



Effect of educational intervention on knowledge and skills of bachelor nursing completion students towards Paediatric emergency triage at Jinja, Mbarara University of Science and Technology. A cross-sectional study.

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Abstract.

Background:

Despite the government's efforts to train in-service nurses, the knowledge of student nurses towards the use of ETAT+, a WHO tool for the rapid identification and management of emergency pediatric patients, is limited. The study aimed to assess the baseline knowledge and skills, as well as the effect of an educational intervention, on the knowledge and skills of Bachelor of Nursing Completion (BNC) students regarding emergency Paediatric triage at Jinja campus, MUST.

Methods:

A pre-posttest quasi-experimental design using quantitative methods was employed among 30 second-year BNC students at MUST-Jinja Campus. Consecutive sampling was applied. Baseline knowledge was assessed using a WHO-adapted questionnaire, and skills were evaluated through a simulation-based checklist. Participants underwent a one-and-a-half-hour lecture-based ETAT+ training and simulation session, followed by a post-intervention assessment after two weeks. Data was analyzed using STATA 17.0 with the Wilcoxon signed-rank and Mann-Whitney U tests, with significance set at $p < 0.05$.

Results:

(53.3%) Of the respondents were males, (63.3% reported having ever worked in an emergency department and only 20% of the participants reported having ever received triage training. At baseline, none of the students achieved satisfactory knowledge or skills scores ($\geq 60\%$). The mean pretest knowledge score was 47% (SD 7), while skills scored a mean of 40% (SD 8). Post-intervention, knowledge scores significantly improved by 46.16%, from a median of 46.15% to 92.31% (Wilcoxon $p < 0.0001$). Similarly, skills demonstrated marked improvement across domains, including patient assessment, communication, and clinical judgment, with overall competence significantly higher than baseline ($p < 0.05$).

Conclusion:

The educational intervention using lecture and simulation-based training significantly improved both knowledge and skills of BNC students in pediatric emergency triage.

Recommendation:

Integration of ETAT+ training into the nursing curriculum and regular refresher simulations and continuous assessment are essential to ensure sustained knowledge and skills among student nurses and future practitioners.

Keywords: Educational intervention, Knowledge and skills, Paediatric emergency triage, Bachelor of Nursing students, Nursing education, Clinical competence, Mbarara University of Science and Technology (MUST), Emergency Triage systems.

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Background.

Newborn and child health remains a significant concern globally (Hategeka, Shoveller, et al., 2017). Low- and middle-income countries account for the greatest mortality and morbidity among children under five globally (Filippi et al., 2016). More than 25% of children admitted to African health facilities have significant acuity requiring prompt management (Graham et al., 2022). Of the 5.3 million deaths among children under five in 2018, 2.8 million were from Sub-Saharan Africa; one of the major factors associated with this high mortality is limited knowledge in formal triage systems in resource-limited settings (Tesfa et al., 2021).

Emergency Triage Assessment and Treatment plus Admission (ETAT+), one of the most current tools introduced by WHO, helps nurses and doctors to quickly identify patients with life-threatening conditions that cannot wait in the queue to be seen. These patients are initiated on appropriate interventions, and then allocated to the right area of care within the emergency department within the first 10-15 minutes of arrival (AlShatarat et al., 2022). Triage at the Emergency Department (ED) aims to prioritize paediatric patients when clinical demand exceeds capacity (FitzGerald et al., 2010). The World Health Organization (WHO) introduced several triage systems in addition to ETAT+ (Emergency Triage Assessment and Treatment plus Admission). Among these are: Simple Triage and Rapid Treatment (START, a quick triage method for those above eight years), Emergency Severity Index (ESI, a five-level ED triage algorithm), the Australian Triage Scale (ATS), Canadian Triage and Acuity Scale (CTAS), and the Manchester Triage System (MTS) (Yancey & O'Rourke, 2025).

ETAT+ was identified as the most favorable system of triage in developing countries since it could easily be applied in resource-limited areas (WHO., 2016b). WHO therefore published guidelines and training materials for pediatric emergency triage assessment and treatment (ETAT) in 2005, which were later revised in 2013 and further in 2016. These guidelines were specifically for low-resource settings and were adopted from the "Advanced Paediatric Life Support" guidelines that are used in high-income countries like Europe for resuscitation (World Health Organization, 2016). The emergency triage, assessment, treatment, plus admission (ETAT+) is a revised version of the original World Health Organization emergency triage assessment and treatment (Hategeka,

Mwai, et al., 2017). ETAT+ was designed to aid health workers involved in the care of pediatric patients who are acutely ill to scale up their admission and care in the first 24-48 hours. ETAT has been adopted in many health systems globally, including East Africa (Hategeka et al., 2018).

Though ETAT+ is a promising triage system, especially for resource-constrained settings, a number of challenges have hampered its application in practice. One of the hindrances includes a lack of adequate knowledge and skills towards ETAT, which has been attributed to inadequate and isolated training among the healthcare workers, including trainee nurses (Jaeger et al., 2018). Consequently, the "World Health Organization recommends regular training of healthcare workers towards triage systems like pediatric ETAT+ as part of quality improvement projects" (Hands et al., 2021). In Uganda, triage is conducted in a variety of healthcare settings, including hospitals, health centers, and clinics. However, the implementation and adherence to triage protocols vary widely and have not been adopted in health training institutions like nursing schools and universities due to gaps in knowledge and skills among nurses. A study conducted by Novakowski et al. (2022) found that only 40% of nurses in a Ugandan hospital reported having received training in triage. Secondly, available evidence demonstrates that ETAT+ has been adopted in the Ugandan healthcare system in several ways, including facilitating the development of smart triage, which is a mobile digital triage device (Agyeman-Yeboah et al., 2017). However, available evidence showed that it has not been adopted to its full capacity, as only "37% of emergency and priority patients were admitted, detained, or referred, and only 55% of the emergency patients received at least one appropriate treatment due to nurses' knowledge gap (Snoswell et al., 2023). There is considerable evidence that triage and ETAT+ training reduces mortality among children (Dekker, 2019). A study in Mozambique (Dekker, 2019) revealed a reduction of 45% in pediatric death after triage and ETAT+ training. Additionally, a study in Sierra Leone by Hands et al. (2021) reported mortality reduction by 33.1% after implementation of ETAT+ from 14.5% at baseline in 2017 to 9.7% after six months of intervention at the start of 2018.

