status. Respiratory Rate ≥22bpm Level of Consciousness (Glasgow Coma Scale) <15 Systolic Blood Pressure ≤ 100mmHg.	Higher overall prediction accuracy of mortality compared to SIRS and NEWS Higher specificity but low sensitivity in predicting mortality	qSOFA Strongly recommended for LIC like Zambia. No blood tests required (no cost)
SIRS	Temperature <36°C or >38°C Heart rate (HR)>90bpm, Respiratory rate (RR)>20bpm, PaCO2<32 Leukocytes<4000or>1200mm/l).	Sensitivity>qSOFA but low specificity for sepsis prognosis	
EWS	Temperature Respiratory rate, SPO2 Serum lactate >2mmol/l Systolic blood pressure Level of consciousness	Widely used in HIC (United Kingdom). prognostic accuracy ≥ qSOFA but difficult to achieve at short notice/limited access to laboratory. for LMIC/LIC	

qSOFA is a validated bedside SST which includes one point for each of 3 criteria (table 3). A qSOFA of greater than 2 is suggestive of sepsis; (Bishop et al. 2021) therefore, it provides a predictive score of mortality. Simple bedside prediction of sepsis-related mortality in LIC settings like Zambia is crucial for triage and resource

utilisation decisions. Koch et al. (2020) argued that SOFA score prediction quality is higher in critically ill patients than qSOFA. Conversely, Wright et al. (2022) argue that other tools like SOFA with high precision require multiple laboratory and clinical data which are potentially challenging to obtain in low resource settings due to logistical and operational issues. Therefore, formulating and implementing qSOFA with a good predictive validity in identifying patients with suspected sepsis will improve sepsis recognition. In line with Wright et al. (2022), Schinkel et al. (2022) argue that all screening tools have limitations, are susceptible to false positives and that there is no tool which is superior to the other in terms of specificity and sensitivity. In addition, as with other tools qSOFA has been described as specific but not sensitive. Therefore, Sarkar et al. (2022) suggested combining qSOFA with point of care venous lactate (>2mmol/l a maker to aid sepsis diagnosis) to enhance the effectiveness of qSOFA.

Inadequate knowledge and skills in sepsis assessment and management is a serious gap with regards to patient mortality which not only affects Zambia but globally (Chua et al. 2023). Support from stakeholders for policy direction to formulate and adapt SSTs and protocols, pre-ordering of antibiotics is cardinal (Denny et al. 2020). Therefore, prescribing privileges using sepsis protocol enhance service delivery (Jones and Nurse. 2018). Alberto et al. (2021) also demonstrates the three steps which has worked in implementation to inform decision and includes content evaluation, development and participation for implementation strategies in quality improvement (QI).

Educating nurses in response to scientific advancement in providing care is one of the main strategies for adjusting positively with change management (Yektatalab et al. 2020). Further, Liao et al. (2019) argues that nurses are the front-line care providers who must possess the ability to solve problems during their busy schedule. In practice, the scope of practice for nurses has been heightened by the Ministry of Health and regulated by the nursing council (Nurses and Midwifery Act 2019) which includes therapeutic interventions and prescribing privileges using National Formulary (Carter et al. 2020). Luna et al. (2020) argues that adaptation of qSOFA with QI is an appropriate way to enhance practice and improve early recognition of sepsis for better clinical outcomes. In line with Rababa et al. (2022) showed that sepsis education and simulations improve sepsis recognition among Critical Care Nurses. This was supported by Choy (2022) who further indicated that simulations were more effective than didactic teaching and was associated with improvement in patient`s clinical outcomes. Rababa (2022) also added that case-based learning, simulations, and reflective discussions has shown to effectively test the ability of nurses to recognise and apply understanding, therefore, this teaching method will be more appropriate to use in practice.

