RESEARCH ARTICLE

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Nursing students' perception of medical errors: A cross-sectional study in a university

Victoria Bam[1] 🔘 | Adwoa Safowaa[1,2] | Alberta Yemotsoo Lomotey[1] 🔘 | Abena Safoa Nkansah[1]

[1]Department of Nursing, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

[2]University Hospital, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

Correspondence
Victoria Bam, Department of Nursing, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana.
Emails: elormbam@yahoo.com; vbbam.chs@knust.edu.gh

Abstract

Aim: To assess the perception of nursing students on medical errors.

Design: A descriptive cross-sectional survey.

Method: Data were collected from March–April 2019 in a university in Ghana from two hundred (200) students using simple random sampling and analysed with SPSS version 21.

Results: Mean age of respondents was 22.64 years. Medication error was perceived as the most common medical errors (MEs; 76%). Negligence was perceived as the most common cause of MEs (80.5%); nurses and doctors (84.5%–89.5%) were considered as staff who make most MEs. Respondents perceived that students commit MEs due to less knowledge about procedures (79%) and inadequate supervision (77%) in the clinical setting.

Conclusion: Medication errors were observed as the most common of MEs that can affect patients' safety. Taking prudent measures in addressing this can reduce MEs in health facilities. Enhanced supervision and effective ways of teaching drug administration are recommended.

KEYWORDS
medical errors, nursing students, patient safety, perceptions

1 | INTRODUCTION

Unsafe practices in health facilities result in about 134 million adverse health events annually in low and middle-income countries (LMICs), contributing to about 2.6 million deaths, and one out of 10 admitted patients are victims of medical errors (MEs) associated with healthcare delivery (WHO, 2019). In nursing education, the clinical practicum is an important developmental process by which a nursing student becomes a "real nurse" (Tseng et al., 2013). Rajeswaran (2016) asserts that learning in a clinical setting creates challenges that are absent in a classroom setting, and by clinical learning, nursing students build critical thinking skills. Some challenges in the

clinical setting for students include MEs, their effects and how to report on them if they occur; hence, there is the need to assess students' perception of MEs to help institutions protect patients' safety.

2 | BACKGROUND

Medical error is an act of omission or commission in planning or execution of care that contributes or could contribute to an unintended result (Grober & Bohnen, 2005). Globally, the prevalence of ME and its associated cost has been estimated at 42 billion US dollars annually which is almost 1% of the world's health expenditure (WHO, 2017).

It is revealed that deaths that occur as a result of MEs exceed that of road traffic accidents, breast cancer and autoimmune deficiency deaths (Fry & Dacey, 2007). Approximately 10% of hospitalized patients suffer adverse events, most of which are preventable (De Vries et al., 2008). Medical error is the third biggest cause of death in the United States, and it is only exceeded by heart disease and cancer (Makary & Daniel, 2016). Medical errors have been broadly classified into two: errors of omission (actions not taken) and errors of commission (wrong actions taken) (Grober & Bohnen, 2005). Assessing the reaction of nurses towards MEs in healthcare practice revealed that most nurses perceived these errors as insignificant to patient safety and the researchers observed that this petty or no-mistake attitude tend to cause many complications in healthcare settings (Crigger & Meek, 2007). Negligence, inadequate training, miscommunication by healthcare workers have led to long hospital stay, life-threatening complications and an increase in fatalities of admitted patients (Ahmed et al., 2019). Error-free performance is a standard that is expected of the medical profession. However, healthcare systems and healthcare professionals are by no means infallible from committing mistakes (Carver et al., 2020). Unintended MEs have a great impact on the victims and contribute to both mental and adverse emotional effects in healthcare providers (Robertson & Long, 2018). Medical errors also potentially weaken a patient's trust in the healthcare system (Smith, 2017), and there is a need for health service institutions to develop patient safety culture. A patient's safety culture is described as an effective and strategic way to decrease the incidence of MEs in the health setting (De Vries et al., 2008). Patient safety is considered as the cornerstone of quality health care and should not be compromised in the delivery of care.

In Ghana, MEs especially medication administration errors among nurses have been observed and the two most frequent error types were omission and wrong time of medication administration (Acheampong et al., 2016; Amponsah et al., 2016). As students undertake their training and development to become professionals, it is important to determine their awareness of challenging situations in the clinical setting which include MEs since this has physical and psychological implications for the healthcare provider and the patient. The aim of the study was therefore to assess nursing students' perception of MEs and the measures to reduce them.