Student nurses have frequent exposure and play a crucial role in receiving, assessing, and treating children under five by use of the ETAT+ protocol (Dekker-Boersema et al., 2019). However, BNC curriculum regarding paediatric



emergency triage through simulation, hands on and theories is inadequate and rarely carry out triage by use of ETAT+ a tool that is crucial in life saving through quick identification of life-threatening conditions among children among which include; convulsions, severe malnutrition, severe dehydration, prematurity, difficulty in breathing. There are limited publications about the assessment of knowledge and skill, plus the effect of educational intervention on knowledge and skills in triage among Bachelor Nursing Completion students. Therefore, this study aimed at assessing baseline knowledge and skills, plus the effect of educational intervention on Bachelor's nursing completion students' knowledge and skills towards the Paediatric emergency triage component of ETAT+ at Jinja campus, Mbarara University of Science and Technology.

Methodology.

Study Design.

A pre-posttest quasi-experimental study design using quantitative methods of data collection was employed using a single group of participants to measure the degree of change occurring after an intervention. According to the literature, this study design was best suited to measure the degree of change in an interventional study of a small single group. Randomized control study couldn't be applied because it was not feasible both logistically and ethically. Secondly, denying lifesaving information to the control group would put patients' lives at risk, which violates medical ethics.

Study Setting.

The study was conducted at Jinja School of Nursing and Midwifery. This study setting was preferred since it was where the gap was identified, and the setting was suitable for the study. Jinja School of Nursing and Midwifery is one of the public nursing and midwifery schools in Uganda, and is affiliated with Mbarara University of Science and Technology (MUST). Jinja School of Nursing and Midwifery is located in Jinja district, Busoga sub-region in the Eastern region of Uganda. It is approximately 78.4km East of Kampala, the capital and the largest city of Uganda. It is along the shores of Lake Victoria near the source of White Nile at an average elevation of 1204 meters above sea level. Jinja School of Nursing and Midwifery was started in 1954 by the government of Uganda, training enrolled nurses and midwives. Later, it started a training

diploma extension program in Paediatric nursing. In 2016, it was affiliated with MUST and started offering a Bachelor's degree in nursing for completion. The program is a three-year intensive weekend program. Students who have prior training in nursing or midwifery at the diploma level and have at least two years of experience are eligible for this course. The campus has approximately 200 student nurses in the completion program, among whom 74 are in their second year of study. Bachelor Nursing completion program students (BNC) in the second year were selected for the study due to the fact that, at this level of training, they were expected to have attained basic knowledge and skills towards the use of Emergency Triage Assessment Treatment plus Admission (ETAT+) guidelines in pediatric triaging. This is attained via various ways, including lectures, simulation, and ward placements.

Study Population

The study enrolled second-year bachelor of nursing students in the completion program at MUST- Jinja campus. This population was preferred due to the fact that student nurses at this level of training have participated in pediatric care and hence have basic knowledge and skills in Paediatric triage, where ETAT+ is fundamental. More to that, nursing students at this level of training are expected to have attained knowledge and skills in emergency Paediatric triage through lectures, simulation, and ward placements as part of their study curriculum. The second-year cohort of Bachelor of Nursing students has 74 nursing students in the completion program (Records academic registrar, August 2024).

Sample Size Determination.

The sample size was determined from Cohen's formula in situations where there is uncertainty of specific information on the magnitude or extent of adoption of a particular intervention, like the extent of skills of Paediatric emergency triage, a component of ETAT+ at Jinja campus, Mbarara University. The sample size calculation was done using the standardized effect sizes (Cohen, 1988; Allen Jr, 2011; Norman et al., 2012). The formula is $n = 16(1/(\text{effect size})^2)$, where n is the required sample size. Therefore, using a standard large effect size of 0.8 (Cohen, 1988), $n = 16(1/(0.8)^2) = 26$ participants. However, considering an attrition of 10%, $= 10/100 = 0.1 = (0.1 \times 25) = 2.5$ participants. Therefore, the total sample size required was $(26 + 2.5) = 28.5$, approximately 29 participants. Also



notable is that a prior power analysis for a planned paired t-test analysis has shown that a total sample size of 20 participants per group is required to detect a large effect (Buchner et al., 2009). Therefore, the final sample size for this Paediatric emergency triage component of the ETAT+ educational interventional project of 30 participants is adequate to measure the effect of the intervention.

Sampling Strategy.

A consecutive sampling strategy was employed to identify the sampling units until the desired sample size was obtained. This strategy was preferred due to the fact that it minimizes selection bias, making the sample more representative of the target population. The strategy is simple to apply and time-saving.

Eligibility Criteria

Inclusion Criteria.

Second year Bachelor of Nursing students, on completion of the program at Jinja campus, MUST have consented to the study and been recruited. This study population was selected because they had adequate exposure in emergency pediatric triage.

Exclusion Criteria.

Second-year Bachelor of Nursing students who met the inclusion criteria but were absent at the time of the study.

Data collection tools

This consisted of two tools: one assessing knowledge in pediatric triage and another assessing skills in pediatric triage.

Knowledge Tool.

The data collection tool was a self-administered questionnaire to assess pediatric triage knowledge of second-year bachelor student nurses in the completion program at MUST-Jinja campus. The tools were adapted from a WHO ETAT training guide (2016) and from reviewed literature. Tools were in English and never required translation since English is the main language of instruction in the institution. The questionnaire consisted of 13 questions with multiple-choice answers examining both general knowledge about pediatric triage and the ability to categorize patients according to ETAT+ guidelines. Each question scored "1" for a correct response and "0" for an incorrect response.

Skills Tool.

Tools to assess student nurses' skills on the emergency Paediatric triage component of ETAT+.

The observation checklist was used to examine the emergency triage skills. The set questions were 23, each assigned "Yes" if correctly performed and "No" if wrongly performed or not done. "Yes" was scored "1" while "No" was scored "0". This was through simulation for observed skills toward ETAT+. A simulation evaluation instrument.

Measurement of tools.

Score level of ($\geq 60\%$) was considered satisfactory, while score level of ($< 60\%$) was considered unsatisfactory for knowledge. This was based on literature from previous researchers (Shehab et al., 2017; Adeeb, 2024).

Assessed skills using Benner's theory of the five stages of skill acquisition. This allows respondents to answer the same questionnaire many times with consistency.

Table 1 demonstrates Benner's Theory of Five stages (Benner 1982).

SCORES	CATEGORIES	COMPETENCY BENNER
>90%	Excellent	Expert
80-89%	Very good	Proficient
70-79%	Good	Competent
60-69%	Fair	Advanced beginner
<60%	Fail	Novice

Data Collection Procedure

The engagement was done within the school premises. The meeting venue was the school's skills lab. A simple and brief

explanation of the objectives and background of the research was provided to the participants being recruited into the study. The data was collected by the principal investigator



and trained research assistant, two weeks before the intervention and two weeks after the educational interventions were complete. The duration of post-test assessment was used in other related studies, and participants demonstrated retention of knowledge.