Evidence showed the improvement in the care of patients after mentorship and implementation of protocols (Rechter and Jennifer. 2021). Following a critical analysis of the various SSTs used in different settings, qSOFA was identified as a more appropriate tool to be used in practice due to its predictive validity and no cost implication (Pillay. 2020). Thereafter, adaptation and piloting the tool should be done by the core team while monitoring and evaluating the process and finally scale up the policy so as to standardise the practice (Alberto et al. 2020). Further, SSTs should be incorporated in the nursing curriculum and taught in continuous education programme for standardisation (Chua et al. 2023). Likewise, Bowles et al. (2020) also indicated the inclusion of SST and innovative clinical models in the curriculum to help undergraduate nursing students make decisions for patients using evidence-based practice. In practice, SST can be included in the induction package for nurses. Further, Carter et al. (2020) argues that if nurses are to provide comprehensive care to critically ill patients, appropriate leaning theories such as competence-based education which should transform care using evidence must be competence based. Thus, nurses should use the newly adapted sepsis protocols to build on their previous experience using multimodal teaching techniques which includes case studies and role plays for skill retention (Holm et al. 2020). Therefore, sepsis recognition will be carried out based on learned sepsis pathophysiology to demonstrate the application of knowledge and evidence in practice through reflective observations (Choy at al. 2022). Adversely, a number of barriers can influence the implementation of qSOFA such as inadequate specialised workforce, work overload, inadequate knowledge, and skills.

Early recognition of sepsis remains a global challenge, particularly with LMIC/LIC. A wealth of evidence has shown good clinical outcome for CCU patients when evidence-based SSTs are incorporated in practice compared to no use of tools. Adaptation, formulation, and implementation of SST in sepsis recognition have shown to give nurses the confidence and autonomy in delivery of care, thereby reducing hospital stay and overall hospital costs. Therefore, qSOFA a simple bedside nurse driven SST has been considered suitable and reliable for adaptation especially for financially constrained countries like Zambia. Further, a robust QI assessment should enforce adherence leading to good clinical patient outcome.

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A Quality Improvement Proposal to Enhance Infection Prevention Practices at St Francis Mission Hospital, Katete, Zambia

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Abstract

Background: Healthcare associated infections (HAI) are a subset of infectious diseases acquired in a health-care facility. They are a major global burden which urgently needs addressing, the operating department is a specialist area of practice, in which infection prevention is essential to safeguard the patients.

Aims: The overall aim of this quality improvement project (QIP) was to equip theatre staff with knowledge of HAI and infection prevention and control (IPC) measures.

Method: The QIP followed the Plan, Do, Study, Act (PDSA) Cycle and involved a cross-sectional observational study, conducted in operation theatres with laboratory analysis used to identify the presence / absence of pathogens. The study involved 3 stages:

- **Stage 1:** Microbiology swabbing of operating table, scrubbing sinks and theatre floors before the use of UV light.
- **Stage 2**: Training session for theatre staff about HCAI and strategies to reduce infection.
- **Stage 3:** Use of UV lighting in operating theatre and then complete microbiology swabbing.

Results: Prior to the training microorganisms were identified after UV light use, however, after training of staff in the correct use of UV and IPC including effective hand hygiene including scrubbing for surgical procedures, microorganisms were reduced.

Conclusions and Recommendations. Disinfection of surfaces to break the transmission HCI was effective, although it was recognised that more than one cycle of cleaning was needed. Hand hygiene training for all staff is essential and this study demonstrated the need for this training, and it is recommended that hand hygiene training and assessment should be included in induction training for all new staff. Training in both theatre cleaning and hand hygiene should be part of ongoing continuous professional development repeated at regular intervals.

This quality improvement project (QIP) was to enhance infection prevention practices at St Francis Mission Hospital, Katete, Zambia. As a low-income country (LIC), the Zambian healthcare system faces challenges with resourcing the healthcare services. One internationally expensive healthcare costs are the prevalence of infection (Mohan et al., 2020). Reduction in levels of infection would have a two-fold benefit, firstly in terms of patient morbidity and mortality, and this in turn reduces the cost and use of resources, for example, length of stay in hospital, use of antibiotics.