3 | THE STUDY

3.1 | Design

A cross-sectional study was conducted using quantitative methods from March–April 2019.

3.2 | Study setting

The setting of the study was the Department of Nursing of a University in Ghana. The Nursing programme is a 4-year programme for generic students and 2 years for top-up students. Students undertake their clinical practice (Adult Health, Child Health, Obstetrics and Gynecology) in secondary and tertiary level health facilities within the metropolitan area where the school is located. Additionally, they undertake their public health nursing practice in primary and secondary level facilities within the region in which the school is situated.

3.3 | Study participants

The study population was students in the nursing programme of the institution. The inclusion criteria were nursing students who have started their clinical internships, and this included all second-year students (135), third year (164) and fourth-year students (103), resulting in a target population of 402 students. The exclusion criterion was first-year nursing students who had not begun their clinical internships. A sample size of 200 was used based on Yamane's formula with a population of 402.

3.4 | Method

A simple random sampling procedure was used in selecting the respondents for the study. In this sampling technique, everyone in the selected groups was given an equal opportunity to participate in the study.

A self-administered questionnaire was developed by the researchers, and the instrument was structured into four sections. Section A sought the demographic characteristics of the respondents (e.g. age, marital status, religion, ethnicity, year of study and student type). Section B assessed the perceptions of the respondents on MEs including the commonly known causes of MEs, the health professionals who make the most MEs and the likelihood of reporting MEs. Section C determined the respondents' perceptions of the effects of MEs on patient safety and safety practices. Questions on availability of safety tools and equipment and their use were asked. Lastly, Section D assessed the measures to reduce MEs. On a Likert scale, respondents rated their perceived effectiveness of measures adopted by institutions in reducing MEs at three levels (not effective, moderately effective and very effective). The researchers contacted the students on the University campus and hand-delivered the questionnaires.

3.5 | Analysis

Data collected from the respondents were coded and entered into the Statistical Package for Social Sciences (SPSS version 21) after checking for completeness of questionnaires, and the same package was used in data analysis. Descriptive statistics were done for respondents' socio-demographic characteristics, respondents' views on types of MEs, causes of MEs, availability of safety equipment and their use, and strategies to reduce MEs. A chi-square test was done to determine

any association between the students' year of study and their views on types of MEs, the causes and measures to reduce them. A binary logistic regression was conducted to examine the relationship between the demographic predictors (such as the sex, student type and year of study) and the perception of students committing medical errors.

3.6 | Ethics

Approval for the study was obtained from a Research Ethics Committee of the university (CHRPE/AP/163/19). The purpose of the study was explained to the potential respondents, and they were assured of confidentiality, anonymity and voluntary participation. The respondents provided informed consent before completing the questionnaires.

4 | RESULTS

4.1 | Demographic characteristics of respondents

Table 1 describes the demographic characteristics of the respondents, with 81% of them being females and 49% were within the ages of 21–25 years.

4.2 | Student nurses' perception of medical errors

This section assessed the perception of nursing students on types and causes of MEs. Medication error was perceived as the most common error, and the use of ineffective medical devices being the least common (Table 2). Figure 1 shows the respondents' views on causes of MEs, with negligence and inadequate information flow being noted as the major causes of errors among health staff. They, however, indicated "less knowledge about procedure" (79%) and "lack of supervision" (77%) as the major causes of MEs among nursing students. In assessing the relationship between the background characteristics (e.g. the sex, student type and year of study) and the perception of students committing medical errors, there was an 87% reduced likelihood that a student in the third year of study perceives students to commit medical errors compared to other year groups (OR-0.13, p-value = .002, [95% CI = 0.038, 0.465]). Similarly, a student in the top-up group had a 3-fold higher likelihood in perceiving students to commit medical errors compared to their generic counterparts (Table 3).

