May 2026 | Issue 1

ARTICLE CATEGORY: Original Article

Structures and Processes of Critical Care Nursing Practice: Insights from Four Ugandan Intensive Care Units

Dominic Ogwal Savio[1,3]* Edrisa Ssemwanga[2] Winter Patrick[3] Lameck Ssemogerere [4, 3] Cliff Asher Aliga[5]
[1]Gulu Regional Referral Hospital, Gulu
[2]Kawempe National Referral Hospital
[3]Nakasero Hospital Limited
[4]Department of Critical Care, Uganda Heart Institute
[5]Aga Khan University School of Nursing

Abstract

Background:

Global epidemiological data on structures, processes, and outcomes of intensive care units (ICUs) are scarce, yet key in understanding the global burden of critical illness across all demographics**.** Critical care nursing practice in Uganda faces challenges in structure and process, impacting patient outcomes. Despite increasing demand, there is limited documentation and understanding of the structures and processes of critical care nursing practice in Uganda, necessitating a comprehensive exploration.

Study objectives

1. To assess the structure and processes of critical care nursing practice in Uganda.
2. To determine the correlation between the structures and processes and the quality of critical care nursing practice in Ugandan intensive care units.

Methods:

A cross-sectional observational study was conducted in four Ugandan ICUs. Nurses' demographics, critical care nurse characteristics, physical and critical care structure, process flow, and perceived quality of nursing practice were collected using modified observation checklists with an interview administered portion.

Results:

A diverse critical care nursing workforce, with 75% of nurses being female and an average age of 35.89 years. However, there were significant disparities in education levels, with only 10% having post-graduate training. Regarding infrastructure, all ICUs followed an open model, but deficiencies in essential facilities like reception areas and laboratories were noted. Process-wise, while 94.7% acknowledged leadership and administrative factors, challenges included inconsistent adherence to critical care protocols (63.2%) and occasional lack of knowledge in patient management (94.7%). Despite these challenges, 100% of nurses reported family involvement in patient care. These findings accentuate the need for targeted interventions to address structural and process-related disparities, ultimately enhancing the quality of critical care nursing practice in Ugandan ICUs.

Recommendations:

To enhance critical care nursing practice in Uganda, recommendations include standardizing protocols, improving infrastructure, and providing specialized training. Addressing these issues can lead to improved patient outcomes and quality of care delivery in Ugandan ICUs.

Corresponding Author: Dominic Ogwal Savio
Email: dominic93savio@gmail.com
Submitted: 15th May 2024 **Accepted:** 19th March 2026 **Published:** 29th May 2026

Background

Globally, the demand for critical care and emergency medical services is substantial, with millions of people requiring such care daily due to trauma or medical-surgical conditions (Webb, Lenormand et al. 2022). There is a considerable likelihood for individuals to require critical care services at least once in their lifetime, emphasizing the importance of preparedness and quality of critical care nursing practice (Ridley and Morris 2007). Critical care nurses are crucial in emergencies, emphasizing the need for preparedness and quality practice (Eastwood, Reade et al. 2012). The quality with which this is done will have a direct ripple effect on the outcomes of care (Clements, Curtis et al. 2015).

In Uganda, the COVID-19 pandemic featured the vulnerability of critical care nursing practice, with overwhelmed healthcare systems highlighting the need for quality improvement strategies (Webb, Lenormand et al. 2022). Therefore, addressing quality issues among nurses requires targeted improvement strategies. (Phua, Weng et al. 2020).

Understanding structures, processes, and outcomes will inform the quality of nursing services offered to clients admitted to ICUs across the country. Investing in accurate documentation, training, and competency development for critical care nurses is crucial, yet these aspects are lacking in major Ugandan hospitals (Giles, Hammad et al. 2019). Additionally, systemic and environmental barriers hinder the delivery of high-quality critical care nursing practice, necessitating a deeper understanding of these challenges (Hammerstedt, Maling et al. 2014).