This QIP took place in St Francis Hospital, which is located in the eastern part of Zambia, and was recently upgraded by the Ministry of Health to a Central Hospital. As a result the hospital now takes more complex referrals from a wider catchment area, with major surgery routinely carried out at the hospital. The range of specialities include obstetric and gynaecological surgery, orthopaedics, urological and plastic surgery. Although overall Zambia has a shortage of nurses, St Francis hospital is well staffed with adequate numbers of nurses and doctors to serve the high volume of patients attending from across the province.

Healthcare associated infection (HAI) is a major global burden which urgently needs addressing (World Health Organisation [WHO] (2023), and Zambia is no exception, with all areas of the hospital needing to focus on preventing infection. The operating department is a specialist area of practice, where infection prevention is essential to safeguard the patients. This QIP was therefore designed to focus on strategies to reduce the spread of infection. HAIs are infections that are not present on admission but are acquired once a patient has been admitted to a healthcare facility (Guckian and Fisher 2019; WHO 2016). The main challenge is that currently

medical records do not clearly indicate whether the infection was present on admission or acquired during their hospital stay. An important first step in identifying and reducing postoperative infections was to make sure that all surfaces in the operating room were free from pathogens prior to a surgical procedure. Checking through procedures revealed that while cleaning swabs were taken and sent for culture, the results came late, and were often filed without discussion. On reviewing recent sets of microbiology cultures, it was evident that some microorganisms were still present after cleaning, but no rationale or explanation was given for these anomalies. This was therefore one area that needed investigation. Secondly, it is essential that all staff follow WHO (2016) guidelines for had hygiene and surgical procedures, but no records of testing effectiveness of procedures carried out was found. Therefore, this QIP focused on these two crucial areas.

HAIs are deemed preventable and a crucial way to prevent infections begins with healthcare facilities having effective infection prevention control protocols to reduce transmission (WHO 2022; WHO 2018). Practices associated with reducing HAIs include routine disinfection of surfaces (environmental cleaning), use of ultraviolent (UV) lighting, correct use of PPE and appropriate hand hygiene (WHO, 2016). Routine disinfection of surfaces reduces the incidence of microorganisms (Mewburn 2014; Spagnolo et al., 2013). This indicates that although an area may look clean, pathogens may be present. Door handles, rails, and tables are high risk areas, that can be overlooked. When cleaning, it is essential that the appropriate cleaning products and disinfectants are used for each surface. It is important that healthcare professionals are aware of the schedules and responsibilities for cleaning and disinfecting the overall area and equipment within it. It is seen as essential that every facility has strict cleaning protocols and that cleaning compliance checks are made (WHO, 2022).

There is increasing evidence that the use of UV lights eliminates up to 99.9% of pathogens found on surfaces, and also kills airborne pathogens (Dancer & King 2021; Simmons et al., 2017). Additional advantages of using UV light are that the procedures for administration are designed to eliminate human error and the shortfalls of chemical disinfecting agents. A major advantage is that it can also decontaminate multiple surfaces within seconds and UV delivery equipment now usually has a configuration that allows it to reach surfaces in a 360-degree radius, thereby cleaning hard-to-reach surfaces, and it can also be targeted to specific identified areas of concern (Ramos et al., 2020).

There are other measures that need to be considered as part of the infection prevention measures. As the Covid-19 pandemic highlighted, a key component of infection prevention is the use of personal protective equipment (PPE), however, it is important to note that PPE helps to reduce the spread of infection, only if it is immediately available, worn correctly, using single-use items wherever possible, with appropriate decontamination after each use and disposed of correctly (WHO 2022). In resource limited settings access to full PPE may be limited and it is therefore essential that other measures such as UV light cleaning are used effectively.