4.3 | Views on availability of safety resources and safety practices

Respondents were of the view that among health professionals (Doctors, nurses, midwives, pharmacists, laboratory technicians), it is nurses (96%) who play most roles in ensuring patients' safety. They considered laboratory technicians (37%) as the staff category that plays the least of roles regarding patient safety. Regarding

TABLE 1 Socio-demographic characteristics of respondents

Variable	Categories	Frequency	Percentage
Gender	Males	38	19
	Females	162	81
	Total	200	100%
Age (years)	Below 21	67	33.5
	21–25	98	49
	26–30	26	13
	31–35	9	4.5
	Total	200	100%
	Mean age = 22.64 years SD = 5.015		
Year of study	Second year	57	28.5
	Third year	80	40
	Fourth year	63	31.5
	Total	200	100%

availability and the frequency of use of safety resources/equipment at the wards, most of the respondents (129, 64.5%) indicated that safety equipment is rarely available for use and only seven (3.5%) reported that safety equipment is not available. Fifty-three per cent (53%) however believe that where safety equipment is available, they are always used by staff in delivering service to patients.

Respondents indicated their views on how safety practices are ensured at the ward (Figure 2). Reporting observed problems at the ward was identified as the best practice (85%) for ensuring safety, followed by good supervision 162 (81%).

4.4 | Measures to reduce medical errors

The practice of hand washing was perceived to be the most effective measure of reducing MEs (67%), followed by the correct identification of patients for procedures (64.5%). The use of computerized equipment to prevent the inability to read illegible handwriting was found to be the least measure to reduce MEs (43%; Table 4). Statistically significant associations were observed between the students' responses on the level of effectiveness of measures to reduce MEs and their year of study (Table 5). The final-year students rated these five factors (improved communication, supervision, correct identification of patients, willingness to ask for help and ensuring medical equipment are functioning) to be more effective while students in the lower classes rated them averagely between moderately effective and very effective in reducing MEs in health facilities. The second-year students, however, rated the correct identification of patients high in reducing MEs.

5 | DISCUSSION

The study aimed to assess the perceptions of nursing students on MEs. Medical errors can occur from a variety of processes and

TABLE 2 Respondents' views on medical errors

Variables	Categories	Frequencies $N = 200$	Percentages
Common medical errors	Medication error	152	76
	Misdiagnosis	148	74
	Negligence	143	71.5
	Infection transmission	125	62.5
	Delayed diagnosis	120	60
	Use of ineffective medical devices	117	58.5
Health professionals that make the most medical errors	Doctors	179	89.5
	Nurses	169	84.5
	Laboratory technicians	120	60
	Pharmacist	119	59.5
	Midwives	119	59.5
Causes of medical errors among student nurses	Less knowledge about procedure	158	79
	Lack of supervision	154	77
	Inexperience	146	73
	Failure to inquire more about procedure	117	58.5
	Negligence	96	48
Likelihood to report medical errors	Self-report medical errors	128	64
	Report other professionals' errors	106	53

devices in healthcare settings. In the current study, respondents perceived medication error as the most common of MEs in health facilities (76%) and the other common errors were misdiagnosis and negligence. Other researchers have also found medication error to be very common (Batat et al., 2011; Vaismoradi et al., 2014; Amponsah et al., 2016; Matin et al., 2018; Gracia et al., 2019), while others reported negligence as a common ME (Muller & Ornstein, 2007; Sohn, 2013). Contrary to this, some researchers in Ghana observed that the least type of adverse medical event experienced by nurses was in administering intravenous infusions (Alhassan et al., 2019). Some studies found nurses mostly did not follow the administration and duration of intravenous fluids as presented in patients' folders (Muller & Ornstein, 2007; Sohn, 2013). Nurses' medication errors have been attributed largely to inadequate knowledge on drugs, job factors like work overload (Gracia et al., 2019; Karimi et al., 2016) which needs the attention of nursing educators on finding more effective ways of teaching pharmacology and drug administration. The current study found most of the respondents indicating negligence as the common cause of the MEs by health professionals, which is inconsistent with findings by Vaismoradi et al. (2014) who attributed MEs mainly to inexperience on the part of health professionals.

Respondents perceived doctors and nurses make the most MEs among all health professionals, while participants in some studies attribute most MEs to nurses (Powell-Cope et al., 2008). The differences in perception could be related to differences in the availability of human resource and workload. A high patient to doctor ratio is likely to negatively impact the doctor–patient interaction due to limited time and workload and may lead to the possibility of making errors. In Ghana, the doctor: population ratio is 1:7374 and the nurse: population ratio is 1:505 (Ghana Health Service, 2018); hence, the

possibility of these categories of staff being more liable to commit medical mistakes as observed by others (Abdar et al., 2014).

