



Exploring the educational needs of nurses on children's pain management: A descriptive qualitative study

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Abstract

Aim: To explore the educational needs of nurses on children's pain management.

Design: A descriptive qualitative study.

Methods: Individual and group interviews were conducted among 28 nurses and four nurse managers at four hospitals in the Ashanti region of Ghana. The recorded interviews were later transcribed verbatim and thematically analysed based on a conceptual interest in the educational needs on paediatric pain management.

Results: Nurses were acquainted with pain assessment of children who can verbally communicate. They mainly used drugs in treating pain and were familiar with the use of some non-pharmacological interventions. Notwithstanding, they desired to know more about pain assessment for children with non-functional speech. Additionally, they were interested in learning more about both drug and non-drug pain relief methods for children. The sampled nurses and nurse managers indicated diverse preferences on the nature of the paediatric pain educational programme based on their personal choices and working dynamics.

KEYWORDS

children, nurses, nursing, pain

1 | INTRODUCTION

Considering the complexities in the assessment and management of children's pain, healthcare professionals especially nurses who spend the most time with hospitalized children and their families ought to be equipped with the appropriate knowledge, attitudes, and skills to meet their pain care needs. In spite of this, international research has revealed that nurses' knowledge, attitudes, and practices on paediatric pain assessment and management are not up to the required standard (Alotaibi, Higgins, & Chan, 2019; Bajjali, 2019; Hua et al., 2019; Smeland, Twycross, Lundeborg, & Rustøen, 2018; Wurjine & Nigussie, 2018). This consequently leads to under-assessment

and under-management of children's pain relative to their adult counterparts (Srouji, Ratnapalan, & Schneeweiss, 2010; Ternullo & DiAntonio, 2015). The current study contributes to further understanding on the educational needs of healthcare professionals on paediatric pain management with a focus on nurses.

2 | BACKGROUND

In many nursing training programmes, competing demands of "essential" content have resulted in an overloaded curriculum with minimal or no focus on paediatric pain management (Ismail, Forgeron,

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Polomeno, Gharaibeh, & Harrison, 2018). This situation is no different in the Ghanaian context and may result in training of nurses who are inadequately prepared to manage paediatric pain in clinical practice (Kusi Amponsah, Oduro, et al., 2019). The lack thereof and insufficient continual professional educational opportunities on this subject also adds to the problem of suboptimal pain management in this vulnerable paediatric population (Aziato & Adejumo, 2014; Twycross, 2013).

International literature has shown that education improves nurses' assessment and management of children's pain (Heinrich, Mechea, & Hoffmann, 2016; Lunsford, 2015; Owens, Smith, & Jonas, 2014; Taddio et al., 2015; Vael & Whitted, 2014). The results of a recent integrative review showed that one of the factors which contributed to the success of paediatric pain educational programmes was the conduct of an educational needs assessment prior to implementation (Kusi Amponsah, Björn, Bam, & Axelin, 2019). While those studies did not report on the outcome of the educational needs assessment carried out before the educational intervention (Lunsford, 2015; Taddio et al., 2015), other studies have reported that there exist urgent educational needs in general nursing practice such as knowledge and practice competence on pharmacological and non-pharmacological pain treatments (Leegaard et al., 2011; Tousignant-Laflamme et al., 2012).

Assessing educational needs provides evidence on the current, desired, and preferred manner of education by the learners and stimulates their interest in the subject as they tend to own the education (Azimi & Rahmani, 2013; Nugraha, Suwandi, Nurkamto, & Saddhono, 2018). In line with this, Eldredge et al., (2016) averred that all educational programmes should address a specific need in society. Hence, it is important to assess the specific educational needs of nurses prior to an educational programme to ensure a well-tailored and beneficial educational programme that suits their demands. In response to this need and as part of the plans to develop and implement a sustainable short-course programme on paediatric pain management for practicing nurses in Ghana, the current study sought to explore the educational needs of nurses on children's pain management.

3 | METHODS

3.1 | Design

This was a descriptive qualitative study whose report was guided by the Consolidated Criteria for Reporting Qualitative Research (Data S1) (Tong, Sainsbury, & Craig, 2007).