Hand hygiene is another key strategy that has been identified as one of the most effective steps to prevent infection and can be used by everyone to reduce transmission of infection. The WHO published the 5 moments for hand hygiene and hand-hygiene standards, arguing that good hand hygiene can reduce infection transmission by up to 40% (WHO 2022), hence this was chosen as the second measure of assessment in this QIP. Teaching was based on the WHO had hygiene guidelines and hand scrubbing. However, this QIP was designed for the operating department, and therefore correct hand washing was not enough, staff need to always use good hand hygiene, but in addition when scrubbing for operations, a second and separate technique needs to be used, and it was important to check that staff were using the guidance specifically developed appropriately and effectively.

The aim of this QIP was:
- To increase knowledge and understanding of the effectiveness of Ultraviolet light in disinfection of operation theatre to prevent HAIs and sepsis.
- To increase compliance with WHO and international standards in hand hygiene and surgical scrubbing.

Outputs:
- Optimal use of UV light for disinfection in operating theatres.
- Common bacterial agents found in operation theatre surfaces are eradicated.
- All staff comply with WHO and international standards for hand hygiene and surgical scrubbing.

Method

The QIP followed the Plan, Do, Study, Act (PDSA) Cycle and was carried out as a cross-sectional observational study, conducted in operation theatres with laboratory analysis used to identify the presence / absence of

pathogens. Prior to starting the QIP, a full risk assessment was undertaken and approval from the Hospital Management team given.

The QIP was carried out in three stages. Stage 1, involved microbiology swabbing of operating table, scrubbing sinks and theatre floors before the use of UV light. Stage 2 involved delivery of a training session for theatre staff about HAI and strategies to reduce infection. Stage 3 involved implementation of UV lighting in the operating theatre and then complete microbiology swabbing with sites of swabbing identified and marked.

Results

The QIP had two distinct sections, which although linked for the teaching session, were in fact separate activities, and therefore for clarity, the results have been presented as two sections, Firstly the results from cleaning the operating department with UV light, have been given and then secondly the results from the hand hygiene training.

Results 1: Cleaning the operating theatre.

Surfaces cleaned included the operating table, sinks and the floor in Operating Theatre. Results from the two cleaning rounds are outlined in table 1.

Table 1: Results from the two rounds of cleaning rounds

Cleaning round 1			Cleaning round 2

Cleaning round 1

Isolates	Before sterilization	After Sterilization
Coagulase negative Staphylococcus	√	
Staphylococcus aureus	√	√
Klebsiella pnuemoniae	√	
Candida spp	√	
Streptococcus spp.	√	
Enterobacter spp.		√
Enterobacter agglomerans		√

Cleaning round 2

St. Francis' Central Hospital

Surface swabs report September 2022

The table below show results obtained from the surfaces swabbed in Theatre 1 and 2

S/NO	Surface swabbed	Culture results
1	Theatre 1 scrub sink Ref. 3	No growth
2	Theatre 1 Operating table	No growth
3	Theatre 2 scrub	No growth
4	Theatre 1 sluice sink	No growth
5	Theatre 2 operating table	No growth
6	Theatre 2 sluice sink	No growth
7	Theatre 2 Floor	No growth

The results from the first round gave important findings. Firstly, these were taken after normal, routine cleaning had taken place, when the results of these pre-UV Light cleaning swabs came back, they revealed that there were a range of microorganisms still present all of which could lead to HAI. This confirmed the need for the additional, different cleaning technique. Secondly, the first cleaning round did not eradicate all micro-organisms, but importantly it identified micro-organisms that had not been found in the first set of swabs. This may be because the second set covered a slightly wider area for each swab. However, it confirmed the need for the second round of UV Light cleaning.

The second round of microbiology results shows that the results from the swabs taken after the second round of UV Light cleaning found that all previously identified micro-organisms had been eradicated, and that no new ones were found. These results were then signed off as confirmation that the cleaning had been effective.