The study also determined respondents' perception of the causes of MEs among student nurses, and it revealed less knowledge about the procedure and lack of supervision as main contributing factors. Similar to these findings are those of other researchers who reported performance, knowledge and communication deficits (Cebeci et al., 2015; Musharyanti et al., 2019; Vaismoradi et al., 2014), and these deficits need the attention of educators since nursing students' lack of readiness threatens safety in the clinical setting (Montgomery et al., 2014). However, a study conducted by Gorgich et al. (2015) found that in nursing, wrong medication calculations, unreadable medicine orders and stress in an emergency may lead to MEs. The study also revealed that nursing students (64%) are likely to self-report MEs than other professionals in the health facility. This finding is consistent with those of other researchers who found that staff are less likely to report errors they make and the barriers to reporting the errors include fear of reprisal, heavy workload, worries about consequences of medication errors and lack of policies on self-reporting in health facilities (Alhassan et al., 2019; Commins, 2011; Fathi et al., 2017). Cooper (2017) however reported that both nurses and nursing students are concerned about errors, and students are more likely to report an error when it could harm the patient as compared to when the error has no potential harm to the patient.

Adequate logistics play a key role in ensuring safe practices in health facilities and safeguarding patients' health. Nabilou et al. (2015) reported that the use of safety equipment at health facilities has a positive effect on patients' safety and help reduce most MEs. Inadequate logistics, low staff strength, poor monitoring and supervision have been reported as perceived causes of adverse
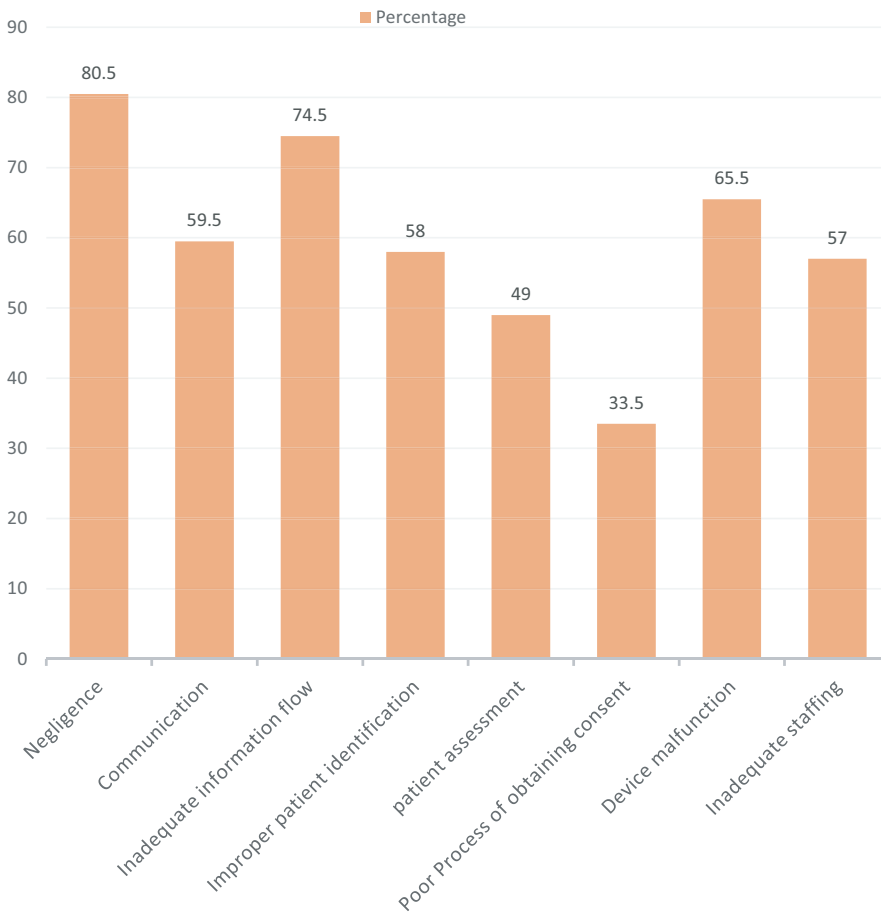
TABLE 3 Relationship between students' background characteristics and the perception of students committing medical errors