3.2 | Settings and informants

Four hospitals in the Ashanti region of Ghana were used as the study sites. These hospitals were purposively chosen as they represented diverse healthcare facility categorizations (private, government,

missionary, and quasi-government) and their locations in the urban, peri-urban, and rural areas of the region. One of them was a specialist children's hospital, while the other three hospitals had a children's department in the hospital structure. The hospitals have been labelled A, B, C, and D for anonymity and confidentiality purposes. All four hospitals take care of sick children (under the age of 13 years) with both medical and minor surgical conditions. A specialized neonatal intensive care unit (NICU) is part of the children's department and focuses on the care of newborns up to 28 days. The hospitals have bed capacities ranging from 18 to 50 in the paediatric units with a range of five to 20 nurses per hospital. Each of the hospitals is staffed with three to six doctors who are responsible for the in-patient paediatric population and their families. Hospitalized children are expected to be with at least one family caregiver on a 24-hr basis. Nurses who work in the children's department perform a host of duties including health assessment, checking of vital signs (including pain as the fifth vital sign), drug administration, nasogastric tube feeding, wound care, peri-operative care of patients, health education among others.

Nurses working in the children's unit of the selected hospitals for a minimum of 2 months were purposively sampled for participation in the current study. Nurse managers of the respective hospitals were also chosen to gain knowledge on their preferred educational day, duration, frequency, and resources that are willing to provide in support of the paediatric pain educational intervention.

3.3 | Data collection

Following administrative and ethical approvals, hospital administrators introduced the researchers to the targeted nursing professionals and nurse managers. The participants were then informed about the purpose and procedures involved in the study before giving their written consent as evidence of their voluntary participation. A scheduled date, time, and venue were agreed by both the researchers and eligible consenting participants for the interviews to be held face to face at a quiet room in the participant's workplace.

Over the course of 3 months (October – December 2018), both individual and group interviews were conducted on the scheduled dates depending on the availability of the participants. The interviews were audio recorded with participants' permission and lasted from 10 to 30 min per session. With the aid of a semi-structured guide, four authors (first, second, fifth, and sixth) facilitated the interview sessions at the four hospitals. Each of these four authors was responsible for data collection in one of the hospitals. At least two out of the four authors were present during each interview to allow for notes taking and the smooth running of the sessions. Notwithstanding, the first author was present at all interviews either as a facilitator or notes taker during the sessions. All interviews were completed in one hospital before moving to the next.

Common questions asked included: their views on pain as a major complain of hospitalized children, aspects of paediatric pain assessment and management they perform well and areas they needed

further assistance, their preferred educational facilitator, content, teaching and learning modes, frequency and duration of a paediatric pain educational intervention. The questions were developed based on a review of relevant literature, feedback from three paediatric experts, and inputs from pilot testing with five participants in a public hospital. In the course of the discussions, participants were asked to rank some predetermined educational contents together with other topics which they felt should be included in the educational programme. Content areas that were ranked as 1 were deemed as the areas of most need whereas those that were ranked with higher numbers (e.g. 9 and 10) were assumed to be least needed area for educational purposes.

3.4 | Data analysis

At the end of each interview, participants were briefed about the main points which were raised during the session for clarifications and corrections as deemed necessary. Each recorded interview was transcribed verbatim and analysed before moving on to the next one. Data saturation occurred within and across hospitals as no new themes were found. The researchers who were involved in the data collection (first, second, fifth, and sixth authors) independently read the transcripts several times and coded them for their basic units of meaning using NVivo 12 plus software as a data management aid. The codes were later combined to form larger meaningful units using deductive analytic techniques until the agreed themes were actively generated (Braun & Clarke, 2006). This analytic technique was underpinned by a conceptual interest in the educational needs of participants which focused on their current competencies, desired competencies and preferred nature of the paediatric pain educational programme (Grant, 2002). During the data analysis period, the research team met severally to discuss the generated codes and resolved discrepancies through consensus building.

3.5 | Rigour

The authors employed several methods to ensure rigour in the present study; these were done to address issues of credibility, dependability, confirmability, and transferability (Guba & Lincoln, 1989; Shenton, 2004). To ensure credibility, each of the four authors (first, second, fifth, and sixth) that were involved in data collection individually coded all transcripts. Codes were subsequently evaluated as a group and final themes were generated through comparison with the original data and consensus building. Through a triangulation process, the authors compared and contrasted their individual codes which ensured that the coded data were confirmable and dependable. Confirmability and dependability were also enhanced by ensuring that audio recordings were audible and clear throughout the interview sessions to enable the researchers correctly code them. The use of nurses and nurse managers with diverse clinical experiences from four different hospitals and thick description of the

entire research process and findings also contributed to the study's transferability.