Leveraging advanced practice nurses can enhance patient access to critical care and improve outcomes (Woo, Lee et al. 2017). Even robust healthcare systems can face challenges when unskilled critical care nurses are involved, highlighting the paramount importance of appreciating and preserving the quality of care provided by critical care nurses (Pauls, Migneault et al. 2020). Assessing the quality of critical care nursing practice in Uganda is essential for achieving Sustainable Development Goal 3 and universal health coverage (Ttendo, Was et al. 2016).

Poor ICU outcomes in Uganda, including prolonged length of stay and increased mortality rates, are linked to inadequate structures and processes, which remain underexplored (Kwizera, Dünser et al. 2012). Processes of critical care nursing practice in Ugandan ICUs are often unstructured and non-uniform, compromising the quality of care. These gaps expose critical care nursing practice during emergencies, highlighting the need for comprehensive exploration and intervention studies (Atumanya, Sendagire et al. 2020).

Understanding the structure, process, and quality of critical care nursing practice in Uganda is essential for designing targeted interventions, improving patient outcomes, and enhancing the sustainability of critical care nursing services in the country. This study aimed to outline gaps in the structures and processes of critical care nursing practice that affect patient outcomes in the ICUs.

Methods

Study design

We employed a cross-sectional observational design to investigate critical care nursing practice in Ugandan intensive care units (ICUs). We utilized a modified observation checklist with an interviewer-administered portion to document the structures and processes affecting the outcomes of critical care nursing practice in Ugandan ICUs. We collected data providing a snapshot of the demographic characteristics, critical care characteristics of nurses, physical and critical care structure, process flow in ICUs, and perceived quality of critical care nursing practice.

The checklists contained key quality indicators being assessed in the particular ICU. The research assistants were non-participant graduate nurses trained and experienced in ICU nursing care. They assimilated into the ICU nursing team as they observed the quality of critical care nursing practice being offered.

Study area

The data was collected from the ICU environment in the 4 hospitals included in the selection. These included St. Mary's Hospital in Gulu. Kawempe National Referral Hospital, Nakasero Hospital in Kampala, and Mbarara Regional Referral Hospital in Western Uganda. These were randomly chosen after stratifying these ICUs by region. The number of patients treated in these facilities in the previous 2 years, as per their ICU records, was reviewed meticulously to get the case mix before the final inclusion decision was made.

These ICUs give regional representation following stratification of the ICUs by the 4 regions and public vs. private. These ICUs offer a good mix of representative findings of the quality of Critical care nursing practice in Ugandan ICUs.

Study population

Nursing administrators, Charge nurses, and Nurses of all cadres formally assigned to work at the ICU were recruited for this study.

Inclusion criteria

- All charge nurses and nursing administrators directly involved in patient care in the ICU of the study site.
- Must have consented to take part in the study.
- Must have had a minimum of 6 months of experience working in the ICU
- All nurses formally employed or assigned to work in the ICU of four tertiary hospitals in Uganda.

Exclusion criteria

- Nurses who were absent from the shift were automatically excluded.

Sampling methods

We used stratified random sampling where all the ICUs in the four regions were randomly selected from different envelopes arranged according to regions and whether private or public, respectively. The case mix of the ICUs was determined by reviewing the number of clients and different diagnoses seen in the previous 12 months.

Processes and outcomes of critical care nursing practice were observed through a systematic sampling method, with every second nurse observed based on the order of entry into the ICU or registration for those who had staff registers. These nurses were observed throughout their shifts. These observations were anonymous to reduce the Hawthorne effect. From the staff register, every second staff member was randomly recruited into the study and observed during the ethnographic survey.

Sample size estimations

The quantitative sample size for the nurses observed during their work as they offered nursing care to the critically ill patients admitted in the ICUs was calculated using Cornfield, Mantel, and Haenszel methods for all the nurses involved in critical care nursing practice in the sampled ICUs The sample size will be estimated from the formula;**, where;,** is the square of the Z value, a 5% margin of error with 95% confidence interval, the sample size wastherefore be 77 participants (Chase and Klauber 1965).

Data Collection and Management

We used SPSS to perform a power analysis to determine statistical power for determining the meaningful differences in critical care nursing structures and processes across the 4 ICUs. Given the limited number of ICU staff, achieving a statistical power of 0.80 (80%) was crucial to minimizing the risk of Type II errors. This power level confirmed that the study's sample size was sufficient to detect significant associations with a 95% confidence level, ensuring the reliability of the findings despite the small population of ICU nurses.

