

Impact of pain management training on the implementation of pain as the fifth vital sign in a Nigerian tertiary hospital.

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Abstract

Background: Pain remains one of the primary reasons why people present to the hospital worldwide. Despite several initiatives towards promoting effective pain management, pain management in middle- and low- income countries continue to be inadequate due to a knowledge gap and other institutional barriers.

Objective: This study evaluated the impact of a multidisciplinary pain management training program aimed to improve awareness and implementation of pain as the fifth vital sign, and opioid utilisation in a tertiary hospital in Nigeria.

Methods: A Pain management training programme was conducted over a 12-month period at Nnamdi Azikiwe Teaching Hospital, Nnewi, Nigeria, involving 840 healthcare professionals across multiple disciplines. Following the training, the pain assessment tool (Numerical Rating Scale: NRS assessment) was incorporated into the routine vital sign assessment after management approval. Compliance with pain assessment was evaluated twice monthly through patient record reviews across selected wards. Opioid utilisation before and after the intervention was also assessed.

Results: There was an improvement in pain assessment compliance from the first to the second quarter across all wards, rising from 69% to 87% in the male surgical ward, 66% to 85% in the female surgical ward, 69% to 89% in the postnatal ward, and 43% to 68% in the Accident and Emergency unit. Although a decline was observed in subsequent quarters, overall compliance remained higher than the baseline values. Opioid utilisation increased following the intervention, including the introduction of stronger opioids such as morphine and fentanyl. Morphine was the most frequently prescribed opioid, with pain clinics accounting for the highest proportion of such prescriptions (20%).

Conclusion: The pain management training, supported by institutional policy change, improved the implementation of pain management strategies and improved access to appropriate opioid analgesics. The importance of multidisciplinary training and organisational support in improving pain care in resource-limited settings is highlighted by these findings.

Keywords: Pain, Management, Training, Implementation, Fifth Vital Signs.

1. Introduction

Pain is a complex sensory and emotional experience associated with actual or potential tissue damage (Raja et al., 2020). It is one of the most frequent complaints encountered in healthcare. Globally, hundreds of millions of adults experience acute or chronic pain each year, with an estimated economic burden exceeding 635 billion dollars in the United States alone (Education et al.,

2011; Goldberg & McGee, 2011).

Despite this significant burden, numerous studies have reported persistent inadequacies in pain assessment and control in hospitals (Hämäläinen et al., 2022; Malones et al., 2021). Indicatively, A. E. Kasahun et al. (2023) observed that almost half of the hospitalised paediatric patients in Ethiopia did not receive proper pain assessment (A. Kasahun et al., 2023). In the same way, the patients in

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the emergency department were reported by Hämäläinen et al. (2022) as often feeling that their pain was not taken into consideration or was underestimated. These gaps are not limited to the low-income group, as even in the high-income patients, the postoperative pain is undermanaged in up to 40% of patients (Apfelbaum et al., 2003).

Untreated or poorly assessed pain is associated with undesirable physiological, psychological and socioeconomic outcomes leading to prolonged hospital stay, increased risk of hospital readmission and decreased ability to return to normal function (Apfelbaum et al., 2003; Gan et al., 2013). In response, several initiatives such as pain advocacy programmes, global year campaigns against pain, introduction of pain as the fifth vital sign, pain-free hospital initiatives and efforts to improve opioid access were implemented globally in the past two decades to improve management of pain (Morone & Weiner, 2013; Tompkins et al., 2017) In many high-income settings, the integration of standardised pain management and assessment routines resulted in notable improvements in the recognition and treatment of pain (Gupta et al., 2014). As an example, Lynch (2001) showed that when pain was made a routine vital sign, the rate of pain being documented improved significantly in US hospitals.

However, evidence from low- and middle-income countries suggests suboptimal pain management (Gao et al., 2023; Ouma et al., 2024). These challenges include limited knowledge and training among healthcare professionals, inadequate multidisciplinary collaboration and institutional or regulatory barriers that restrict access to opioid availability (ABDULMUMEEN & Emmanuel; Awe & Owoyemi, 2024; Elumelu et al., 2014). In Nigeria, structured interventions targeting pain assessment and management are limited, and available evidence suggests that pain is often under-assessed and undertreated (Gao et al., 2023). Addressing these gaps requires both capacity building among healthcare professionals and institutional support in integrating pain assessment into clinical practice. Nevertheless, the literature on structured institutional intervention to implement pain assessment in Nigerian tertiary hospitals is limited. Hence, this study was conducted to determine the effects of a structured pain management training program among healthcare professionals on the introduction of pain as the fifth vital sign and on the use of opioids in a tertiary hospital in Nigeria.

