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Implementing Evidence Based Practice nursing using the PDSA model: Process, lessons and implications

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ABSTRACT

Evidence Based Practice (EBP) is recognised as a problem-solving approach to clinical practice that integrates the most relevant evidence with clinical expertise and patient preferences and values, to answer clinical questions and aid decision making. Although the value of EBP is widely accepted, it is not standard in healthcare systems globally. Similarly in Zambia EBP is not a standard and nursing care is mainly routine and characterized by poor quality.

An Evidence Based Practice Pilot Project was conducted in University Teaching Hospital. The project utilized a quality improvement approach including modified experience-based co-design, rapid reviews of evidence and practical implementation of evidence. It was implemented through a five phased process using the Plan Do Study Act (PDSA) Model. It focused on four “hacks” subdivided in 12 areas of implementation.

From the four “hacks”, and the subsequent 12 areas of implementation, the project met set target for improvement in eight out of 12. The four where set targets were not met included; awareness of rights and responsibilities by patients, explaining the patient’s condition to at least one relative, completing nursing care plans and regular multi-disciplinary team meetings. The eight areas where set targets were met included; display of patients’ rights, educational materials and hand washing guidelines. Others were orientation and mentorship for junior nurses and students, use of task allocation, and use of hand washing soap and decontamination buckets.

Implementers of EBP should take stock of the enablers and detractors and put appropriate measures to sustain the former and minimize the latter.

1. Background

Evidence Based Practice (EBP) has been defined, redefined and universally agreed to be the conscientious, explicit and judicious use of current best evidence in conjunction with clinical expertise and patient values to guide health care decisions (Title & Everett, 2001; Titler, 2006; Hughes, 2008). It is a problem-solving approach to clinical practice that integrates a systematic search for, and critical appraisal of the most relevant evidence to answer a burning clinical question, incorporating one’s own clinical expertise, patient preferences and values (Melnik & Fineout-Overholt, 2015). EBP originally arose from the field of medicine

termed as Evidence Based Medicine (EBM) with its philosophical origins extending back to the mid-19th century (Sackett, Rosenburg, Muir Gray, Haynes, & Richardson, 1996) but has remained a “hot” and current topic to date. In nursing, there is a rich history of using research in practice, pioneered by Nightingale and Edward (1863). Although it is generally agreed that during the early years, in the mid 1900s, few nurses contributed to the foundation initiated by Nightingale. The nursing profession over the past 25 years has increasingly provided major leadership for improving care through application of research findings in practice (Kirchhoff, 2004).

EBP has numerous benefits. It has been hailed as the foundation for

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excellence in clinical practice with benefits including: improved clinical outcomes and quality, increased satisfaction for patients/families, staff and faculty, improved efficiency, decreased disparities of care and decreased costs (Titler, 2006; Hughes, 2008; American Association of Critical Care Nurses, 2012). Although the value of EBP is widely accepted, it is not standard in healthcare systems globally due to multiple barriers (Manal and Hala, 2014; Melnyk et al., 2016). Several authors have identified barriers to EBP, for example McKenna, Ashton, and Keeney (2004) in their study on barrier to EBP in primary care identified organization issues concerning cost implication of funding EBP, time limitations and lack of incentives to using EBP. Wallis (2012) stated that lack of time and an organizational culture that didn't support EBP were among major barriers. Wallis further asserted that getting past workplace resistance and the constraining power of the phrase, "That's the way we've always done it here" pauses as major constraints to EBP implementation.

Literature presents multiple models of EBP that have been applied in a variety of setting. However, when interrogated, all the models have common elements applied in a process with a series of steps spanning from identification of a clinical question, search for evidence, appraisal of evidence, implementation of evidence integrated with clinical expertise and patient preferences and evaluation of outcomes (Dawes et al., 2005; Craig & Smyth, 2007) Some common models supporting implementation of EBP include; the Iowa Model of EBP Practice to Promote Quality of Care (Title & Everett, 2001; Titler, 2006) John Hopkins Nursing EBP Model (Gwalinski & Rultledge, 2008), Joanna Briggs Institute (JBI) Model of EBHC (Pearson, Wiechula, Court, & Lockwood, 2005; Jordan, Lockwood, Munn, & Aromataris, 2018; The PARIHS Framework, 2004; Harvey & Kitson, 2016).