77 nurses were observed using the modified observational checklist. This checklist was validated in a pilot survey at Nakasero Hospital. Observations were to understand the process flow in the ICU. These were entered into a CRF, which was analysed using SPSS. All the structures and processes that affected the quality of critical care nursing practice were documented.

Data analysis

The perceived quality of critical care nursing practice was assessed using quantitative Likert scale data. All collected data were recorded and verified by the Principal Investigator before analysis using SPSS. Data were analyzed using both univariate and bivariate statistical methods, including chi-square tests for categorical variables and logistic regression to examine associations.

Descriptive statistics were computed to summarize the structures and processes of critical care nursing practice in Ugandan ICUs. Chi-square tests were used to identify significant relationships between variables, while logistic regression was performed to determine the correlation between structures, processes, and the quality of critical care nursing practice. Odds ratios were calculated to determine associations between outcome variables and predictive factors or confounders.

Quality control

For internal validity and reliability, confounders were analysed independently. Training of the research team before commencement was a priority. All procedures were performed under stipulated SOPs.

Ethical considerations

Ethical considerations

All participants went through the detailed informed consent process. The participants were individually spoken to as they walked into the different ICUs for their routine shifts by the research assistant. Rapport was created, and the study was then introduced to the participants. Privacy and confidentiality were emphasized through performing the consent process in a free room to avoid external influence from other people. Autonomy was encouraged as the participants were allowed to choose whether to participate or not without any form of coercion. The entire procedure, risks, and benefits of the study were explained to allow the participants to make an informed decision.

Ethical approval number MUREC-2023-208 from Mildmay Uganda Research Centre, which houses a Research and Ethics Committee (MUREC), was attained. Finally, a letter of authority from the Ministry of Health or the City Health Officer was obtained for performing the study in the different districts across the regions. Administrative clearance from the different hospital leadership was attained for permission to enter the health facility.

Safety of participants

It was a minimal risk study with no anticipated side effects and no delays in standard of care.

Findings

Demographics and Critical Care Characteristics of Critical Care Nurses

A thorough analysis of 77 critical care nurses revealed an average age of 35.89±8.43 years, with 60% exceeding 35 years. Regarding education, 45% held diplomas or certificates, while only 10% had post-graduate training.

Gender diversity was strong, with 75% being female. Shift allocation showed dedication, with 53% on day shifts and the rest on nights. In terms of experience, less than 10% had over 10 years in the ICU, while over half (57%, n=77) had less than a year.

Physical and Critical Care Structure

Variables	Category	Frequency	Percentage (%)
Age Mean (SD		35.89 (8.42546)	
Age (Years)	26.00-35	27	35
	>35.00	50	65
Gender	Male	20	25
	Female	57	75
Education	Diploma and Certificate	41	53
	Graduate	8	37
	Post-graduate	28	10
Number of consecutive shifts done	1	28	37
	2	24	31
	>2	25	32
Shift	Day	41	53
	Evening	8	10
	Night	28	37
Experience in the ICU	<2 years	44	57
	3-5 years	17	22
	5-10 Years	8	11
	10-15 years14.00	4	6
	>15 years	4	6

Examining the ICU infrastructure and operating environment, all four ICUs adhered to an open model. Despite the absence of reception areas, more than half (52%) of ICUs had accessibility to the biomedical engineering workshop, while staff lounges and care-taker waiting areas were scarce (38% of ICUs). None of the ICUs had an on-site laboratory, and only 52% boasted of a point-of-care testing availability.

While all ICUs were located on the same floor as the operating room, client accessibility varied, with 58% offering unrestricted access. Restricted access lock systems were present in 42% of ICUs, but the capability to rotate beds 360 degrees was absent in all units. Only 5% of ICUs maintained an uninterrupted anesthesiologist presence throughout shifts. Furthermore, 68% of ICUs had implemented risk management and admission protocols, along with reminders for hand hygiene. All ICUs possessed functional ventilators and ensured a nurse's presence at the bedside to some degree, but the availability of a suction machine was less consistent, present in 95% of units

.