2. Materials and Methods

2.1 Study design and setting

The study used a before-and-after quasi-experimental design, which was conducted at Nnamdi Azikiwe Teaching Hospital, Nnewi, Nigeria, a tertiary institution that delivers multidisciplinary specialist care. The research assessed the effect of a structured training programme on pain management and an associated institutional policy change on (i) the adoption of pain as the fifth vital sign and (ii) opioid utilisation. The research timeframe was 12 months (January-December 2022). The “before” period comprised the 12 months immediately prior to the intervention, and the “after” period comprised the 12 months post-training.

2.2 Study Population

The intervention targeted healthcare professionals involved in patient care. The participants were selected from different departments, including medical doctors, nurses, pharmacists, physiotherapists, social workers, medical record officers, and administrative staff. Training inclusion criteria were: (a) at least six months of employment at the hospital, and (b) direct or indirect experience in the assessment or management of patient pain. There were no exclusion criteria used. All the eligible members of staff were invited to take part. The training was provided in groups of 50-60 individuals.

2.3 Sample size for Compliance Review

Patient records were reviewed twice a month in four clinical areas: the male surgical ward, female surgical ward, postnatal ward, and Accident and Emergency (A&E) unit. Individual patient records of each ward were reviewed at each review (with 30 randomly selected records per ward per review). A total of 24 reviews per ward were carried out over 12 months, resulting in 2,880 records per ward (or 11,520 records). This sample size (considering that the average number of beds occupied in the hospital on a daily basis is approximately 500 and the expected increase in compliance is 20% as an absolute value) was considered to be adequate enough to identify a 20 percent absolute change in compliance.

2.4 Intervention: Pain Management Training

The training programme was a multidisciplinary approach to teaching pain management within a 12-month timeframe, at the Nnamdi Azikiwe University Teaching Hospital, Nnewi, Nigeria. The training comprised 5 hour sessions (with a 30 minute break), and was delivered by two board certified pain specialists and covered pain physiology

and classification, pain assessment methods (Numerical Rating Scale, Visual Analogue Scale, verbal rating scale), pharmacological management (WHO analgesic ladder, non-opioids, weak and strong opioids, adjuvants), opioid prescribing and regulatory considerations in Nigeria, non-pharmacological approaches (physical therapy, psychological support), the roles of various professionals in multidisciplinary pain care, barriers to pain management in low and middle income countries, and a practical session on NRS documentation. Eight hundred four hundred healthcare professionals (doctors, nurses, pharmacists, physiotherapists, social workers, medical record officers and administrative staff) took part in the training provided in batches of 50 to 60 participants, with a pre- and post-training knowledge test showing an improvement in the mean scores of a subset of participants.

2.4 Institutional Policy Implementation

After the training was completed, the management of the hospital officially approved the implementation of pain as the fifth vital sign. The standard nursing vital signs chart was modified with the addition of the Numerical Rating Scale (0-10). The clinical staff were also ordered to assess and record pain at each regular vital sign check (at least once per shift in stable patients, more frequently in unstable patients). In order to strengthen the policy, A4 posters were laminated and displayed at every nursing station and patient bay to explain what NRS is and why it is necessary.

2.5 Data Collection

2.5.1 Pain Assessment Compliance

Compliance with pain assessment was assessed through a bimonthly retrospective review of patients' medical records from selected wards assessed bimonthly retrospective review of patient's medical records from selected wards and units (including surgical wards, postnatal ward, and Accident and Emergency) over a one-year period.

Compliance was calculated by dividing the number of patient records with documented pain assessment by the total number of patient records reviewed in the ward. Quarterly compliance was generated for comparison over the study period.

2.5.2 Opioid Utilisation

Data on opioid consumption were obtained from the hospital pharmacy records. Quantities of commonly

used opioids were extracted and compared. Ward-level distribution of morphine was also analysed.