3.6 | Ethics

Permission to conduct the research at the study sites was given by the respective heads (medical superintendents) of the hospitals, ethical approval was subsequently obtained. Ethical principles such as informed consent, autonomy, privacy, confidentiality, justice, and voluntary participation were adhered to during the entire research process. Participants' data were accessible only to the researchers involved in the study.

4 | RESULTS

4.1 | Demographic characteristics of participants

In all, 28 nurses were purposefully selected and interviewed from these four hospitals. Ten (10) of them were chosen from hospital A, seven from hospital B, six from hospital C, and five from hospital D. They were 24 females and four males; their ages ranged from 24 to 38 years. The sampled nurses had worked postqualification for a minimum of 6 months and a maximum of 14 years. They had, however, worked in the children's unit from 2 months to 10 years. The nurses had Certificate, Diploma, Bachelor's, or Master's degree as their highest educational qualification.

The four nurse managers were all females and ranged in age from 43 to 58 years. They had worked in the nursing profession for 19–36 years and as nurse managers for one to five years. They all had Bachelor's degree as their highest educational qualification.

4.2 | Themes

Deductive analysis of the qualitative data resulted in three main themes which described the nursing educational needs on paediatric pain management. These themes were as follows: current and desired competencies in pain assessment, current and desired competencies in pain management, and preferred nature of the educational programme.

4.2.1 | Current and desired competencies in pain assessment

With regards to pain assessment, participating nurses reported being efficient in assessing children who can talk as they are able to verbalize the location and extent of their pain. According to some of them, pain assessment tools such as the FLACC (Face, Legs, Activity, Cry, Consolability scale) and Numeric rating scales were used in grading the severity of children's pain. Other less reported pain assessment

methods included observation of pain-associated behaviours and head-to-toe assessment of children especially for pre- and non-verbal children. Participants also intimated their engagement with family caregivers as a means of ascertaining the cause of some pain-related behaviours such as crying:

Sometimes too, the child can tell you verbally that I am experiencing the pain and sometimes too with the non-verbal aspect, we have things that you have to look for, that's the FLACC (Face, Legs, Activity, Cry, Consolability scale) ... Sometimes too, is not the children themselves but the parents or the relatives... they report that the children are experiencing pain because they are most at times with them.

(P3, Hospital C)

However, the participants also detailed areas where they required further improvements in their paediatric pain assessment knowledge and practice. They described the difficulties they encountered in assessing pain for children who cannot verbalize their pain and desired for further training on pain assessment for unconscious, critically ill, pre-verbal, and non-verbal children due to their inability to verbally communicate with such children:

Assessing a child who can't tell pain, I think it's a bit difficult for me because one, the child cannot talk and the child too is in pain. The child is let's say 6 months, the child is suffering, you want to do something for the child, you can't identify what is wrong with the child so that you will help the child out. So for me, that part is my challenge, to identify pain in a child who cannot talk... Like those who can't talk, it will be very difficult for you to identify the kind of pain or how to assess the person.

(P5, Hospital B)

4.2.2 | Current and desired competencies in pain management

According to the participating nurses, the children's pain was treated with both pharmacological and non-pharmacological interventions following pain assessment. They testified of using Paracetamol and Ibuprofen as the main pharmacological agents and occasional usage of Morphine and Tramadol in treating children's pain. Some of the non-pharmacological pain management methods frequently used and affirmed by them included non-nutritive suckling, swaddling, cuddling, consoling, oral glucose solution, watching television displaying cartoons, playing with toys, child-friendly ward designs, and wall paintings. Nurses reported using non-pharmacological pain management interventions mainly to divert children's attention from pain associated with their disease conditions or invasive clinical procedures. They also testified

of family caregivers' involvement in the care which helped them in the management of pain:

Errrm ... we use both the pharmacological and non-pharmacological. We realize that each ward has a television with toys and cartoons which are constantly being played. And that serves a means of diverting their attention from their pain. The ward has also been designed such that it is child friendly with designs and drawings on the walls which all withdraws their attention from the pain. This we think is a non-pharmacological approach in managing their pain