Process flow in Ugandan ICUs

Variables	Category	Frequency	Percentage (%)
ICU operating model	Open	4 (4)	100
	Closed	0 (4)	0
Presence of ICU reception	No	77	100
	Yes	0	0
Access to the biomedical engineering workshop	Yes	40	52
	No	37	25
Staff lounge present	Yes	29	38
	No	48	62
Care-taker waiting area	Yes	29	38
	No	48	62
ICU laboratory presents	Yes	0	0
	No	77	100
ICU point of care availability	Yes	40	52
	No	37	25
ICU on the same floor as the OR	Yes	77	100
	No	0	0
Is the ICU accessible to all clients?	No	45	58
	Yes	32	42
Door lock system present	Yes	40	52
	No	37	25
Can the ICU bed rotate 360^0 without touching anything	Yes	0	0
	No	77	100
Uninterrupted presence of anaesthesiologists throughout the shift	No	72	95
	Yes	5	5
Presence of Risk Management protocols	Yes	53	68
	No	24	32
Presence of admission protocols	Yes	53	68
	No	24	32
Presence of reminders to perform hand hygiene	Yes	53	68
	No	24	32
Ready Gas supply	Yes	45	42
	No	55	58
Ventilator tested and functional.	Yes	77	100
	No	0	0
Nurse present at the bedside.	Yes	77	100
	No	0	0
Suction machine present	Yes	72	95
	No	5	5

The data analysis provided insights into critical care nursing practices in ICUs. Leadership and administrative factors were widely acknowledged (94.7%), with 63.2% confirming adherence to critical care protocols. Family involvement in patient care was 100%. Challenges included nurses' occasional lack of knowledge in patient management (94.7%). Concerns like multidrug-resistant organisms (84.2%) and privacy observance (31.6%) were noted. However, patient care standards were upheld, with consistent oral care (94.7%) and grooming. Skill areas exhibited variability, with only 5.3% reporting adequacy in intubation tube size.

Summary of findings of the ICU processes

Variables	Category	Percentage (%), n=77
Leadership of the unit is present	Yes	94.7
Monitoring of the processes of work	No	5.3
	Yes	94.7
	No	5.3
Administrative availability of nursing leadership during ward rounds		
	Yes	94.7
Real-time supervision of staff procedures performed	No	5.3
	Yes	63.2
Reference to protocols in critical care service delivery		
	No	36.8
	Yes	42.1
Response in code blue and other emergencies	No	57.9
	Yes	42.1
Patient turned every 2 hours		57.9
	No	100
Nurse using appropriate PPE at all times of the shift	Yes	0
	Yes	63.2
Nurses wash their hands following the 5 moments of hand hygiene		36.8
	No	31.6
Medicines administered in time and charted	Yes	68.4
	Yes	73.7
Vital signs recorded in real time	No	26.3
	No	5.3
Nurse responds to abnormal vitals	Yes	94.7
	Yes	47.4
Patients reviewed by the primary healthcare provider	No	52.8
	No	31.6
Protocols followed	Yes	68.4
	Yes	100
Families involved in patient care	No	0
	Yes	100
Monitoring tools at the bedside	No	0
	Yes	73.7
Alarms audible	No	26.3
	No	31.6
The nurse responds to the alarms appropriately	Yes	68.4
	Yes	94.7
The nurse demonstrates proficiency in using monitoring tools	No	5.3
	No	94.7
The nurse knows the patient's diagnosis and can manage the patient	Yes	5.3
	Yes	84.2
Nurse able to titrate vasopressors	No	15.8
	No	31.6
Responds appropriately to ventilator alarms	Yes	68.2
	Yes	63.2
Early extubation*	No	36.8
	Yes	63.2
Readiness for intubation	No	36.8
	Yes	68.4
Readiness for central line insertion	No	31.6