2.6 Data Analysis

The data were analysed descriptively and presented as frequencies and percentages. Results were summarized using tables and figures. There were no inferential statistical tests performed due to the nature of the study, which was exploration and the nature of the intervention, which was implemented on a hospital-wide level with no control group. All calculations have been done in Microsoft Excel 2016.

3. Results

3.1 Participant Characteristics

As shown in Table 1, a total of 840 healthcare professionals participated in the multidisciplinary pain management training. Nurses constituted the largest proportion (54.76%), followed by medical doctors (30.95%). Other participants included pharmacists (2.9%), physiotherapists (4.3%), social workers (1.4%), medical record officers (2.9%), and administrative staff (2.9%). Female participants accounted for 63.1%, while males represented 36.9%.

3.2 Compliance with Pain Assessment as the fifth Vital Sign

Figure 1 shows the adopted nurse chart of Nnamdi Azikiwe teaching hospital with pain assessment as the fifth vital sign. Following the implementation of pain as the fifth vital sign, an increase in pain assessment was observed between the first and second quarters. The compliance changes were as follows: male surgical ward (69% to 87%), female surgical ward (66% to 85%), postnatal ward (69% to 89%) and Accident and Emergency unit (43% to 68%). Although a decline was observed in the subsequent quarters, the compliance level was higher than the baseline value, followed by a gradual decrease in subsequent quarters (Figure 2).

3.2 Opioid utilization

Prior to the intervention, opioid use was largely limited to pentazocine and pethidine. Following the training and institutional policy, stronger opioids, including morphine and fentanyl, were procured and made readily available in the hospital.

Table 2 shows that morphine became the most frequently prescribed opioid during the study timeframe. A total of

Table 1: The distribution of the training participants based on the professional cadre

Cadre	Number	Percentage (%)
Doctors	260	30.95
Nurses	460	54.76
Pharmacists	24	2.86
Physiotherapists	36	4.29
Social workers	12	1.43
Medical record officers	24	2.86
Administrative officers	24	2.86
Total	840	100%