In addition to the generic EBP models outlined above, more recently there has been an increasing focus on the use of quality improvement models that aim to bring measurable improvement into healthcare settings (Foundation, 2013). One of the approaches to continuing quality improvement is the Plan Do Study and Act (PDSA) model (Foundation, 2013; Taylor, McNicholas, Nicolay, Darzi, Bell, & Reed, 2014). The focus on quality improvement and experience co-design is motivated by a belief that all health care staff have a role in ensuring that health services continue to improve (Foundation, 2013). It is however worth noting that detailed review of the other stated EBP models is beyond the scope of this paper. Reference and a brief description is made regarding the PDSA model, which was applied in the pilot study described in this article.

The PDSA model/cycle (Fig. 1) started out as the Plan, Do, Check, Act cycle, introduced by Walter Shewart in the 1920s. It provides a structure for iterative testing of changes to improve quality of systems, and this method is now widely accepted in health care improvement (Taylor

et al., 2014). In the 'plan' stage a change aimed at improvement is identified, the 'do' stage sees this change tested, the 'study' stage examines the success of the change and the 'act' stage identifies adaptations and next steps to inform a new cycle (Taylor et al., 2014). The PDSA was considered appropriate and feasible to guide the implementation process. The pilot study sought to determine if implementation of Evidence-Based Practice interventions using the Plan-Do-Study-Act model would improve the outcomes identified in the hacks.

2. Materials and methods

In 2018 the University of Zambia-School of Nursing Sciences (UNZA-SON) in collaboration with Cardiff University - School of Healthcare Sciences -Wales United Kingdom implemented a pilot project whose aim was to promote the wellbeing of critically ill patients through evidence-based nursing. With permission from the University Teaching Hospital – Adult Hospital (UTH-AH) in Lusaka Zambia, a three month pilot project was implemented in a female medical ward from November 2018 to February 2019. The pilot project used a quality improvement approach, which combined modified experience based co-design (EBCD), (Green, Bonner, Teleni, & Bradford, 2020) rapid reviews of the evidence and practical implementation of change. The Implementation was undertaken through a five phased process using the PDSA Model. Using the PDSA, Phase 1, 2 and 3 of the Pilot were equated to the "plan" stage of the PDSA, where areas that required improvement were identified, agreed upon and supported through a baseline audit, stakeholder consensus and a rapid review respectively. Phase 4 of the pilot was equivalent to the "do" stage of the PDSA, where the agreed upon interventions were implemented in what was referred to as the four project "hacks" (Main Areas of Implementation) which were subdivided in 12 sub-areas of implementation as shown in Table 2. Being a Pilot Project, Phase 4 was meant to test the interventions to determine whether or not they would yield any improvements in nursing care. The 5th and final Phase of the Pilot which was the post implementation evaluation which was equated to the "act" stage of the PDSA, through which interventions were evaluated to determine those that could be recommended for adaptation. Phase 5 also provided information to inform the next cycle.

All the 12 nurses who were working in the ward during the course of the project participated in the implementation process. In addition, six members of the project team from the University of Zambia provided weekly supervisory/working visits in the ward. Baseline and Post implementation data were collected in phase 1 and 5 of the project using a project-specific audit questionnaire. Data analysis involved simple counts and conversion to percentages of patients, relatives and staff on whom an intervention was carried out or who implemented an intervention against the total eligible. For example the number of patients who had complete nursing care plans against the total number of patients in the acute and sub-acute bays. Details of the processes in each phase are indicated in Table 1.

3. Results

From the four "hacks", and the subsequent 12 areas of implementation, the project met the set target for improvement in eight out of the 12 as shown in Table 2. The four where the set targets were not met included; awareness of rights and responsibilities by patients, explaining the patient's condition to at least one relative, completing nursing care plans and regular multi-disciplinary team meetings attended by representatives from all disciplines. On the other hand, the eight areas where set standards were met included; display of patients' rights and responsibilities, mentorship for all junior nurses and students, orientation for new nurses and students, display of educational materials, provision and use of task allocation book for staff working in the acute and sub-acute bay. Others were display of hand washing guidelines, provision and use of hand washing soap, and use of decontamination buckets for