(P5, Hospital D)

The nurses also desired to improve their management of children's pain through the use of pharmacological and non-pharmacological interventions. They expressed their desire in knowing more about analgesics especially the doses and dosages for children across the developmental milestones. Participating nurses also communicated their concerns about getting to know the diverse nondrug techniques that they could use themselves and also teach the family caregivers to use in children's pain management due to the safety profile of such techniques:

So, I will suggest that we need to improve on the analgesics, the drugs we give so that we know how... because we have to know the dose, the dosage and the age so that we know how we will manage the pain. ... Also, we can't use only the drugs aspect. We should also improve on the other ways, nondrug techniques.

(P4, Hospital A)

4.2.3 | Preferred nature of the educational programme

The preference of participants regarding the nature of the anticipated educational programme represented this third theme. They intimated their varied preferences with some rationale for the educational facilitator, content, delivery mode, duration, and frequency. The nurse managers also indicated their preferences on the delivery of the educational intervention from a management point of view.

Educational facilitator

Nurses expressed mixed opinions on the professional qualification of the educational facilitator. While some preferred a particular health professional to deliver the educational intervention, others felt the profession of the intervention provider was unnecessary provided the person had the expertise on the subject matter (paediatric pain assessment and management) and or methods of educational delivery. Among the preferred professions of the intervention deliverer, mention was made of the following: advanced

nurse practitioner, paediatric specialist nurse, paediatrician, pharmacist, and/or pain researcher:

As for me, I think everybody is qualified to give those things because if the person is a doctor, the person is a nurse, the person is a pain researcher, the person is whatever and the person knows what he (or she) is talking about, if he can solve the problem that is going on, I think it will be fine for me.

(P4, Hospital B)

Educational content

According to the sampled nurses, education was needed in all content areas related to paediatric pain assessment and management. They described this as important as they believed understanding basic principles of paediatric pain assessment and management would enhance their practice. Nurses reiterated their preference for the educational content to be delivered in manageable units so they could have a good grasp of the subject. They also emphasized on the need for the educational content to be adapted to the local context of the children's unit. Among the content areas of desired education included: pain definition, types, and physiology. They further rated the importance of these content areas as shown on Table 1, with pain assessment being ranked as the topmost area they desired further education on.

Educational medium

Participating nurses preferred a host of methods which should be used in teaching paediatric pain assessment and management. The participants generally preferred face-to-face medium in the educational delivery as it gives them the opportunity to obtain prompt feedback from the facilitator and the learners alike as well as its general acceptability in the Ghanaian setting. They also desired both individual and group teaching in different circumstances. Individual teaching was preferred during practical training sessions to ensure that they obtain the necessary guidance during demonstration sessions. Group teaching was favoured in both theoretical and practical training so that they could share ideas,

learn from others and build consensus on issues under discussion. They further intimated their liking for videos and audios as they afforded them the opportunity to visualize and listen to the content under study. Both non-interactive and interactive teaching methods such as lectures, discussions, demonstrations, and simulations were also suggested by participants as their preferred methods of receiving instructions. They further desired to have the learning materials prior to the teaching session so they could familiarize themselves with the material:

I think as a group... face to face, interaction, videos, discussion too and demonstrations... and may be sort of stimulation will also help. So if you have some videos displaying how some non-pharmacological methods are being used... Because massage, you may think that you are massaging well but if a video is displayed on how best to massage and videos that shows that a child who is in pain has been given some treatment, if he is improving what are the facial expressions that shows... They should also give out the material so that we can go through, read about it before the main lectures

(P6, Hospital A)

Educational frequency and duration

The preferred frequency and duration of the educational intervention were influenced by the educational content, regularity of new information on the subject and the need to prevent boredom among learners. While many of the participants were uncertain about their preferred frequency and duration, a few others specified the exact frequency and duration of the educational intervention. However, no consensus could be reached on an optimum duration or frequency. From those who stated their preferred frequency, mention was made of monthly, quarterly (every 3 months), 4-monthly, 6-monthly, and yearly. The reported duration of the educational intervention also ranged from one hour to 12 hr over several days and with breaks between those that last for more than two hours per session:

Every 3 months or every 6 months is okay but as for the time, whatever time it will last is okay. We are learning so whatever time we can use to learn the topic well ... but it must be frequent because it enlightens you on the work you have to do.