Pre-Intervention

The pre-intervention data were collected two weeks before the Intervention phase, as this would help in modifying the teaching based on their baseline knowledge and skills. A collection of post-intervention data two weeks after intervention allows time for participants to assimilate what was taught and allows practice to take place. On the day of the instruction, a self-administered researcher-designed pretest questionnaire was issued to each respondent with explanations as necessary. The respondents answered the questionnaire within 30 minutes under supervision without referring to any sources and handed it over to the researcher immediately upon completion. They were also requested to avoid copying. The tests were done in lecture rooms free from distraction.

Intervention for Knowledge towards Paediatric Emergency Triage.

A one-and-a-half-hour educational session was provided during the intervention phase using a lecture-based method aided by a PowerPoint presentation. The training was conducted by two researchers with master's degree level of training and had received prior training in emergency pediatric triage with the guidance of the WHO ETAT+ guideline. The training was done in the lecture room. The education session was aimed at enhancing the completion of nursing students' knowledge and skills towards emergency pediatric triage, a component of ETAT+. The teaching included information on the triage component of ETAT+. For skills towards the triage component of ETAT+, a simulation-based approach was used to instill and assess the competencies of the nurses. Educational simulation is a teaching method that tests participants' knowledge and skill levels by placing them in scenarios where they must actively solve problems. This simulation strategy aimed to facilitate an objective assessment of the competency of student nurses on completion of the program toward the application of ETAT++ in triage among pediatric patients. This would help to complement the results of their self-perceived competence. The reason is that studies have reported nurses to overrate their self-perceived competencies. Furthermore,

simulation has demonstrated the ability to enhance the clinical reasoning ability of nursing students.

The simulation sessions were conducted at MUST-Jinja campus skills laboratory, which was improved to meet the required standards for the simulation sessions to take place. This was after permission had been granted by the university administration. All the participants who participated in the knowledge training were expected to participate in the simulation observation session for skills after giving informed consent. The session was provided on the same day after a discussion with the Academic Registrar and the class leaders. The scenario was for a pediatric patient with signs and symptoms of clinical deterioration upon arrival at a facility. The scenario was developed by the researcher, and the relevance of the content was reviewed by a pediatrician and two senior nurses on the pediatric ward at Mbarara University of Science and Technology. A minimum of three participants per simulation was considered distributed in ten groups. The entire simulation session was divided into three phases: pre-brief, simulation, and debrief phases, as elaborated below:

The pre-brief phase included orienting the participants to the simulation room including equipment for example for vital signs like, clinical thermometer, blood pressure machine, stethoscope, pulse-oximeter, the patient's attendant, the consultation materials like the national clinical guide line and British national formulary, a phone to call any specialists outside the simulation, housekeeping rules (the dos and don'ts), writing materials and the ETAT plus chart and algorithm were present in the simulation room. It was generally intended to make the participants fully aware of the environment so as to mimic the actual skills environment. This process took a maximum of 10 minutes. The pre-briefing phase was guided by a standard pre-briefing guide, which was adopted from the Mbarara University of Science and Technology simulation center.

The simulation phase included running the actual scenario. During this phase, the scenario facilitator read the scenario while giving brief information about the chief complaint of the patient to the participants and asked the participants to intervene and help the deteriorating patient. They were expected to ask for more information about the patient from the attendant actresses who were at the bedside. To further mimic reality, relatively little information was provided, the clinicians were allowed to investigate freely, and the participants were given clinical information over time in accordance with a process-based information giving. This



approach would help enhance the ecological validity of the simulation, allowing the participants to exercise clinical thinking dynamically. To achieve an effective and practical learning environment, two important considerations were made. These included the level of relevance of information provided and the predictability of the perceived relationship. For example, alterations in the patient's pulse rate and blood pressure will signify alterations in the cardiac output. The skills competency of the nurses was assessed by observation against a checklist by two separate non-participant trained observers. This would aid in harmonizing the level of agreement or disagreement to maintain the objectivity of the assessment. This simulation phase lasted for 20 minutes.

The debriefing phase followed the simulation phase. This debriefing phase was guided by the "Promoting Excellence and reflective learning in simulation (PEARLS) tool". A modified version of this tool by Mbarara University of Science and Technology's simulation department was used with permission. During the debriefing, more items of the competency, which are; Reflection on process of managing

rapidly changing patient situations" and Extrapolation of knowledge from the reflection process to apply in managing future patient situations were observed from the participants against the checklist. This phase took a minimum of 45 minutes to allow the participants to resume their normal duties. During this phase, the researcher would facilitate the instillation of appropriate skills to the participants through practical demonstration and return demonstration. This debriefing phase was guided by a standard debriefing guide.

Post Intervention Phase.

The post-intervention data were collected with the same questionnaire and checklist used in the pretest, two weeks after the educational interventions were completed. This period of data collection post-intervention was based on guidance from other related studies. Another simulation session was organized post-intervention. The data collection procedure was summarized in the Study profile.

Study Profile

Pre - intervention Phase

- Pre-intervention data collection of student nurses' baseline knowledge and baseline skills towards triage component of ETAT+ (45 minutes).



Intervention Phase

- Educational intervention on triage component of ETAT+
- Hands-on skills on triage component of ETAT+



Post- intervention Phase

- Post intervention data collection on completion student nurses' knowledge and skills in triage component of ETAT+



Data Management

The collected data was checked for completeness and consistency in time, as well as the completion of the questionnaires before leaving the institution, and any missing data was filled in. Furthermore, the data collection process ensured enough questionnaires for all participants and that individual interviews were administered to avoid shared responses while also maintaining confidentiality. The data was entered into the Epi Info version 7.0 software, cleaned, and coded. Furthermore, knowledge regarding pediatric emergency triage was graded as good knowledge (score ≥ 60) or poor knowledge (score < 60). For knowledge and skills, a score was given: “1” for questions answered correctly and “0” for questions answered incorrectly. This would facilitate obtaining the overall mean/median score for knowledge and skills pre-intervention and post-intervention.

Data Analysis.

The data analysis was conducted in STATA 17.0 (Texas, USA). The descriptive statistics were used to summarize the data. Continuous variables were summarized using the mean and standard deviation (SD), median, and interquartile range (IQR). Categorical variables were compared using the frequencies and percentages. The continuous variable age was categorized using the median age of participants to compare the knowledge and skills of participants in performing pediatric emergency triage. The Shapiro-Wilk test was used to test for normality of data distribution, and the P-value was 0.002 (indicating non-parametric).

For objective 1, the overall baseline knowledge about pediatric emergency triage scores was summarized using the median and IQR, while scores per domain were presented in frequencies and percentages. The distribution of the knowledge scores across the demographic characteristics of the participants was assessed using the two-sided Wilcoxon Rank Sum test.