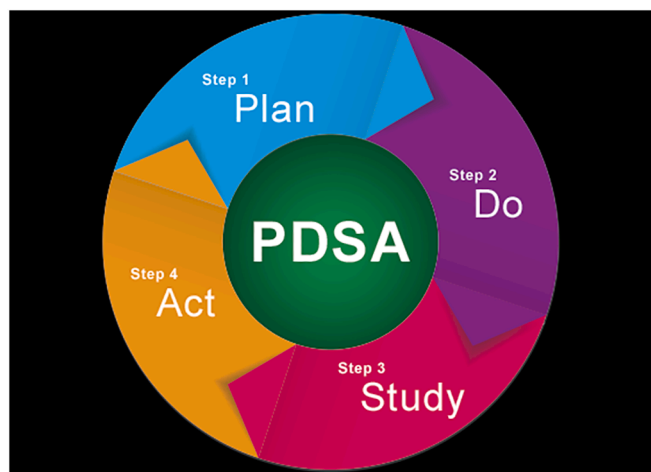


Fig. 1. Plan, Do, Study, Act cycle. The PDSA was considered appropriate and feasible to guide the implementation process.

Table 1
Phases of the Implementation Process.

Project Phases	Activities
Phase 1: Pre Implementation Audit	A baseline audit of care was conducted to identify key areas of concern with regard to nursing and to determine where adherence to the evidence base could contribute to improved nursing care. Both pre and post Implementation findings are provided in Table 2 .
Phase 2: Stakeholder Consensus workshop using modified experience based co-design	Results from the audit were discussed in a pre-implementation stakeholder workshop attended by University of Zambia and Cardiff University Staff, representative from Ministry of Health Nursing Unit, The Zambia Union of Nurses Organization, Nursing students, and the Nursing Leadership and Ward staff from the University Teaching Hospital. A total of 25 stakeholders participated in the consensus workshop. Baseline data was shared; areas of improvement identified, and eventually four "Hacks" for implementation were agreed upon. The four "Hacks" identified were: Communication between staff, patients and relatives, assessment and skills/education of nursing staff, environment and infection Prevention, and staff allocation and effective team work. Consensus building also involved setting and agreeing on performance target per hack. Areas where performance was low or none existent prior to the project were allocated low target scores, for example multidisciplinary meetings. Therefore the range for the targeted scores was from 80% to 100%
Phase 3: Rapid Review	Following the pre implementation audit and workshop, rapid reviews of the evidence for the identified areas of concern was undertaken by Cardiff University staff. The results were used during the pre-implementation seminar to facilitate discussion with nursing staff about the challenges of caring for critically ill patients within their ward and to identify ideas and evidence based practical solutions which could be implemented through the 'hacks'.
Phase 4: Implementation Phase	Over a 3-month period, the Four 'hacks' identified in phase 2 were introduced. An immediate Pre- implementation orientation seminar was held to orient the nurses on the specific intervention strategies and how they were to be implemented to address the identified problems. All the 12 nurses who were working in the ward during the course of the project were purposively sampled to participate in the implementation process. In addition, six members of the project team from the University of Zambia provided weekly supervisory/ working visits in the ward. Additionally a midterm seminar was held to provide educative support. The Seminar focusing on the use of the nursing process and mentorship and also served as a point of discussion on the progress of the implementation.
Phase 5: Post Implementation Audit	A post implementation audit was conducted to compare the pre- and post-implementation findings in the four main areas of intervention. The audit was done to determine whether there was any improvement in the identified areas. Both pre and post Implementation findings are provided in Table 2 .

infection prevention purpose.

4. Discussion

Evidence-Based Practice (EBP) is one of the most important underlying principles in modern health care (McKenna et al., 2004). Patients who receive evidence-based therapies have better outcomes than those who do not (Manjula, Anjani, & Ashok, 2018). According to Leufer, Clearly, and Holdforth (2009) EBP is highly relevant in a social and healthcare environments that have to deal with budget cuts, accountability, rapidly advancing technology, consumerism, demands for ever-increasing knowledge and litigation. Pearson et al. (2005) asserts that evidence-based healthcare is gaining increasing acceptance in most westernised countries and the science of evidence synthesis is continually evolving and expanding. Accordingly, in some countries like the United Kingdom, successive governments have highlighted the fact that a quality health service is built upon the use of best evidence (McKenna et al., 2004). Work described in this article is based on a an Evidence Based Care pilot project which was undertaken from November 2018 to February 2019 in a Medical Ward at the University Teaching Hospital –Adult Hospital in Lusaka Zambia.