Male = 36.9%, Female = 63.1%

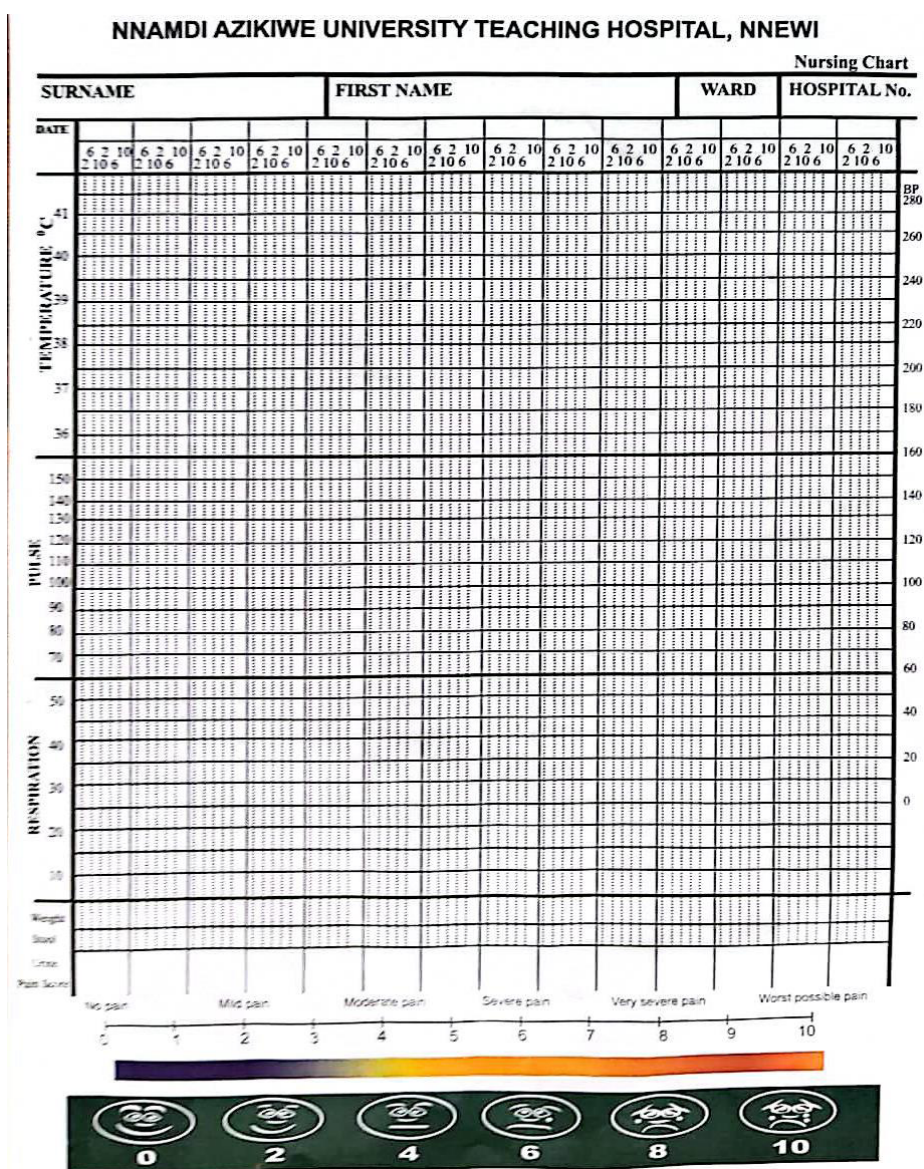


Figure 1: The distribution of the training participants based on the professional cadre

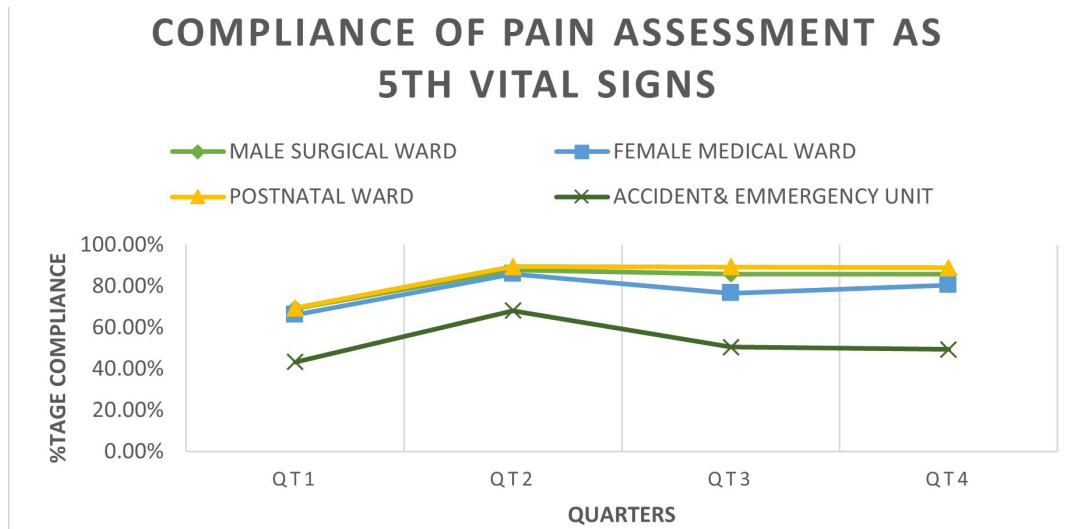


Figure 2: A Graphical Representation of the Compliance to Pain assessment as a fifth vital sign

340 morphine prescriptions were recorded across the hospital unit. The highest proportion of prescriptions was from pain clinic (20.0%), followed by the Paediatric ward (14.4%), Male surgical ward (11.2%), Male medical ward (11.2%), Accident and Emergency (10.9%), Postnatal ward (10.6%), Female surgical ward (8.2%), Female medical

ward (7.4%), and General outpatient department (6.2%). Figure 3 illustrates total opioid consumption (all opioids combined), which is increasing steadily from month 3 post intervention and peaking around month 8, with a slight decline in the final quarter.