For objective 2, the overall baseline skills assessment scores were summarized using the median and IQR, while scores per domain were presented as frequencies and percentages. The skills assessment scores were further summarized by the domains of the ETAT+ triage instrument.

For objective 3, the median overall knowledge score before and after the educational intervention was compared using a two-sided Wilcoxon signed-rank test. The subgroup analysis was done to compare the knowledge scores before and after

the educational intervention by the demographic characteristics using a two-sided Mann-Whitney U-test. The differences in the scores were not normally distributed (assessed using a histogram). Similarly, the median skills assessment score before and after the educational intervention across the demographic characteristics was compared using a two-sided Mann-Whitney U-test. The change in the skills assessment score in each of the domains of the ETAT+ triage instrument was assessed before and after the educational intervention using a two-sided Mann-Whitney U-test. For all the statistical tests, the level of significance was set at a P value < 0.05 .

Quality Control and Assurance

The study employed validated tools to measure knowledge and skills on the emergency pediatric triage component of ETAT+. The questionnaire was pre-tested among 4 respondents in Mbarara University of Science and Technology among completed student nurses. This was done a month before data collection. Senior pediatrician and two senior nurses who had prior training in triage were approached for guidance and face validity of the tool to ensure construct validity, and the questionnaire was confirmed viable for the study. The principal investigator closely monitored the data collection process to ensure timely corrections and guidance. The research assistants were trained before data collection. The validity was safeguarded by grounding the questionnaire in existing scientific knowledge obtained from the literature.

Pretested knowledge assessment questionnaire for reliability using the Alpha Cronbach's test. The alpha reliability of this part was = 0.81. Indicating a good level of consistency of the tool. Score level of ($\geq 60\%$) was considered satisfactory, while score level of ($< 60\%$) was considered unsatisfactory for knowledge. This was based on literature reviews of previous studies that used similar ratings (Shehab et al., 2017; Adeeb et al., 2024), and for the skills assessment tool, Berner's theory of the five stages was used for rating. The skills tool was tested for reliability using Cohen's kappa coefficient, $k = 0.63 = 63\%$ (SD 0.18). Reflecting substantial (good) agreement between the raters. P-value of 0.003, which is statistically significant. We thus reject the null hypothesis, which states that there is no agreement between the raters.



Ethical approval.

Scientific approval was obtained from the Department of Nursing and the Faculty Research committees of the Faculty of Medicine of Mbarara University of Science and Technology. Ethical approval was provided by the Research and Ethics Committee of MUST (MUST-2024-1377). Administrative Clearance was obtained from the Academic Registrar of MUST-Jinja campus. Written informed consent was sought from all participants before enrollment.

Informed consent

A consent form was filled out by the respondents after explaining the purpose of the study to them. Anonymity and confidentiality were strictly observed during data collection,

description, and reporting of findings. Written informed consent forms were supplied to them, and the confidentiality of all the information about the respondents was communicated and maintained.

Results.

Characteristics of Participants

The median (IQR) age of the study participants was 35.6 (32-41) years, and more than half were males (53.3%). The participants reported having been in clinical practice for a median (IQR) period of 9.8 (7.6-12.0) years, and about two-thirds reported having ever worked in an emergency department (63.3%). Only 20% of the participants reported having ever received triage training.

Table 2: Characteristics of 30 nursing students who participated in the study, n=30

Variable	Median	Interquartile range
Age	35.6	32 – 41
Years of experience	9.8	7.6 – 12.0
	Frequency	Percentage
Sex		
M	16	53.3
F	14	46.7
Ever worked in the emergency department?		
Yes	19	63.3
No	11	36.7
Ever had training		
Yes	6	20.0
No	24	80.0

Baseline Knowledge of Bachelor Nursing Completion Students Towards Pediatric Emergency Triage.

Baseline Knowledge Scores of Student Nurses.

The knowledge assessment scores in the pretest were non-parametric (Shapiro-Wilk p-value = 0.002). The overall baseline level of knowledge of the participants towards the paediatric emergency component of ETAT+ was low, with none of the participants demonstrating a satisfactory level of knowledge, as all scored less than 60% in the pretest knowledge questionnaire, representing a pass rate of 0%.

Table 3: Baseline Performance of Respondents in Each Component of Paediatric Emergency Triage Knowledge Assessment Tool

Variable	Responses: n=30	
	Correct response f (%)	Wrong response f (%)
Define pediatric triage	28(93.33)	2(6.67)
When and where should pediatric triage take place	25(83.33)	5(16.67)
Who should do pediatric triage	26(86.67)	4(13.33)
What do letters A, B, C, D & E stand for in pediatric triage	25(83.33)	5(16.67)
List the priority signs of pediatric triage	9(30.00)	21(70.00)
Put the actions of pediatric triage in the right chronological order.	24(80.00)	6(20.00)
What signs of severe malnutrition do you check during pediatric triage	4(13.33)	26(86.67)
Where do you look for signs of severe wasting in children	5(16.67)	25(83.33)
Below what age is a child always a priority	5(16.67)	25(83.33)
What should you do if a child has a priority sign	3(10.00)	27(90.00)
Ability to categorize according to ETAT		
A 3-year-old girl is carried in her mother's arms, wrapped in a blanket	28(93.33)	2(6.67)
A 4-year-old male child was rushed in. he convulsed one hour	4(13.33)	26(86.67)
A one-year-old had a seizure at home, then again outside the clinic	24(80.00)	6(20.00)
	Adequate knowledge	Inadequate knowledge
Overall pretest grade	0(0.00)	30(100.00)
Mean score	47% SD 7	

The majority of the respondents (90%) did not know what to do if a child had a priority sign. 86.7% didn't know the signs of severe malnutrition during pediatric triage assessment. The majority of 83.3% did not know what age a child is always a priority and what should be done. 93.3% didn't have any idea about patient categorization according

to ETAT+ guidelines mean while 93.3% were able to define pediatric triage, 83.3% knew where and when the pediatric triage should take place, 86.7% knew who should do the pediatric triage, 83.3% knew what A, B, C, D, E stand for in pediatric triage and 80% were able to put action of triage in the right chronological order.



BASELINE SKILLS OF BNC STUDENTS IN PERFORMING PEDIATRIC EMERGENCY TRIAGE.