As stated earlier, EBP has been acclaimed as the foundation for excellence in clinical practice with numerous benefits including; improving clinical outcomes and quality, increasing satisfaction for patients/families, staff and faculty, improving efficiency, decreasing disparities and decreasing costs (Titler, Kleiber, & Steelman (2001); Titler (2006); Hughes (2008); American association of critical care nurses (2012). The authors' perspective is that the recognition of EBP as a principle element in health care is probably based on its tripod-approach of not only emphasizing application of research findings into practice but integration of clinician experience and expertise together with patient preferences and values. Despite this recognition, EBP is not a universal standard of care in healthcare systems globally and more especially in Africa, Zambia inclusive, probably due to multiple barriers as asserted by McKenna, Ashton, and Keeney (2003).

Discourse around EBP and recognition of its importance can be traced in literature as far as the mid-19th century, however in most settings, its implementation has probably received "Lip service" as asserted by Leufer et al. (2009). Results of the case study being reported in this paper revealed a mixture of both areas of improvement and non-improvement following the implementation of evidence based solutions. From the four "hacks", and the subsequent 12 areas of implementation, the project met the set target for improvement in eight out of the 12. The four where the set targets were not met included; awareness of rights and responsibilities by patients, explaining the patient's condition to at least one relative, completing nursing care plans and regular multidisciplinary team meetings attended by representatives from all disciplines. On the other hand, display of patients' rights and responsibilities, mentorship for junior nurses and orientation of new nurses and students, display of educational materials, provision and use of allocation book for staff task allocation met the minimum set standards. Others areas of intervention where standard/scores were met included display of hand washing guidelines and provision and use of garbage and decontamination bins, and provision and use of hand washing soap.

The first "hack" focused on improving communication between staff, patients and relatives which was to be achieved by displaying of patients' rights and responsibilities, explaining the patient's condition to at least one relative and documentation of care through completion of nursing care plans. The pilot study utilized structured communication model, where communication cards were developed and utilized for identification of one family member who was allowed to seek for and receive information from the hospital team. Patients and relatives were informed of this requirement on admission. The adoption of the structured communication system reduced the numbers of inquiries on patients' condition and related information. Although this area of intervention did not meet the predetermined target like the improved

Table 2
Pre and Post Implementation Findings under the four Hacks.

Hacks (Target Areas)	Activities for PDSA –UTH-AH Pilot Project	Targeted Score (%)	Pre- Implementation Findings (%)	Post Implementation Finding (%)	
Improved communication between staff, patients and relatives	Display of patients' rights and responsibilities	Acute and Sub-Acute Bay	95	50	100
	Awareness of Rights and Responsibilities by patients	Acute and Sub Bay	95	20	60
	Explaining the patient's condition to at least one relative	Acute and Sub-Acute Bay	95	0	60
	Completed nursing care plans	Acute Bay	100	75	100
		Sub-Acute Bay	100	75	40
Improved assessment and skills/education of nursing staff	Mentorship for all junior nurses and students to be mentored		80	75	100
	Orientation of new staff		90	75	100
	Display of education materials and training		90	25	100
Improved Infection Prevention Practices	Display of hand washing Guidelines		100	0	100
	Provision and use of garbage bin, and decontamination Buckets		100	50	100
	Provision and use of Hand washing Soap		100	25	100
Improved staff allocation and more effective team work	Provision and use of checklists for staff working in acute and sub-acute bay		100	75	100
	Regular multi-disciplinary team meetings attended by representatives from all disciplines		80	0	0

*Hack is an area of intervention. PDSA-Plan Do Study and Act Model.

communication between staff, patients and relatives, improved assessment and skills/education of nursing staff, improved infection prevention practices and improved staff allocation and more effective team work. The interviews with patients and relatives who received this intervention expressed satisfaction and appreciation of the confidentiality of their information which was confined to them and one relative or significant other. Similarly nurses also reported reduced inquiries from family members thus sparing their time for other patient care activities. Findings of our pilot study resonates with those of [Kynoch et al. \(2011\)](#) who stated that introducing structured communication programs for family members of patients in the ICU can decrease the number of incoming telephone calls from family members without compromising satisfaction with care or the family's need for information.