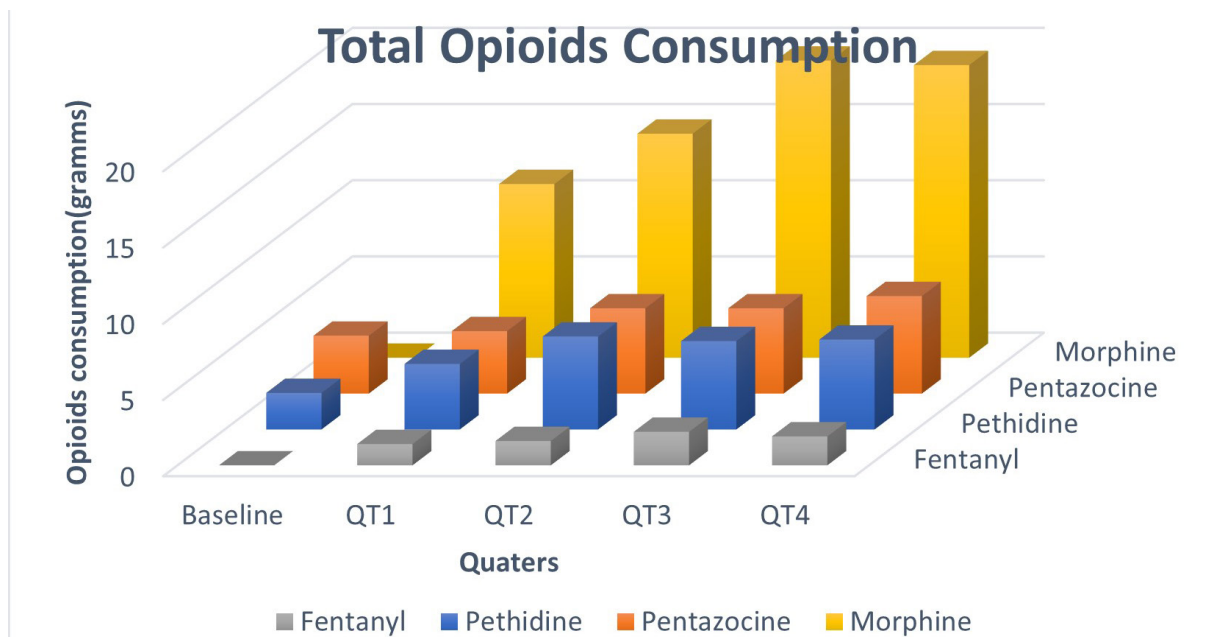


Figure 3: Total Opioid Consumption within the study timeframe

4. Discussion

The research demonstrated that institutional support, in addition to a well-designed pain management training programme, seems to help in the implementation of pain as the fifth vital sign in a tertiary hospital

environment. The identified result, the enhanced pain assessment and documentation, proves the beneficial role of targeted education and integrating the system-level in clinical practice.

Interestingly, in this study, there was a significant

Table 2: Distribution of Morphine Prescriptions by Ward/Unit

Wards/ Clinics/Units	Prescriptions	Percentage
Accident & Emergency	37	10.9
Male Surgical Ward	38	11.2
Male Medical Ward	38	11.2
Female Medical Ward	25	7.4
Female Surgical Ward	28	8.2
Post Natal Ward	36	10.6
GOPD	21	6.2
Pain Clinic	68	20.0
Paediatric Ward	49	14.4
Total	340	100%

General Outpatient Department =GOPD.

improvement in the pain assessment compliance between the first and second quarters across all wards assessed after the implementation. This initial positive change probably indicates the increased level of knowledge and motivation of the healthcare workers due to the intervention training. According to the explanation provided by Valério et al. (2019), continuous and multidisciplinary knowledge of nurses on pain management can be used to implement the concept of pain as the fifth vital sign, as it enhances their understanding of the principles and nature of the pain assessment process (Valério et al., 2019). The more pronounced improvement observed in the inpatient wards and most so in the surgical and post-natal units may be due to the more organized nature of the inpatient wards and the fact that nurses are the main players in the routine observations.

A contributory factor of interest is the management support towards adopting pain as the fifth vital sign in the hospital. This institution's policy further supported the assessment's implementation by incorporating the numerical rating scale into the nursing chart used in routine hospital care. This incorporation brought a level of standardization to pain assessment, limiting the variability we previously experienced in clinical practice in the hospital. Similar improvements in compliance have been reported in studies where pain assessment tools were incorporated in standard nursing documentation, underscoring the importance of visibility and standardisation in sustaining practice changes (Bayisa et al., 2024; Bhatnagar et al., 2022).