Results 2: Hand Hygiene training.

This second section of the training was designed specifically for them and only nurses working in the operating department were initially invited. However, given surgical scrub is only undertaken specialist groups e.g. theatre nurses and surgeons, it was agreed only they would be assessed in surgical hand hygiene. However, when the session took place, junior doctors/ interns working in theatre, asked to attend, and to participate in the practical sessions. This was welcome and enabled the session to reach a wider audience. Management was supportive regarding the inclusion of other disciplines, and the hand hygiene part of this second demonstration was appropriate for all healthcare professionals regardless of department. Prior to the teaching session a small group of the theatre staff were assessed as they scrubbed for a surgical procedure. This was a multi-disciplinary group, but as the numbers were small, to avoid any individual being identified, the findings have been presented together. As the findings below show for all areas assessed, some participants did not complete the procedure appropriately.

Questions 1-4

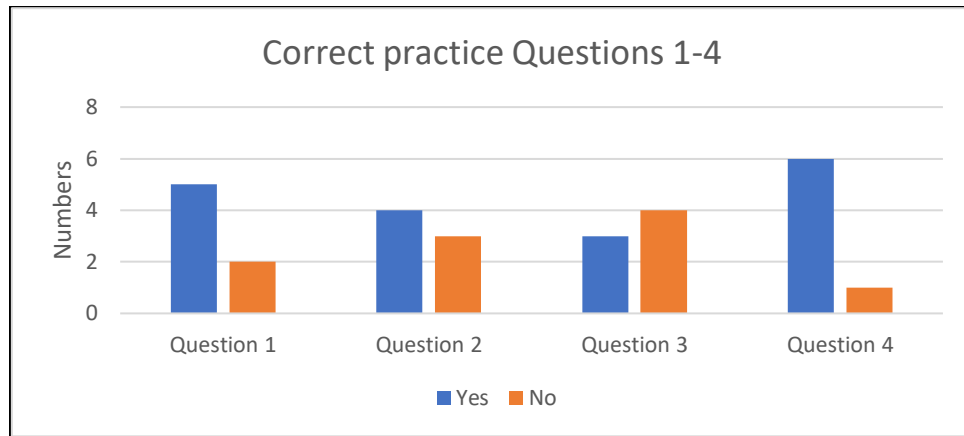|	
1.	Did the staff wet hands up to the elbow before putting soap?
2.	Did he/she apply enough soap to cover all hand surface?
3.	Did he/she rub their hands in a circular motion up to below the elbow?
4.	Did he/she rinse both their hands up to below the elbow?

Chart 1: Assessment of steps 1 to 4

Questions 5-8

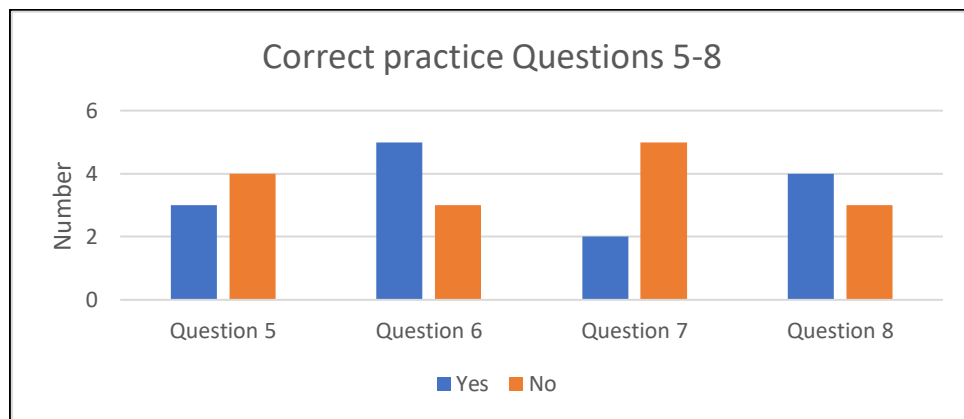|	
5.	Did they repeat the process up to mid arm and rinse the hands up to below the elbow?
6.	Did they rub their hands palm to palm?
7.	Did right palm over left dorsum with interlaced fingers and vice versa?
8.	Did he/she do palm to palm with fingers interlaced?