In addition to strategies on communication, another aspect of the first hack was documentation of care and completion of nursing care plans. EBP shares fundamental principles with the Nursing process via use of evidence, clinical expertise and judgement and patient preferences ([Melnyk & Fineout-Overholt, 2015](#)). With the aim of the project being to improve care for the critically ill patients, it became fundamentally inevitable to focus on improving the application and use of the nursing process. However the implementation of the nursing process was a challenge throughout the project. Inconsistencies were noted in almost all steps of the process, from assessment to identifying and stating nursing diagnosis and evaluation to documentation of care on the care plans. Consequently, although the post evaluation findings revealed a 100% completion rate of the care plans in the acute bay, there was a 40% completion rate in the sub-acute bay.

This finding in the use of the nursing process is not unique to this study; most studies conducted in Africa have reported low utilization of the nursing process ([Kynoch, Paxton, & Chang, 2011](#)). Some of the reasons cited are inadequate nursing staff, overworking, lack of time, high patient nurse ratio, inadequate theoretical and practical knowledge, lack of nursing records, lack of standard procedures or institutional guidelines on implementation and in worst case scenario never seen a nurse put into practice the nursing process as reported by [Fisseha, Fessehay, Fikadu, Semarya, and Alemseged \(2014\)](#). The inadequate staffing, high patient nurse ratio and inadequate theoretical and practical knowledge were also observed in the implementation ward.

The second hack of the pilot project was targeted at improved assessment, skills/education of nursing staff which was to be attained through improved mentorship and orientation of junior and new staff and through display of educational reference materials for management

of common conditions admitted in the ward. This area of intervention met the target score at 100%. Two new nurses allocated to the ward during the pilot project reported having received orientation and mentorship on different areas of patient care including management of common conditions admitted to the ward, infection prevention practices, wards routine such as nursing procedure of patient hygiene, nutrition, wound care, measuring vital signs and maintaining fluid balance charts. Other areas of orientation were assessing patients and completing nursing care plans, administration of medication, ordering and storing drugs, isolation techniques, managing ward rounds, communicating and coordinating with other wards and diagnostic settings such as laboratories and radiology department. The scope of orientation significantly increases compared to the pre-implementation findings.

For the Pilot project, mentorship was envisioned to serve three purposes; improve the nursing skills for all nurses, improve the orientation and mentorship for new nurses and to improve project buy-in for sustainable implementation of EBP after the project life time. One shortcoming under this hack was that the mentorship was not structured on a one to one basis. Junior and new nurses receive mentorship on daily basis from senior staff whom they are allocated with in a particular bay or shift and not necessarily an identified named mentor. This situation is inevitable due to inadequate staffing compounded by inadequate senior staff to serve as mentors consequently an adhoc like mentorship strategy is used where any available experienced nurse is used to provide mentorship to the juniors and students on that particular shift. Notwithstanding the challenges, this area of intervention still requires structuring. It is however worthy noting that in addition to the routine mentorship provided by the senior staff on the ward, mentorship was also given by the project team during the supportive/working supervisory visits which were undertaken once per week and focused on specific identified areas of weakness. Provision of mentorship by the project implementation team was based on the premise that mentorship with direct care nurses on clinical units by EBP mentor is important in strengthening their belief about evidence-based care and their ability to implement ([Julie et al., 2017](#)). Additionally [Melnyk, Fineout-Overholt, Gallagher-Ford, and Kaplan \(2012\)](#) stated that when nurses' belief and confidence in their ability to implement EBP is strong, then their EBP implementation is greater.

The third "hack" focused on improving infection prevention strategies, via provision of guidelines, supplies and materials. This area of intervention met the predetermined target score. The nurses interviewed

during the post-intervention survey revealed having improved hand washing practices due to the availability of hand washing soap. Similarly, practices related to decontamination of equipment improved due to availability of chlorine granules and decontamination buckets. The authors' assumption is that the infection prevention hack was easily adopted because it's a status quo that did not require complex additional learning to implement and that it serves a duo benefit of protecting the nurse and the patient. This is in line with assertions of other scholars who have indicated that the inherent characteristics of an innovation determine its adoption. As asserted by Titler and other scholars (Titler et al., 2001; Melnyk et al., 2004; Rogers, 2003) characteristics of an innovation that influence adoption include (a) the complexity of the topic, (b) the credibility and pertinence of the evidence based healthcare practice to the user, and (c) the ease of assimilation into existing behaviour.