Table 4: Performance frequencies in each component of paediatric triage before intervention, n = 30

Areas of assessment	n=30 categories	
	Competent	Incompetent
Assessment	f (%)	f (%)
Obtains pertinent data	27(90)	3(10)
Performs follow-up assessment as needed	12(40)	18(60)
Assesses the environment in an orderly manner	12(40)	18(60)
Communication		
Communicates effectively with intra-/ interprofessional teams using SBAR	0(0)	30(100)
Communicates effectively with patient and significant other (verbal, non-verbal)	03(10)	27(90)
Documents clearly, concisely, and accurately	12(40)	18(60)
Responds to abnormal findings appropriately	15(50)	15(50)
Promotes professionalism	6(20)	24(80)
Clinical Judgement		
Interprets vital signs (T, P, R, BP, Pain)	9(30)	21(70)
Interprets lab results	3(10)	27(90)
Interprets subjective /objective data (recognizes relevant from irrelevant data)	6(20)	24(80)
Priorities appropriately	3(10)	18(90)
Performs evidence-based interventions	0(0)	30(100)
Provides evidence-based rationale for interventions	0(0)	30(100)
Evaluates evidence-based interventions and outcomes	0(0)	30(100)
Reflects on clinical experience	24(80)	6(20)
Delegates appropriately	27(90)	3(10)
User Identifiers		
Uses patient identifiers	21(70)	9(30)
Utilizes standard practices and precautions	21(70)	9(30)
Administers medications safely	15(50)	15(50)
Manages technology and equipment	9(30)	21(70)
Performs procedures correctly	3(10)	27(90)
Reflects on potential hazards and errors	3(10)	27(90)
Skill performance score ranges.		
Mean score		
40% (SD 8)		

From table 4, 90% demonstrated competency in obtaining pertinent data from the patient, 90% of them were able to delegate appropriately, meanwhile 60% demonstrated

incompetency in performing follow-up assessment as needed, and the environment was maintained in an orderly manner. 100% knew communication skills. Most of the

respondents scored < 60% in clinical judgment as per ETAT, as 80% failed in evidence-based rationale, intervention, and outcome, 80% failed to perform in clinical experience, and half of the respondents failed to demonstrate patient safety skills.

as Per Domain

The overall median (IQR) score of the baseline skills in performing pediatric emergency triage was 39.0% (30.4 - 48.0). All of the participants scored less than 60% in performing the pediatric emergency triage, reflecting incompetence.

Baseline Skills in Pediatric Emergency Triage

Table 5: The baseline skills assessment scores in performing the pediatric emergency triage among student nurses as per domains. n=30

Domain	Number of assessment criteria	Pretest skills assessment score Median (IQR)
Overall score	23	39.0 (30.4 - 48.0)
Patient assessment	3	33.3 (33.3 - 100.0)
Communication	5	40.0 (20.0 - 60.0)
Clinical judgement	9	33.3 (22.0 - 55.6)
Patient safety	6	50.0 (33.3 - 50.0)

Effect of Education Intervention on Knowledge of BNC Students towards Pediatric Emergency Triage.

There was a significant improvement in the level of knowledge on paediatric emergency triage after the educational intervention (ETAT+ training), as demonstrated

by a 46.16% increase in the median score from the pretest (median score = 46.15%) and post-test (median = 92.31), a statistically significant difference (Wilcoxon Matched pairs signed rank test $p < 0.0001$). Signifying a high statistical difference between the median scores of two groups. Therefore, the education intervention on knowledge has significantly impacted positively on the respondents.

Table 6a: Change in knowledge after education intervention among individual items. n=30

Domain	Pretest scores		Post-test scores	
	Correct response f (%)	Wrong response f (%)	Correct response f(%)	Wrong response f(%)
Define pediatric triage	28(93.33)	2(6.67)	29(96.67)	1(3.33)
When and where should pediatric triage take place	25(83.33)	5(16.67)	29(96.67)	1(3.33)
Who should do pediatric triage	26(86.67)	4(13.33)	30(100)	0(0.00)
What do letters A, B, C, D & E stand for in pediatric triage	25(83.33)	5(16.67)	30(100)	0(0.00)
List the priority signs of pediatric triage	9(30.00)	21(70.00)	25(83.33)	5(16.67)
Put the actions of pediatric triage in the right chronological order.	24(80.00)	6(20.00)	28(93.33)	2(6.67)

What signs of severe malnutrition do you check during pediatric triage	4(13.33)	26(86.67)	24(80.00)	6(20.00)
Where do you look for signs of severe wasting in children	5(16.67)	25(83.33)	26(86.67)	4(13.33)
Below what age is a child always a priority	5(16.67)	25(83.33)	29(96.67)	1(3.33)
What should you do if a child has a priority sign	3(10.00)	27(90.00)	27(90.00)	3(10.000)
Ability to categorize according to ETAT				
A 3-year-old girl is carried in her mother's arms, wrapped in a blanket	28(93.33)	2(6.67)	27(90.00)	3(10.00)
A 4-year-old male child was rushed in and had convulsed one hour before	4(13.33)	26(86.67)	26(86.67)	4(13.33)
A one-year-old had a seizure at home, then again outside the clinic	24(80.00)	6(20.00)	28(93.33)	2(6.67)
	Pretest		Post test	
	Competent f (%)	Incompetent f(%)	Competent f (%)	Incompetent f(%)
Overall Remark	0(0.000)	30(100.00)	30(100.00)	0(0.000)

Table 6b: Overall Effect of Education Intervention on Knowledge n=30

VARIABLES	N	Min	Max	Median	Z	Wilcoxon signed-rank p-value
Pre-test score	30	30.77	53.85	46.15	4.838	<0.0001
Post-test score	30	76.92	100	92.31		
Test difference	30			46.16%		

All participants demonstrated 100% of knowledge change in the posttest.

Effect of Educational Intervention on Skills of Completion Nursing Students Towards Emergency Pediatric Triage.

The Overall performance of emergency pediatric triage significantly increased after an educational intervention given to the participants, with a P value of <0.001.