(P3, Hospital D)

TABLE 1 Ranking of the most needed educational content areas by nurses

Topic	Rank
Pain assessment for children of different ages (N = 28)	1st
Definition of pain (N = 28)	2nd
Classification of pain (N = 28)	3rd
Effects of pain (N = 28)	4th
Factor that influence pain perception in children (N = 28)	5th
Pain physiology (N = 28)	6th
Pharmacological pain management (N = 28)	7th
Non-pharmacological pain management (N = 28)	8th
Barriers to effective pain management (N = 28)	9th
Involvement of parents in pain management (N = 2)	10th

Conversely, the participating nurse managers preferred days which were relatively less busy with no major activities such as a clinic day or intensive ward rounds. They desired for a mid-morning to early-afternoon timing due to less-busy nature of the ward activities during those periods. The nurse managers preferred the education to be delivered frequently as often as it will be needed or weekly or monthly basis. They all indicated an educational duration lasting from one to two hours to allow as many staff nurses to participating without unduly

affecting the smooth running of activities on the paediatric units. They were all supportive of the educational programme and were committed in providing a venue, educational materials, refreshment, and/or allowances for facilitators:

Wednesday or Thursdays as these days are relatively less busy...10am to 12pm since ward rounds are usually completed by that time...Weekly basis for two hours...We will release some nurses to attend the education and provide for the venue and water

(P7, Hospital C)

5 | DISCUSSION

Nurses are expected to engage in continual professional development to upgrade their knowledge and skills on various aspects of nursing including paediatric pain management (Kol, İlaslan, & Turkey, 2017). The current study aimed at exploring the educational needs of nurses on children's pain management at four selected Ghanaian hospitals.

The sampled nurses in this study expressed competence on the assessment of pain in verbal children, the use of bodily cues and affirmations from family caregivers. On the other hand, they expressed their desire in knowing more about how to effectively assess pain in children who cannot verbally communicate their pain experience due to their developmental stage or some medical condition. Earlier studies have shown that the use of behavioural and physiological indicators, although not exclusive to paediatric pain, are useful parameters to use in such situations (Srouji et al., 2010; Subramaniam, Doss, Chanderasekar, Madhavan, & Rosary, 2018). The International Association for the Study of Pain (2019) also reports of a host of pain assessment tools that can be used for non-verbal children. These include: the Premature Infant Pain Profile (PIPP), the Face-Legs-Activity-Cry-Consolability (FLACC) scale, and the Non-communicating Children's Pain Checklist-Revised (NCCC-R). Earlier studies have also shown that educational needs assessment stimulates learners' interest and can serve as a basis for decision-making on their teaching and learning experiences (Paci, 2013; Soruc, 2012). Based on the nursing educational needs identified in the current study, future educational interventions could build on already possessed nursing competencies on paediatric pain assessment to improve on their assessment of non-verbal children.

Non-steroidal anti-inflammatory drugs (NSAIDs) were predominantly mentioned by the participating nurses as the main pharmacological agents used in treating children's pain. The use of NSAIDs has been proven as one of the effective ways of managing pain in children due to its documented safety profile (Kahsay, 2017; Krauss, Calligaris, Green, & Barbi, 2016). Consistent with earlier literature (Larjow, Papavasiliou, Payne, Scholten, & Radbruch, 2016; Samarkandi, 2018), the nurses in the current study expressed knowledge limitations in the full range of safe analgesics as well as their doses and dosages. Although participants desired further knowledge

about non-pharmacological pain management interventions as extensively described in the literature (Oliveira & Linhares, 2015; Srouji et al., 2010), they all expressed familiarity with these methods. It was therefore not surprising that they were not ranked among the top-most areas of needs. The identified needs in both pharmacological and non-pharmacological pain management warrant inclusion in the design and implementation of the proposed educational programme. This education should be based on the current best evidence on paediatric pain management approaches so as to improve pain care for vulnerable children and their families.