The fourth and final "hack" was to improve staff allocation and more effective team work through provision and use of a task allocation book for staff working in acute and sub-acute bay, and through multi-disciplinary team meetings attended by representatives from all disciplines. The pilot project adopted a team based nursing model in which at least two nurses with different levels of qualification and or experience were allocated to a bay of about 8–12 patients. Additionally student nurses at different levels of training were allocated to observe, learn and provide nursing care depending on the level of training and under the guidance of the qualified nurses. The team approach to care provision served as a mentorship strategy to junior and student nurses. Regarding this hack, improvement was seen with regard to consistence and skill mix in staff and student allocation. The hack met a minimum pre-determined score of 100%. The choice of team approach to nursing care was based on lessons drawn from literature on the benefits which include increased job satisfaction, retention and skills transfer that are inherent of the team approach as reported (Titler et al., 2001). On the contrary, multidisciplinary meetings could not be achieved. Failure to hold multidisciplinary meetings was due to conflicting scheduling of project meeting and other clinical activities. Members of the multidisciplinary team however attended the project launch where the objectives and the implementation plan for the pilot project were shared. Furthermore, the implementation team shared project information through the ward rounds during the clinical supportive supervisory work days. To this effect, members of the multidisciplinary team were supportive of the process.

5. Lessons and implications for future implementation

Five major lessons were learnt from the implementation process; four being enablers of the process and one being a detractor. The enablers were team involvement in the planning process, need for champion (s), need for management support and Ongoing supportive supervision. The detractor was comfort with status. Each of the four enablers had its own role to play in the success of the project. Take for example team involvement in the planning process, it was observed that the nurse who participated from the beginning of the planning phase, had more buy-in to the project, and understood the process well and consequently their participation in the process was greater. Similar observation were made by Melnyk and Fineout-Overholt (2002) who stated that when nurses' belief and confidence in their ability to implement EBP is strong, then their EBP implementation is greater.

Regarding mentorship as an enabler, it was observed that the weekly supportive supervisory working visit served as reminders on the expectations of the project and provided mentorship in implementation of certain aspects of the "Hacks" for example the use of the communication cards which was a totally new concepts which most nurses could easily forget to implement. Another aspect where mentorship worked as an enable was the use of nursing process. Therefore the mentorship team provided hands on mentorship on patient assessment, identification of patient problems, formulating nursing diagnosis and documenting care

on the care plans.

With regard to management support and the need for champions, management provided an enabling environment for implementation as they did not interfere with the implementation process. For example management accepted the use of patient communication cards which was a totally new concept. On the other hand, the role of a champion was seen in the role played by the Nurse in Charge of the Ward. She understood the process and took the role of mentorship to the new nurses and other staff including students allocated to the ward. Due to the authority she held, she was in the fore-front in ensuring that different aspects of the evidence based process were being implemented. As it has been noted earlier, resistance from nurses, nurse managers, and other leaders, and an environment that does not support EBP can be major barriers in implementing EBP (Melnyk et al., 2016, 2012; Fair brother et al., 2010).

The observed detractor for the project was the comfort with status quo. The comfort with status quo was such that no matter what is said, no matter the justification and call to change some nurses remained doing what they have been doing and remain encased in their comfort zone. Such category of nurses were seen as detractors of the process. We therefore recommended that implementers of EBP should take stock of the enablers and detractors and put appropriate measures to sustain the former and minimize the latter.

6. Limitations of the study

There was one main limitation to this study. The project was piloted for three months, a relatively short period of time, which meant that, while the implementers were still settling and striving to meet the project minimum set standards, it was time to evaluate. The period was agreed to be three months because of the high patient turnover, and high consumption of project supplies to which if the period was extended, all the supplies would have been consumed before the evaluation, consequently the evaluation would have been conducted in an environment devoid of the minimum requirement.

Authors contribution

All the authors contributed equally, read and approved the final manuscript

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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