As observed in this study, compliance with pain assessment was relatively lower in the Accident and Emergency unit in comparison to other units. Similar observations have

been reported in previous studies and can be linked to the relatively high patient turnover, limited time and staffing limitations (Giusti et al., 2018; Hämäläinen et al., 2022). Despite pain being a predominant complaint in this unit (Raven et al., 2021), the dynamics of care limit the adequate implementation of pain as the fifth vital sign in this unit. Nonetheless, the improved documentation observed in this unit is commendable and aligns with the training goal.

Moreover, the availability and use of more varieties of opioids in the hospital increased after the training. It is necessary to be cautious while interpreting this observation, since it could reflect addressing newly identified needs rather than inappropriate prescribing. This increase can be interpreted as a heightened ability to recognise and manage moderate to severe pain, which might have resulted from the improved pain assessment and documentation after the training. However, an increase in opioid use should be accompanied by appropriate monitoring to ensure compliance with prescribing guidelines and rational and safe drug use. Morone and Weiner (2013) argued that the implementation of pain as the fifth vital sign comes with more complex responsibility than just addressing the newly identified need, pain, through an increase in opioid prescriptions, since opioid use comes with potential health issues that should be considered and monitored (Morone & Weiner, 2013). The increase in opioid use should be interpreted cautiously, given global concerns regarding opioid misuse and the need for adherence to WHO pain management guidelines.

The involvement of multiple disciplines in the training, such as pharmacists, might have improved the opioid availability and compliance with opioid use. Pharmacists

are essential in drug procurement, storage and regulatory adherence and hence important in the management of pain (Thapa et al., 2021).

This research provided an insight into the combined effects of a well-designed and targeted pain management training and institutional support on improving the adoption of pain as the fifth vital sign in a tertiary hospital setting. The observed decrease in compliance in the subsequent quarters after the second highlights the need for continuous reinforcement and training to maintain motivation and discipline.

5. Limitations and Strengths

The study has some limitations. The absence of a control group limited causal inference since the observed improvement cannot be solely attributed to the training intervention. In addition, pain assessment compliance was evaluated through documentation review, which might not reflect actual clinical practice. Patient-centred outcomes and appropriateness of opioid prescriptions were not assessed in this study. Finally, the relatively short duration of training may have limited the sustainability of observed improvement.

Despite the limitations, the study also has several key strengths. It is amongst the first in Nigeria to appraise a multidisciplinary pain management training programme coupled with an institutional policy change and involving a large group of 840 healthcare workers of various cadres. Bimonthly record review over 12 months enabled quarterly trend analysis, which showed the initial gains and subsequent losses- a key finding of the sustainability planning. The objective measurement of opioid utilisation in the form of pharmacy records, including the introduction of previously unavailable strong opioids (morphine, fentanyl), in themselves provides tangible evidence of the linkage between training and changes in prescribing behaviour. The last type of evidence is strong institutional support (management approval, integrating NRS into vital signs charts, and monthly reminders) that displays how institutional backing enhances educational interventions.

6. Conclusion

This study demonstrates that a well-structured multidisciplinary pain management training supported by institutional policy implementation improves the adoption of pain as the fifth vital sign and improves access to appropriate opioid analgesics in a tertiary hospital setting in Nigeria. There was significant improvement during the

initial implementation of this process, with compliance rates increasing 18-25 percentage points between the second quarter. However, after approximately six months, there was a decline in compliant behaviour, indicating that continuous education, auditing and feedback will need to continue to support the ever-changing landscape of practice change amongst paramedics. These findings highlighted the importance of structured education and organisational support in strengthening pain management practices in resource-limited healthcare systems. Ongoing reinforcement should be provided to allow paramedics to maintain their compliance, and possibly use the improvements made in this study, as a foundation to further improve the delivery of patient-centred pain management.

Declarations

Ethics approval and consent to participate

Ethical approval was obtained from the institutional review board of Nnamdi Azikiwe Teaching Hospital. The training was conducted as part of a hospital wide quality improvement initiative. All participating healthcare professionals provided verbal informed consent after the purpose and nature of the training were explained. Patient records used for compliance assessment were anonymised prior to data extraction; therefore, individual patient consent was waived by the IRB.

Consent for publication

Not applicable. This manuscript contains no individual person's data, images, or videos.

Availability of data and materials

The datasets generated and analysed during this study are not publicly available due to institutional data protection policies, but are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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