Students committing medical errors	Odds ratio	Std. Err.	z	p > z	95% [Conf. interval]	
Year of study						
Second year	Base	–	–	–	–	–
Third year	0.132	0.085	−3.16	.002	0.038	0.465
Fourth year	0.246	0.171	−2.01	.044	0.063	0.962
Student type						
Generic	Base	–	–	–	–	–
Top-up	2.949	1.954	1.63	.103	0.805	10.806
Sex						
Male	Base	–	–	–	–	–
Female	2.108	1.417	1.11	.267	0.565	7.869

medical events among nurses (Alhassan et al., 2019). Health facilities can optimize safe practice when safety equipment is readily available for use but just about a third of respondents in the current study considered these resources to be readily available at most of the wards that they have worked in. Even in resource-constrained settings, health facilities need to make efforts to acquire necessary logistics to reduce the possibilities of staff making errors that put the safety of patients at risk. Countless ill-fated cases are caused by misused or defective medical equipment (Tavakoli et al., 2007).

Students in the final year perceived some measures to be more effective in reducing MEs as compared to those in the lower classes except correct identification of patients which was perceived by the second-year students as very effective. These differences in perception could be related to the length of experience the students had in the clinical setting and the frequency of interaction with the clinical nurses which is likely to improve communication between them, hence their ability to seek help to prevent making mistakes (Cooper, 2017; Musharyanti et al., 2019).

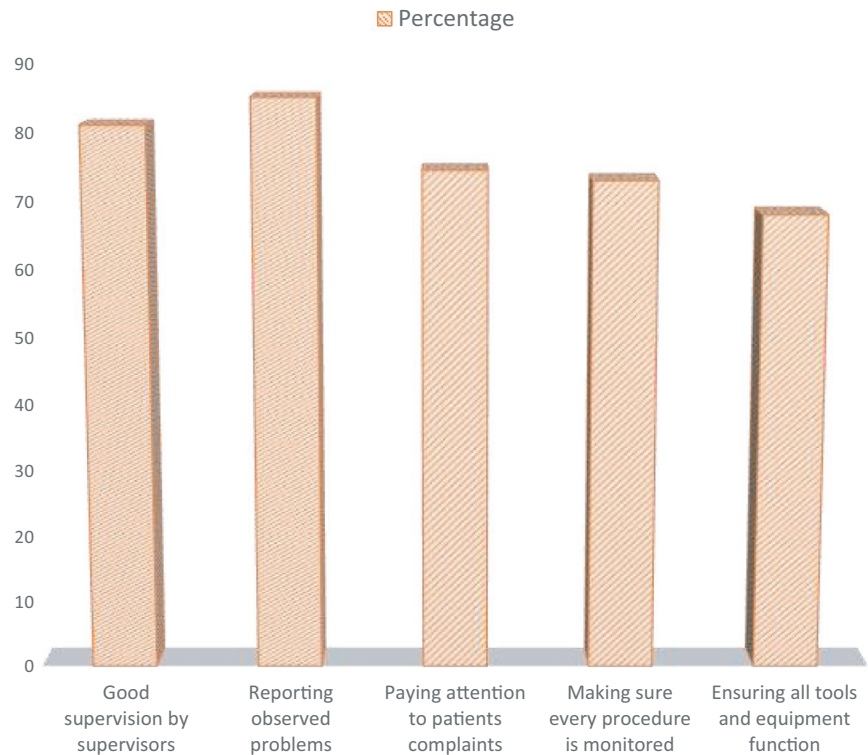**FIGURE 2** Respondents' views on ensuring safety practices at the ward

TABLE 4 Respondents' views on measures to reduce medical error

Measures	Very effective		Moderately effective		Not effective	
	Freq.	Per cent	Freq.	Per cent	Freq.	Per cent
Practice hand washing	134	67	51	25.5	15	7.5
Correct identification of patient	129	64.5	66	33	5	2.5
Quality assurance monitoring	110	55	75	37.5	15	7.5
Resource provision	109	54.5	75	37.5	16	8
Thorough patient assessment	107	53.5	83	41.5	10	5
Ensuring medical equipment are functioning	107	53.5	80	40	13	6.5
Willingness to ask for guidance	104	52	83	41.4	13	6.5
Willingness to ask for help	98	49	82	41	20	10
Improve communication	97	48.5	95	47.5	8	4
Supervision	96	48	84	42	20	10
Improved staffs' technical knowledge	89	44.5	94	47	17	8.5
Use of computerized equipment to prevent inability to read illegible handwriting	86	43	82	41	32	16