Chart 2: the assessment of steps 5-8

For question 9, how long did the individual take to finish the whole procedure, four possible times were given 2 minutes, 3 minutes, 5 minutes, and 10 minutes. The findings from this question have not been presented in a chart because all participants completed the whole procedure in under 2 minutes. As a result, no participant passed this question, they all received the comment partially complete. This was major cause for concern,

however, it was addressed in the teaching session and demonstration, before the final part of the session when participants were assessed using the hand hygiene kit. The results from the demonstration using the hand hygiene kit, were positive. Participants were able see the gel still on their hands when hand hygiene was not complete and to accept the importance of using correct timing and of completing all steps in the procedure. This participatory approach to teaching was appreciated by the participants, and as a result has been repeated with other groups in the hospital, as well as theatre nurses from across the region.

The subject choice for the QIP was both topical and important, and the project has had positive outputs, with the overall outcome being changes in the way the operating department theatre is cleaned. As stated previously, it made staff aware of the need to improve infection prevention and control including hand hygiene in the operating theatre. The findings following the routine cleaning and then the first cycle of UV Light cleaning clearly showed the presence of microorganisms. This fitted with the original check of recorded results, but that only one more cycle was needed to eradicate all micro-organisms shows that this approach is realistic and appropriate. This QIP has demonstrated the importance of specialist nurses leading practice and improving the patient safety and quality of care.

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Conference Proceedings: Future Directions in Critical Care Nursing in Zambia

The inaugural critical care conference was held 2nd – 4th August 2023 in Lusaka. With over 150 delegates attending the face-to-face activities and more online, the conference provided an environment for networking, reflection on what is happening in critical care nursing practice and how emergency, trauma and critical care nurses see the future developing both for us as a profession and for the patients for whose care we are responsible. The conference had four main themes:

- National Perspectives
- Research, Quality Improvement, and Innovation
- International Perspectives
- Advancing Critical Care Nursing

Each presentation highlighted the crucial work being undertaken by critical care nurses from strategic engagement to bedside care (table 1). Topics ranged from work being undertaken by the Critical Care Nurses Association of Zambia including the Safe Staffing Position Paper and outcomes from the first National Stakeholders Roundtable discussion.

Table 1: Summary of Presentations		
Theme	**Title**	**Presenter**
National Perspectives	CCNAZ Safe Staffing Position Paper	Sabelo Maphenduka
	Outcomes from the National Stakeholders Meeting	Christine Chishimba
Research, Quality Improvement, and Innovation	Improving Patient Reviews in ICU	Aida Banda Maina Soko Medical Centre
	Evaluation of a low-cost, highly sustainable enteral nutrition regimen project for critically ill patients	Mwaka Chongwe Birmingham City University
	SAFE Project: Critical Care Follow Up Evaluation	Mable Nsonga Birmingham City University
	Enhancing Infection Prevention in the Operating Theatre: Lessons for the ICU	Memory Nalwamba Nursing Now Challenge Fellow
	Impact of Critical Care Nursing in Zambia	
International Perspectives	Critical Care Nursing in Botswana	Cynthia K M Tembo
	Critical Care Nursing in Malawi	Memory Msowoya Ndaona Botha
	Critical Care Nursing in Lesotho	Ramone E Tsoeute
	Renal Transplantation at the University Teaching Hospital	Shelby Nthala
	Cardiac Care at the National Heart Hospital	Racheal Chanda
Advancing Practice	Advancing the Critical Care Nursing Agenda	Assc Prof Chris Carter and Prof Joy Notter
	Writing for Publication	Maj Richard Kahalu