Table 7: Effect of intervention on performance frequencies in skills in each part of the Paediatric emergency triage before and after education intervention in the emergency pediatric triage. n=30

DOMAIN	CATEGORIES	PRETEST f (%)		POSTTEST f (%)	
		Competent	Incompetent	Competent	Incompetent
ASSESSMENT	Obtains pertinent data	27(90.00)	03(10.00)	30(100)	0(0)
	Performs follow-up assessment as needed	12(40.00)	18(60.00)	27(90.00)	3(10)
	Assesses the environment in an orderly manner	12(40.00)	18(60.00)	30(100)	0(0)
COMMUNICATION	Communicates effectively with intra-/interprofessional teams using SBAR	0(0)	30(100)	30(100)	0(0)
	Communicates effectively with patient and significant other (verbal, nonverbal)	3(10.00)	27(90.00)	30(100)	0(0)
	Documents clearly, concisely, and accurately	12(40.00)	18(60.00)	30(100)	0(0)
	Responds to abnormal findings appropriately	15(50.00)	15(50.00)	30(100)	0(0)
	Promotes professionalism	6(20.00)	24(80.00)	30(100)	0(0)
CLINICAL JUDGMENT	Interprets vital signs (T, P, R, BP, Pain)	9(30.00)	21(70.00)	30(100)	0(0)
	Interprets lab results	3(10.00)	27(90.00)	27(90.00)	3(10.00)
	Interprets subjective/objective data (recognizes relevant from irrelevant data)	6(20.00)	24(80.00)	310(100)	0(0)
	Priorities appropriately	3(10.00)	27(90.00)	30(100)	0(0)
	Performs evidence-based interventions	0(0)	30(100)	30(100)	0(0)
	Provides evidence-based rationale for interventions	0(0)	30(100)	30(100)	0(0)
	Evaluates evidence-based interventions and outcomes	0(0)	30(100)	30(100)	0(0)
	Reflects on clinical experience	24(80.00)	6(20.00)	30(100)	0(0)

	Delegates appropriately	27(90.00)	3(10.00)	30(100)	0(0)
PATIENT SAFETY	Uses patient identifiers	21(70.00)	9(30.00)	30(100)	0(0)
	Utilizes standard practices and precautions	21(70.00)	9(30.00)	30(100)	0(0)
	Administers medications safely	15(50.00)	15(50.00)	30(100)	0(0)
	Manages technology and equipment	9(30.00)	21(70.00)	30(100)	0(0)
	Performs procedures correctly	3(10.00)	27(90.00)	30(100)	0(0)
	Reflects on potential hazards and errors	3(10.00)	27(90.00)	30(100)	0(0)
	Overall mean score		92% (SD 7.4)		

As shown in Table 7, under assessment, the majority of student nurses (90%) of the participants demonstrated competency in regard to obtaining pertinent data from the patient, while they demonstrated incompetency (40%) in performing follow-up assessment as needed and in the environment in an orderly manner. After the education intervention, all participants (100%) demonstrated good skills in assessment. In regard to communication, respondents failed to demonstrate communication skills

(60%). After the education intervention, all respondents (100%) demonstrated good communication skills. 60% of the respondents failed to carry out clinical judgment in the baseline assessment of skills. All the respondents (100%) were competent in demonstrating clinical judgment after educational intervention, while 70% of the respondents failed to demonstrate patient safety, which improved to 100% after educational intervention.

Table 8: overall effect of education intervention on skills of bachelor completion student nurses in emergency pediatric triage, n=30.

VARIABLES	N	Min	Max	Median	Z	Wilcoxon signed-rank p-value
Pretest mark	30	30.4%	48.1%	39.0%	2.812	<0.001
Posttest mark	30	86.0%	100.0%	91.3%		
Test difference				52.3%		

There was a great improvement in the overall practice of Paediatric emergency triage with a test difference of 52.3% in the scores of participants during observed practical assessment before and after training, with a p-value of < 0.001.

The median performance in skills of the student nurses towards Paediatric emergency triage before intervention was 39% (30.4-48.1). The skills of completion of student nurses' post-intervention indicated a median of 91.3% (86-100), because the scores of observed practice post-

intervention were not normally distributed (Shapiro-Wilk p= 0.00006), a Wilcoxon signed-rank test was performed to determine the effect of educational intervention on completion of student nurses' observed practices toward the triage component of ETAT+. The results show that the educational intervention had a significant effect on the student nurses' skills toward the triage component of ETAT+ (Z=2.812, p <0.001). Since the difference of medians is not equal to zero and the p value <0.001 and CI<0.05 (Shown in table 11 above), this gives strong



evidence to reject the null hypothesis, which stated, "Education intervention does not affect student nurses' skills towards triage a component of ETAT+". This allows the researcher to conclude that there is a significant difference between the pretest marks and the posttest marks of skills in the pediatric triage; therefore, the education intervention had an effect on student nurses' skills towards practicing triage, a component of ETAT+. Therefore, all participants demonstrated competence with a median score of 91.3% in the post-test compared to what was reflected in the pre-test with a median score of 39%.

Discussion of results.

Baseline knowledge of BNC students on Paediatric emergency triage

This study revealed that knowledge of the Paediatric emergency triage among student nurses in the completion program was very low, with none of the participants demonstrating at least a satisfactory knowledge score (60%) during baseline knowledge assessment. The majority of the participants, 93.3% were unable to categorize patients according to ETAT+ guidelines, and 90% were unable to identify priority signs and what to do in a critically ill child as per ETAT+ guidelines. This low level of knowledge on paediatric emergency triage could be due to low levels of exposure to triage training in the group we studied, with only 20% of the participants reporting having received prior paediatric triage training.

The fact that there was no significant difference in knowledge between those with previous triage training, median score, and those without training could be because those with prior training could have forgotten information learnt from previous training. It has been shown that knowledge decay occurs after triage training without repeat training, even as early as 6 weeks (Recznik and Simko, 2018b). It could also be because the previous training received was for general triage, which focuses mostly on adult patients, and yet there are variations with triage protocols that apply specifically to the paediatric age group. Furthermore, a study among nurses working in four emergency centers in Tanzania revealed low levels of knowledge in triage, with only 33% of the nurses demonstrating knowledge on triage (Aloyce et al., 2014). Their study differed in that they were assessed in triage in general without restriction to paediatric aspects, which may limit drawing conclusions from their findings in the context of paediatric triage.

Another study among Egyptian nurses revealed low levels of knowledge on triage, including paediatric triage, with a baseline score of only 3.8% before training, even though these were nurses working in emergency departments where triage is expected to be part of the bread and butter of their daily nursing work (Shehab et al., 2017). It appears that the low levels of knowledge on paediatric triage are not only restricted to the global south, with a study of emergency department nurses in four Australian hospitals revealing the same shortcomings with marked variations between different hospitals (Allen et al., 2015).

A similar study also reported that marked differences in the knowledge on different components of paediatric triage, with scores ranging from 15% to 100% in a single component. Their assessment was, however, based on the Emergency Triage Education Kit (ETEK), where patients' triage categories were assigned on a triage score on a scale of 1-5, which varies from the assessment approach used in this study, where mostly cognitive ability to correctly recognize or recall a given phenomenon was assessed. On the other hand, not all studies have shown unsatisfactory knowledge on paediatric triage among nurses. A study comparing triage nurses working in paediatric emergency departments and general emergency department in two Italian hospitals reported better levels of knowledge among nurses working in paediatric triage but less than satisfactory performance in the ability to correctly assign correct codes during triage with underestimation of the severity of illness in many scenarios among the nurses who had been working in the general triage (Bijani & Khaleghi, 2019). The better levels of knowledge observed in their study compared to this study are probably because they had nurses working in dedicated paediatric emergency departments, in contrast to the group we studied, who were from a more heterogeneous group with diverse working backgrounds, as they work in different units of their respective health facilities.