The nurses in this study reported the need for education in many aspects of paediatric pain management, especially on pain assessment for children of different ages. According to the International Association for the Study of Pain (2019), knowledge of age-appropriate pain measures is very critical in the diagnosis of pain and evaluation of pain treatment strategies. Participating nurses also expressed their desire to understand the fundamental underpinnings of pain in terms of definition, classifications, and effects of pain. Current knowledge on basic pain principles can enhance nurses' understanding of paediatric pain problems and guide the administration of appropriate pain management therapies (Málek et al., 2017). The involvement of parents in pain assessment and management was identified as an important area for inclusion in the educational programme as they are best positioned with vast knowledge about their children's behaviour (Palermo, Valrie, & Karlson, 2014; Srouji et al., 2010). The ranking of the educational content needs helps in directing the intended education towards their satisfaction of the most important needs (Noh, Park, Kim, & Kim, 2018); thus, more contact hours should be dedicated to those areas.

The participating nurses and nurse managers articulated diverse preferences on the nature of the educational programme based on their personal choices and working dynamics. They indicated a willingness to learn from an experienced person or group of persons provided they possessed the requisite knowledge and expertise in both the subject content and the pedagogical approaches (D'emeh, Yacoub, Darawad, Al-Badawi, & Shahwan, 2016). In general, a face-to-face interactive educational session with a group were most often identified as preferable. As pointed out by earlier studies (Graham, 2019; Hodges, 2018), the perceived benefits of a face-face interactive educational session with a group are the ability to group-think, share ideas, and learn from other members while receiving prompt feedback. This approach also supports the main purpose of continual professional development, which is to update nurses' knowledge and skills for enhanced and improved patient care (Filipe, Silva, Stulting, & Golnik, 2014).

The participating nurses indicated a willingness to be educated on the subject at varying frequencies and duration. These varying preferences reaffirm the complex nature of education as an intervention (Mattick, Barnes, & Dieppe, 2013; Tarquinio, Kivits, Minary, Coste, & Alla, 2015). Thus, the primary purpose of any education is to be relevant to the target audience (Lunsford, 2015; Taddio et al., 2015), appeal to the diverse learning styles of learners (Newton & Miah, 2017), be of sufficient duration (Kahan & McKenzie, 2015;

Menheere & Hooge, 2010) and ultimately lead to a relatively permanent changed behaviour (Tirri, Moran, & Menon Mariano, 2016). The nurse managers also indicated their willingness to support by committing to provide some material resources for the smooth operation of the educational programme which reaffirms the relevance of leadership in promoting optimal healthcare outcomes (Sfantou et al., 2017).

6 | STRENGTHS AND LIMITATIONS

Measures which were implemented to ensure rigour (credibility, dependability, confirmability, and transferability) contributed to some of the strengths in the current study. The engagement of nurses with varying degrees of experience in the nursing profession and in the paediatric unit permitted an exploration of the learning needs of both novices and experts. While this might limit internal validity of the study's findings, it does reflect the real world of nursing work for external validity. Like all qualitative studies, the findings of this study cannot be generalized but can be transferable to similar settings.

7 | CONCLUSION

Although nurses demonstrated some knowledge and appropriate attitudes towards children's pain assessment and management, they still desired to know more about this subject. They indicated varying preferences on the desired nature of the paediatric pain educational programme based on their personal preferences and professional working dynamics. This reaffirmed the need for educators to seek input from learners so that the education provided would be congruent with their preferences and promote their participation, which will optimally result in improved knowledge and expertise in effectively managing pain among hospitalized children and their families. The findings of the current study provide the foundation for future development and implementation of the nursing short-course programme on children's pain management in Ghana.

Nurse managers also demonstrated their leadership support for the educational programme which is commendable as leadership is critical in improving pain outcomes for vulnerable children and their families. Responding to the paediatric pain educational needs of nurses is one step towards the development of a competent healthcare workforce to address the pain care needs of vulnerable children and their families. Future research studies should be guided by the identified nursing educational needs during the development, implementation, and evaluation of paediatric pain educational programmes.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

AUTHOR CONTRIBUTIONS

AKA and JKD: Contributed to conception and study design, data collection, analysis, interpretation, manuscript writing, reviewing, and revising it. VB and AA: Contributed to conception and study design, data interpretation, reviewing, and revising the manuscript. EFK: Contributed to data interpretation, manuscript writing, reviewing, and revising it. EO and CKA: Contributed to conception and study design, data collection, analysis, interpretation, reviewing, and revising the manuscript. All authors read and approved the final manuscript.

DATA AVAILABILITY STATEMENT

Data supporting this work would be provided on reasonable request.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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