The research, quality improvement and innovation section showcased the projects in clinical practice ranging from acute care to rehabilitation. The international perspectives section, allowed for regional updates and insights into critical care nursing with presentations from Botswana, Malawi, and Lesotho. Presenters from Zambia gave an update on new areas of practice, such as kidney transplants and cardiac surgery. The advancing critical care practice pulled together all the themes and highlighted the importance of partnership working and making critical care nurse more visible in the clinical, research and leadership areas. Throughout all the presentations, two key themes were the importance of data collection and sharing findings, without this information it is difficult to demonstrate the impact of critical care nurses and move the nursing agenda forward.

British Association of Critical Care Nurses (BACCN) Conference

The theme of the 38th BACCN Conference was 'Recovery, restoration and sustainability'. BCU was delighted to be able to support two of the BCU Master of Science Professional Practice (Adult Critical Care) students to present at the BACCN International Conference. Sabelo Maphenduka and Patricia Banda were on a study exchange to the UK and therefore, could present and network with other delegates. The presentation was one of two focusing on emergency and critical care in low-resource settings. The BACCN conference organisers recognised the importance of the presentation and gave the team a double presentation slot, to enable them to cover material appropriately. The presentation was titled *Impact of Critical Care Nurses in Resource Limited Environments.*

Following this the event the team were able to visit the Royal Wolverhampton NHS Foundation Trust in the midlands, University Hospital Lewisham and Royal Free Hospitals in London. BCU would like to say a huge thank you for the support and welcome given to the team.

Team with the Emergency Department Practice Development Nurses Royal Wolverhampton NHS Trust

Team with the Chris Hill at Royal Free NHS Trust in London

Guidance for Authors

The International Perspectives in Emergency, Trauma and Critical Care Nursing is the journal for students completing the Birmingham City University Professional Practice (Adult Critical Care) programme and has been developed in partnership with the Critical Care Nurses Association of Zambia. The journal will be managed by the BCU HELS Centre of International Health Partnerships and on completion of the education programmes, CCNAZ have agreed to continue the journal using it as a vehicle to promote emergency, trauma and critical care nursing across Zambia and the wider region.

This peer reviewed journal will provide a platform for emergency, trauma and critical care nurses across our partnership and will span nursing practice, research, education, or management relating to emergency, trauma and critical care nursing. This will support and facilitate opportunities for nurses to learn publication skills, to enable them to share and disseminate best practice. The ethos of the journal is the promotion of quality and excellence of care for critically ill patients. The journal will be published twice yearly (February and October) and will be open access. Any income generated will be used to promote critical care nursing, through publication costs and study days on writing for publication.

Articles from the following categories will be considered:

- Original research
- Quality improvement reports
- Systematic reviews with/without meta-analysis
- Reviews
- Editorials
- Current insights in emergency, trauma and critical care nursing
- Case studies
- Letters to the Editor
- Conferences & scientific meetings

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- Peer reviewed articles should be a maximum of 3,500 words (including references)
- Opinion pieces should be a maximum of 1,000 words (including references)
- Harvard Referencing should be used.
- Submissions double spaced and must include:
  - Abstract (maximum 300 words)
  - Key words
  - Front cover including:
    - All authors (in order of contribution)
    - Professional Qualifications for each author
    - Role and organisation for each author
- Contributors' photographs can be submitted – as separate JPGs, not embedded in Word documents. These must have permission from all participants, patient consent and for under-18s parental consent. Authors must adhere to any data protection for their establishment/Institution. Proof of consent must be supplied with articles and ideally photos should be at least 300dpi (at least 1mb).
- Final decisions on publication are made by the editorial board.
- Authors can submit as many articles as they wish.
- If the editorial team have received many contributions, your article may be held for later editions.
- Please note that the editorial team will amend the final copy to suit our house style.

Submissions should be emailed to chris.carter@bcu.ac.uk

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