Depending on the above observation, it is crucial to note that an unattended knowledge gap in paediatric emergency triage among nurses can have adverse implications for young patients, particularly due to the unique challenges of recognizing and addressing their needs swiftly. Delayed recognition of critical conditions is a significant risk, as children often exhibit subtle or atypical symptoms such as lethargy masking sepsis, meaning nurses with inadequate knowledge and triage skills might fail to prioritize these cases, postponing vital interventions like intravenous fluids



or antibiotics and allowing conditions to escalate dangerously.

Furthermore, this gap in knowledge and expertise can worsen outcomes by overlooking age-specific vulnerabilities, such as how rapidly infants and neonates deteriorate from dehydration compared to adults, potentially leading to organ damage or irreversible harm if care is not expedited.

Inappropriate pain management in relation to inadequate knowledge further compounds the issue, as children may struggle to articulate distress; for instance, mistaking an acute abdomen for a minor stomachache could leave a child in prolonged pain, and this may increase risks of complications due to misjudged severity during triage. These unattended errors may bring about the likelihood of permanent injury or death as critical windows for intervention close.

Baseline skills of BNC students in Paediatric emergency triage

The level of skills in the practice of Paediatric emergency triage among the student nurses was not satisfactory, which was still below the set standard score. All the participants were unable to communicate effectively using SBAR during patient triage. This can be partly explained by the knowledge decay that occurs over the years and by the overall low levels of previous exposure to triage training. The skill levels were also not satisfactory in those with previous triage training, where performance of triage is expected as part of their daily routine duties.

One-time effort in training may also not be very effective, especially over the long run. Hathcock et al previously demonstrated that a curriculum for paediatric emergency resuscitation based on short, frequent training was more effective in improving skills (Hathcock et al., 2018). In the group we studied, only 3 of the 30 participants had ever attended at least 2 episodes of training on paediatric emergency triage.

Sustained change in practice of any skill or ingrained patterns of behavior or attitudes may not easily be achieved, unless reinforced by regular training and support supervision (Andersen and Watkins, 2018). Support of emergency and acute care is the most important pillar in reducing childhood in-hospital deaths (Chiume et al., 2018). The Tanzanian study by Aloyce et al. (2014) also reported that a majority of the nurses (52%) lacked the skills to correctly triage patients. This could partly be explained by

the relatively low education and cumulative experiences of the nurses in the hospitals they studied, with almost half of them having worked for less than a year, and all being certificate or Diploma holders.

Studies elsewhere have noted unsatisfactory performance in specific components of paediatric triage. In the study of Italian nurses working in Paediatric emergency department (ED) and General ED, it was noted that both paediatric and general nursing groups could not correctly complete all steps of the paediatric triage protocol as expected of them, with most of the participants not carrying out the re-evaluation step after initial assessment (Bijani & Khaleghi, 2019). As previously noted, the inability to perform assessment was a similar challenge in the nursing student population we enrolled in this study.

In this study population, the median years of experience among nurses was 9.8 years, yet this level of experience did not influence their emergency triage skills. This finding contrasts with a study by Elgazzar (2023), which reported low triage proficiency among emergency department nurses in an Iranian hospital. In that study, the majority of nurses were younger and had less than five years of experience, where their fewer years of experience were assumed to have affected their triage competency (Elgazzar, 2023)

A Study of nurses in Saudi Arabia, however, reported a high level of proficiency in conducting triage, with the majority of the nurses assessed demonstrating good ability and skill during triage, unlike in our study (Al Mutair et al., 2022) This is probably because they only enrolled nurses who were already working in the emergency departments, the majority of whom had already received prior triage training, unlike in this study.

In conclusion, therefore, inadequate emergency triage skills in paediatric care, among nurses, can lead to significant and interconnected implications for young patients, heightening the risk of adverse outcomes in an already vulnerable population. Misidentification of urgency is a critical issue, as nurses with inadequate skills might overlook subtle signs of distress or a quiet child in shock being deprioritized over a vocal one with a minor injury, resulting in delayed treatment for those in urgent need. This can worsen treatable conditions like hypoglycemia or early meningitis. Delayed recognition lets them escalate into emergencies needing intensive care, or even death, which could have been avoided if identification and treatment were prompt.

Nurses who struggle to interpret vague parental concerns like “my child isn’t acting right” may miss out on early



warning signs of serious underlying conditions, thus delaying critical interventions. This may lead to a series of complications, for example, under-estimated cases of respiratory distress leading to hypoxia and causing irreversible brain injury. This stems from an initial improper triage assessment that fails to trigger timely care. This makes triage knowledge and skills a basic requirement in pediatric emergency care.

Effect of Education Intervention on Knowledge and Skills of BNC Students in Paediatric Emergency Triage

Effect of educational intervention on knowledge

This study showed training on ETAT+ remarkably improved the level of knowledge on paediatric triage. This indicates that targeted educational interventions, such as adapting the ETAT+ training manual focused on pediatric triage, can effectively enhance student nurses' knowledge and skills in emergency care triage for pediatric patients. The study by Shehab et al. (2017) showed marked improvement in knowledge of triage from 3.8% to 98.1% in the post-test. Another study by Yazdannik et al demonstrated that it could still be possible to achieve improvement in knowledge of triage with online training or even using mobile technology, demonstrating the potential of harnessing the capability and flexibility of using technology to improve knowledge of paediatric triage among nurses in training and even in service in our setting (Yazdannik et al., 2018).

A similar study in Iran also demonstrated the effectiveness of a similar educational intervention in improving nurses' knowledge on triage, with improvement from only 14% demonstrating good knowledge before training to 98% after training (Rahmati et al., 2013). Similar to our study, they reported no differences in the level of improvement across the different socio-demographic strata of the nurses. They, however, noted a decline in knowledge scores 6 weeks after training. In contrast to what was observed in this study, they reported a significantly higher increase in knowledge scores in those who had more years of experience working in the emergency department.

Effect of educational intervention on skills

This study demonstrated the effectiveness of the educational intervention on the skills of student nurses on completion of the program. All the participants significantly improved in

all domains, with the highest frequencies in patient assessment and clinical judgement during patient care. The significant improvement in student nurses' triage skills can be attributed to several key aspects of the educational intervention. A structured learning framework, from the ETAT+ manual, offered a clear approach to pediatric triage. It replaced uncertainty with protocols, boosting confidence and accuracy. Targeted skill practice, like simulations of respiratory distress or shock, helped students apply theory to practice. This sharpened their practical skills. The training also likely taught pediatric red flags, such as lethargy or poor feeding. This addressed prior knowledge gaps, speeding up assessments. The low pretest score showed initial unfamiliarity with triage. The intervention's focused education on pediatric emergencies effectively fixed these baseline deficiencies, leading to dramatic improvement.