	Yes	68.4
Readiness for investigations	No	31.6
	Yes	68.9
Readiness during a CPR	No	21.1
	No	27.8
ICU exit interviews	Yes	63.2
	Yes	57.9
ICU early tracheostomy	No	42.1
	No	63.2
Code blue team availability		36.8
	Yes	84.2
Presence of MDR organisms in the ICU	No	15.8
	Yes	31.6
Nurses observe the privacy of all patients	No	68.4
	Yes	21.1
Patients with pressure sores	No	78.9
	Yes	94.7
Patient's oral care was done	No	5.3
	Yes	100
Patient groomed, kempt, and clean	No	0
	Yes	5.3
If intubated, ETT the same size and one less present at bedside	No	94.7
	Yes	36.8
The nursing practice manual presents	No	63.2
Assesses GCS at the start of the shift	Yes	31.6
	No	68.4

Perceived Quality of critical care nursing practice by the nurses working in the ICU

The Likert scale findings offer insights into critical care nursing practice perceptions by nurses themselves. Structural aspects reveal concerns about soap availability (47.4%) and bedside equipment checks (42.15%), but comfort with ICU structures (57.9%) and floor safety (73.7%). Process-wise, nurses are positive about following admission criteria (57.9%) and team leadership during emergencies (84.2%). However, effective client feedback mechanisms (68.4%) and preventable death avoidance (68.4%) need improvement. Regarding outcomes, nurses are generally comfortable with ICU admission (79%) but report multiple deaths (73.7%) and varied perceptions on length of stay changes. Overall, the findings highlight areas for structural and procedural improvements to enhance perceived care quality and emphasize the importance of feedback mechanisms and patient outcomes.

Reflection of perceptions of nurses on the quality of critical care nursing practice

Parameters	SD	D	N	A	SA
Structures					
I feel comfortable with the structures of our ICU	0	31.6	10.5	36.8	21.1
The ergonomic of the ICU is good for our work	0	15.8	10.5	57.9	15.8
The IPC infrastructure is well-organized in our ICU	0	21.1	10.5	47.4	21.1
We never have soap in the unit	47.4	10.5	10.5	15.8	15.8
There is always soap and water for IPC activities	15.8	10.5	0	5.3	68.4
The ICU floor is slip-resistant	10.5	5.3	10.5	52.3	21.1
The ICU has enough space and can rotate 360 degrees	10.5	31.6	0	52.6	5.3
Safety checks are available in the ICU	10.5	15.8	15.8	10.5	47.4
Does your bedside have a BVM that was checked for effectiveness this morning	15.8	26.3	15.8	36.85	5.3
I can apply the fire escape protocols effectively	15.8	26.3	15.8	36.8	5.3
Processes					
I follow the admission criteria	5.3	36.8	21.1	21.1	15.8
I feel satisfied with the services I provide here	5.3	10.5	5.3	57.9	21,.1
I can perform team leading effectively during a code blue resuscitation	5.3	0	10.5	42.1	42.1
My clients have a feedback mechanism that they give us	15.8	21.1	15.8	26.3	21.1
All preventable deaths are avoided by our ICU protocols	21.1	5.3	5.3	31.6	36.8
Outcomes					
I am comfortable being admitted to this ICU	5.3	10.5	5.3	52.6	26.3
Had more than two deaths this week	15.8	42.1	0	10.5	31.6
Pressure sores are an indicator of poor nursing care	31.6	0	0	21.1	47.4
The average length of stay has increased since this year, Begum	0	21.1	36.8	21.1	21.1
The average length of stay has reduced since the start of this year	5.3	31.6	31.6	21.1	10.5

SD*- Strongly Disagree, D*- Disagree, N*- Neutral, A*- Agree, SA*- Strongly Agree

Discussion

The findings regarding the physical and critical care structure of the intensive care units (ICUs) in Uganda reveal both strengths and areas for improvement. In terms of the ICU operating model, all four ICUs followed an open model, which aligns with the literature suggesting the benefits of this approach (Lewandowska, Weisbrot et al. 2020). However, notable deficiencies were observed, such as the absence of reception areas in all ICUs and limited accessibility to essential facilities like the biomedical engineering workshop, staff lounges, and caretaker waiting areas(Minton and Batten 2016). Additionally, the lack of on-site laboratories in all ICUs is concerning, as this may impede timely diagnostic processes and patient care (Wenham and Pittard 2009). Regarding patient accessibility, while the majority of ICUs were located on the same floor as the operating room, only a little over half offered unrestricted access to clients, which may hinder family involvement and patient-centered care (Weled, Adzhigirey et al. 2015). Furthermore, the absence of door lock systems in a significant portion of ICUs raises security concerns and highlights the need for enhanced safety measures (Firth and Ttendo 2012).