6 | LIMITATIONS

The study had a small sample size and was conducted in only one institution; hence, these should be considered as limitations in generalizing the findings. However, it provides valuable information that can be applied in similar settings. There is also difficulty in the estimation of incidence of MEs due to the use of a cross-sectional design in this study.

7 | POLICY IMPLICATIONS

Hospital management should strengthen incident reporting and MEs audits for the timely intervention of incidents. Nursing institutions should review and strengthen preceptor engagement to enhance supervision and monitoring of students' practice and improve the acquisition of clinical competence to prevent MEs.

TABLE 5 Association between the students' year of study and their views on effectiveness of measures to reduce medical errors

Measures to reduce medical errors		Year of study				Chi square test	p value
		Year Two	Year Three	Year Four	Total		
Improved communication	Not effective	0	6	2	8	11.5498	.021
		0.00	7.50	3.17	4.00		
	Moderately effective	31	42	22	95		
		54.39	52.50	34.92	47.50		
	Very effective	26	32	39	97		
		45.61	40.00	61.90	48.50		
Correct identification of patient	Not effective	0	2	3	5	12.6245	.013
		0.00	2.50	4.76	2.50		
	Moderately effective	21	34	11	66		
		36.84	42.50	17.46	33.00		
	Very effective	36	44	49	129		
		63.16	55.00	77.78	64.50		
Ensuring medical equipment are functioning	Not effective	1	7	5	13	10.8742	.028
		1.75	8.75	7.94	6.50		
	Moderately effective	28	36	16	80		
		49.12	45.00	25.40	40.00		
	Very effective	28	37	42	107		
		49.12	46.25	66.67	53.50		
Supervision	Not effective	2	8	6	16	13.5000	.009
		3.51	10.00	9.52	8.00		
	Moderately effective	25	37	13	75		
		43.86	46.25	20.63	37.50		
	Very effective	30	35	44	109		
		52.63	43.75	69.84	54.50		
Willingness to ask for help	Not effective	1	5	7	13	9.9977	.040
		1.75	6.25	11.11	6.50		
	Moderately effective	25	40	18	83		
		43.86	50.00	28.57	41.50		
	Very effective	31	35	38	104		
		54.39	43.75	60.32	52.00		

8 | CONCLUSION

Medical errors adversely affect patient safety and trust in healthcare systems. Medication error is perceived as the most common type of MEs committed by healthcare providers. Negligence and inadequate information flow were noted as the major causes of errors among healthcare staff. However, with student nurses, their MEs is attributed mainly to inadequate knowledge of procedures and lack of supervision. Doctors and nurses are considered as the personnel that mostly commit MEs probably because of their frequent interactions with patients. Effective teaching and administration of medication to improve medication safety is recommended in addition to enhancing the supervision of students by strengthening preceptor engagement.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest in this study.

AUTHOR CONTRIBUTIONS

VB contributed to the conceptualization and design of the study, writing and review of the manuscript. AS contributed to the conceptualization and study design, data collection, analysis, writing and review of the manuscript. AYL contributed to writing and critical

review of the manuscript. ASN contributed to the conceptualization and study design, data collection, and review of the manuscript. All authors read and approved the manuscript.

ETHICAL APPROVAL

Approval for the study was obtained from a Research Ethics Committee of the university (CHRPE/AP/163/19). The purpose of the study was explained to the potential respondents and they were assured of confidentiality, anonymity and voluntary participation. The respondents provided informed consent before completing the questionnaires.

DATA AVAILABILITY STATEMENT

The data set for this study is available upon reasonable request to the corresponding author Victoria Bam (vbbam.chs@knust.edu.gh).

ORCID

Victoria Bam 🆔 https://orcid.org/0000-0003-2780-7579
Alberta Yemotsoo Lomotey 🆔 https://orcid.org/0000-0001-9028-1739

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