Similarly, the study of Egyptian nurses showed an educational intervention on triage led to marked improvement in the skill from 19.2% in the pre-test to 84.6% in the post-test (Shehab et al., 2017).

This study, therefore, is a proof of concept that training nursing students on the paediatric emergency care components of ETAT+ could lead to improved skills in care for critically ill children and potentially reduce infant mortality rates. A previous study conducted in Uganda demonstrated that mortality outcomes for children under five managed for critical illnesses by nurses after undergoing a targeted emergency care training program were non-inferior to physician-supervised care (Rice et al., 2016).

There is a paucity of similar experimental studies assessing the effect of similar educational interventions on improving paediatric emergency triage among specifically nursing students, with most studies focusing on those already in practice. However, as previously mentioned, the nurse trainees we studied are already qualified registered nurses on an extension program to obtain Bachelor of Science in Nursing degrees, who also form part of the nursing workforce in the country.

Resnick et al were able to demonstrate that an educational program on paediatric triage led to improvement in paediatric triage practice among nurses (Recznik et al., 2019). An Australian study that assessed the impact of a similar educational intervention in nurses' practice of triage also demonstrated effectiveness (Malyon et al., 2014). The study by Rahmati et al. (2013) also noted improvement in



the performance of triage nurses after a training intervention.

In concordance with other related studies, this study suggests that simple, inexpensive interventions could be effective in improving hospital triage of sick children. These interventions have been demonstrated to improve in-hospital childhood mortality, as demonstrated in a previous Malawian study (Robison et al., 2012).

These findings could have important implications for nursing education and practice, among which include documentary evidence that nurses, when trained appropriately, could help reduce backlog in paediatric emergency units. A technical report of the American Academy of Pediatrics had previously agreed with this proposition, with the observation that giving nurse practitioners more responsibilities in handling emergency paediatric critical illnesses leads to reduced crowding in the emergency departments, reduced waiting times and length of stay, and even improves outcomes (Barata et al., 2015).

The absence of ETAT+ training for nurses in emergency pediatric care can lead to a cascade of serious implications for patient outcomes. Without the standardized approach provided by ETAT+, nurses may resort to inconsistent triage decisions. This may lead to relying on intuition rather than evidence-based protocols, which could result in erratic prioritization, potentially missing a critically ill child in favor of a less urgent case. This lack of training might also delay emergency treatments, slowing the recognition and initiation of life-saving interventions like fluids for shock, thereby worsening conditions that require rapid response.

Furthermore, nurses untrained in ETAT+ could easily miss critical pediatric-specific warning signs, such as stridor or grunting, delaying care for life-threatening issues like airway obstruction and allowing manageable cases to deteriorate. Consequently, the increased mortality risk becomes a stark concern, as preventable deaths from conditions like severe dehydration or sepsis may rise due to late or incorrect responses in the absence of ETAT+ systematic guidance. Additionally, without proper prioritization, staff and resources could become overwhelmed, leading to chaotic workflows that misallocate time and equipment away from the sickest children, further compounding the challenges in delivering effective emergency care.

Conclusion

The baseline level of knowledge on Paediatric emergency triage among student nurses in the completion program was low, with no student demonstrating at least a satisfactory level of knowledge.

There was a low level of skills and competence as expected to effectively triage and manage children in emergency settings among student nurses in the completion program at MUST.

This study has demonstrated that practical training on Paediatric emergency triage using ETAT+ guidelines is an effective intervention in improving the knowledge and skills of student nurses in Paediatric emergency triage.

Strengths of the study

This study demonstrated the effectiveness of emergency paediatric triage training based on ETAT+ guidelines among student nurses, a group that had previously not been incorporated in ETAT+ training programs in Uganda. It therefore makes a strong case for incorporating student nurses in training of emergency triage, as well as making similar training a part of core nursing training curricula.

Study limitations

Baseline and post-training practice of emergency triage were conducted in a simulation environment where observed practices may be different from actual practice in clinical setting (real-world) scenarios due to awareness of being observed, leading to bias (Hawthorne effect).

Furthermore, the performance of emergency triage was assessed in groups, which could have masked individual challenges in performing specific components of the triage process and therefore prevented the identification of problematic areas that require emphasis during educational interventions.

Generalization of findings from this study to the general undergraduate nursing students' population or even diploma nurses with the same level of qualifications may be limited by the fact that the participants could have been more skilled and experienced than either group. The study was conducted in one university.

Recommendations.

Nursing education, especially in completion programs, as they strive to become graduate nurses. The curriculum should incorporate and emphasize Paediatric emergency triage so as to equip nurses with the knowledge and skills



required to effectively triage and manage Paediatric emergencies through various ways, including lecturing, simulation, and ward placements with full orientation support.

There is a need to incorporate ETAT plus and Paediatric emergency training in Continuous Professional Education activities at different levels, both during school placements and at the places of work, as this will increase exposure towards pediatric emergency triage. These have basic qualifications, and most of them are already in service, whose competence levels could be reflective of the general nursing workforce in the country.

Parliament to formulate a policy to sustain adequate knowledge among healthy workers with compulsory training about Paediatric emergency triage by the MOH.

More research should be conducted in relation to experience, attitude, perceptions of student nurses towards pediatric triage, and factors affecting triage among nurses. Repeated studies in multi-centered universities among multi-disciplinary health professionals.

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List of abbreviations.

ABCD: Airway, Breathing, Circulation, Coma/Convulsion, Dehydration/Diarrhea

BNC: Bachelor of Nursing Completion program

ETAT: Emergency Triage Assessment and Treatment

ETAT+: Emergency Triage Assessment and Treatment plus Admission Care

JRRH: Jinja Regional Referral Hospital

PEWS: Paediatric Early Warning Score; Severe poisoning, Respiratory distress, Urgent referral, Restlessness, Severe malnutrition, Oedema in malnutrition, Burns major

MUST: Mbarara University of Science and Technology

3TPR/MOB: Temperature, Tiny infant, Trauma, severe Pain, severe Pallor

WHO: World Health Organization.

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Conflict of interest.

There is no conflict of interest.

Availability of data.

Data used in this study are available upon request from the corresponding author.

Author's contribution.

LA designed the study, conducted data collection, cleaned and analyzed data, drafted the manuscript, and VN supervised all stages of the study from conceptualization of the topic to manuscript writing and submission.



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