On the staffing front, the low percentage of ICUs maintaining an uninterrupted anaesthesiologists' presence throughout shifts highlights potential staffing challenges and the importance of adequate staffing levels (Kwizera, Sendagire et al. 2022). Similarly, the inconsistency in the availability of risk management and admission protocols, as well as reminders for hand hygiene, suggests opportunities for standardization and improvement in clinical protocols and infection control practices (Lewandowska, Weisbrot et al. 2020).

Perceived quality of critical care nursing Practice

The Likert scale findings offer valuable insights into critical care nursing practice perceptions among nurses, shedding light on both strengths and areas for improvement. Structural concerns, such as the availability of soap and the effectiveness of bedside equipment checks, highlight the importance of optimizing the ICU environment to ensure patient safety and quality of care (Atumanya, Sendagire et al. 2020). Despite these challenges, nurses express comfort with certain aspects of ICU structures and floor safety, indicating a foundation for quality care delivery.

In terms of processes, nurses generally demonstrate confidence in following admission criteria and exhibiting effective team leadership during emergencies. However, there are notable gaps in effective client feedback mechanisms and the avoidance of preventable deaths, suggesting a need for enhanced communication channels and adherence to established protocols

(Legido-Quigley, Asgari et al. 2020). Outcomes reveal a mixed picture, with nurses reporting comfort with ICU admission but also noting multiple deaths and varied perceptions regarding changes in length of stay. These findings stress the complex interplay between structural elements, nursing processes, and patient outcomes in the critical care setting (Grunow, Mörgeli et al. 2019).

Drawing parallels with existing literature, specialized training programs for critical care nurses and the presence of nurse specialists as ICU head nurses emerge as potential avenues for improving patient outcomes and quality of care delivery (Weled, Adzhigirey et al. 2015). The findings also align with efforts to enhance critical care service availability in Uganda, emphasizing the importance of standardized care practices and increased training for ICU personnel.

In conclusion, the findings highlight the critical role of nurses in shaping the quality of care delivery in Ugandan ICUs and emphasize the importance of ongoing efforts to address structural, process-related, and outcome-oriented challenges in the provision of critical care nursing practice. These insights provide a valuable foundation for future interventions aimed at enhancing care quality and patient outcomes in Ugandan intensive care units.

Funding Statement:
This research was made possible through a Seed Grant by the Uganda Nurses and Midwives Council (UNMC) of 2023/2024

Disclaimer

The views, opinions, and conclusions expressed in articles published in the Uganda Journal of Nursing and Midwifery (UJNM) are solely those of the respective authors and do not necessarily reflect the official policy, position, or opinions of the editorial board, publisher, reviewers, affiliated institutions, or partners of the journal. While every effort is made to ensure the accuracy, reliability, and integrity of the information published, the Uganda Journal of Nursing and Midwifery (UJNM) and its publisher shall not be held responsible for any errors, omissions, or consequences arising from the use of the information contained in this publication. Readers are encouraged to independently verify clinical practices, drug dosages, procedures, and research findings before application in professional practice.

References

1. Atumanya, P., et al. (2020). "Assessment of the current capacity of intensive care units in Uganda: A descriptive study." Journal of critical care 55: 95-99. https://doi.org/10.1016/j.jcrc.2019.10.019
2. Chase, G. and M. R. Klauber (1965). "A graph of sample sizes for retrospective studies." American Journal of Public Health and the Nation's Health 55(12): 1993-1996. https://doi.org/10.2105/AJPH.55.12.1993
3. Clements, A., et al. (2015). "The effect of a nurse team leader on communication and leadership in major trauma resuscitations." International emergency nursing 23(1): 3-7. https://doi.org/10.1016/j.ienj.2014.04.004
4. Eastwood, G. M., et al. (2012). "Critical care nurses' opinion and self-reported practice of oxygen therapy: a survey." Australian Critical Care 25(1): 23-30. https://doi.org/10.1016/j.aucc.2011.05.001
5. Firth, P. and S. Ttendo (2012). "Intensive care in low-income countries: a critical need." N Engl J Med 367(21): 1974-1976. https://doi.org/10.1056/NEJMp1204957
6. Giles, T. M., et al. (2019). "Nurses' perceptions and experiences of caring for patients who die in the emergency department setting." International emergency nursing 47: 100789. https://doi.org/10.1016/j.ienj.2019.100789
7. Grunow, J., et al. (2019). Innovative ICU solutions to prevent and reduce delirium and post-intensive care unit syndrome. Seminars in respiratory and critical care medicine, Thieme Medical Publishers, 333 Seventh Avenue, New York, NY 10001, USA.
8. Hammerstedt, H., et al. (2014). "Addressing World Health Assembly Resolution 60.22: a pilot project to create access to acute care services in Uganda." Annals of Emergency Medicine 64(5): 461-468. https://doi.org/10.1016/j.annemergmed.2014.01.035
9. Kwizera, A., et al. (2012). "National intensive care unit bed capacity and ICU patient characteristics in a low-income country." BMC research notes 5: 1-6. https://doi.org/10.1186/1756-0500-5-475
10. Kwizera, A., et al. (2022). "Building Critical Care Capacity in a Low-Income Country." Critical Care Clinics 38(4): 747-759. https://doi.org/10.1016/j.ccc.2022.07.003
11. Legido-Quigley, H., et al. (2020). "Are high-performing health systems resilient against the COVID-19 epidemic?" The Lancet 395 (10227): 848-850. https://doi.org/10.1016/S0140-6736(20)30551-1
12. Lewandowska, K., et al. (2020). "Impact of alarm fatigue on the work of nurses in an intensive care environment: a systematic review." International journal of environmental research and public health 17(22): 8409. https://doi.org/10.3390/ijerph17228409
13. Minton, C. and L. Batten (2016). "Rethinking the intensive care environment: considering nature in nursing practice." Journal of Clinical Nursing

25(1-2): 269-277. https://doi.org/10.1111/jocn.13069
14. Pauls, M. A., et al. (2020). "Ethical considerations in the allocation of critical care resources when capacity is overwhelmed." Canadian Journal of Emergency Medicine 22(4): 404-406. https://doi.org/10.1017/cem.2020.354
15. Phua, J., et al. (2020). "Intensive care management of coronavirus disease 2019 (COVID-19): challenges and recommendations." The Lancet Respiratory Medicine 8(5): 506-517. https://doi.org/10.1016/S2213-2600(20)30161-2
16. Ridley, S. and S. Morris (2007). "Cost effectiveness of adult intensive care in the UK." Anaesthesia 62(6): 547-554. https://doi.org/10.1111/j.1365-2044.2007.04997.x
17. Ttendo, S. S., et al. (2016). "Retrospective descriptive study of an intensive care unit at a Ugandan Regional Referral Hospital." World journal of surgery 40(12): 2847-2856. https://doi.org/10.1007/s00268-016-3644-5
18. Webb, E., et al. (2022). "Transforming delivery of essential health services during the COVID-19 pandemic." TEN 28(1): 14.
19. Weled, B. J., et al. (2015). "Critical care delivery: the importance of process of care and ICU structure to improved outcomes: an update from the American College of Critical Care Medicine Task Force on Models of Critical Care." Critical care medicine 43(7): 1520-1525. https://doi.org/10.1097/CCM.0000000000000978
20. Wenham, T. and A. Pittard (2009). "Intensive care unit environment." Continuing Education in Anaesthesia, Critical Care and Pain 9(6): 178-183. https://doi.org/10.1093/bjaceaccp/mkp036
21. Woo, B. F. Y., et al. (2017). "The impact of the advanced practice nursing role on quality of care, clinical outcomes, patient satisfaction, and cost in the emergency and critical care settings: a systematic review." Human resources for health 15(1): 1-22. https://doi.org/10.1186/s12960-017-0237-9