



# The prevalence and factors associated with acute postoperative pain in elective gynecologic surgical patients at two referral hospitals in Addis Ababa, Ethiopia, 2021: a cross-sectional study

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**Background:** Postoperative pain is an expected and undesirable by-product of all surgical procedures. The provision of effective and safe postoperative pain management should be one of the top priorities of any healthcare, where surgical procedures are carried out. Major abdominal surgical operations require pain management services, regular pain assessment, and timely management of breakthrough pains in the postoperative period.

**Objective:** This study aimed to determine the prevalence and factors associated with acute postoperative pain.

**Methods:** A cross-sectional study was conducted at Minilik and Zewditu Referral hospitals from October to December 2021 and chart review and face-to-face interviews were the methods of data collection. The pain was measured at the 2, 12, and 24 h postoperatively through a numerical rating scale, and the pain was categorized as no pain (score = 0), mild pain (score 1–3), moderate pain (score 4–6), or severe pain (score 7–10). All independent variables with *P* less than or equal to 0.2 in the univariable logistic regression were reanalyzed with multivariable logistic regression at 95% CI to determine predictive factors and a *P*-value of less than 0.05 was considered statistically significant.

**Results:** In the study period, a total of 368 eligible patients were involved, out of this 11 patients were discharged before 24 h, four patients refuse to participate two incomplete documentation and one patient was ICU admitted, therefore 350 patients were involved with a response rate of 95.1%. Among those patients 73.1% of respondents' experience at least one episodes of moderate to severe postoperative pain within the first 24 h. Preoperative anxiety (AOR: 2.2, 95% CI: 1.2, 5.1), urban residency (AOR: 2.3, 95% CI: 1.2, 5.0), participants who have not formal education (AOR: 2.5, 95% CI: 1.3, 4.1), surgical patients without pre-emptive analgesia (AOR: 2.7, 95% CI: 1.3, 3.6), abdominal incision greater than 10 cm (AOR: 3.5, 95% CI: 2.1, 7.2), and surgical duration greater than or equal to 60 min (AOR: 2.3, 95% CI: 1.1, 3.1) were factors associated with acute postoperative pain following elective gynecologic surgery.

**Conclusion:** In this study, the overall incidence of moderate to severe postoperative pain after gynecologic surgery was unacceptably high, and patients undergoing gynecologic surgical procedures suffer sufficient postoperative pain need of intervention.

**Keywords:** gynecologic surgery, NRS, pain prevalence, postoperative pain, pre-emptive analgesia

## Introduction

Pain is a multidimensional experience, personalized to each patient. Differences in pain experience are influenced by the biological response, psychological state and traits, and social

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## HIGHLIGHTS

- The prevalence of postoperative pain in gynecologic surgical patients was unacceptably high (73.1%) in the study area.
- Most postoperative pain predictors are preventable, so pain management should be integral to patient care and outcomes.
- The quality of postoperative pain management in the study area is not in line with the international standardized recommendations.

context<sup>[1,2]</sup>. Postoperative pain is a form of acute pain following surgery that results from tissue injury during surgical procedures like skin incision, tissue dissection, manipulation, and traction<sup>[3]</sup>. Despite the heightened awareness regarding pain and the clinical advancements in pain management during the past 20 years, there has been little improvement in postsurgical analgesia<sup>[2,4,5]</sup>.

Postoperative pain is an expected and undesirable by-product of all surgical procedures<sup>[1,6,7]</sup>. Currently, 4.7–95.2% of patients undergoing gynecological operations experience at

least one episode of pain within 24 h<sup>[6,8–11]</sup>, and in Africa, there are scanty data available to characterize the quality of postoperative pain management specifically on post gynecologic surgical operation<sup>[12]</sup>.

The provision of effective and safe postoperative pain management should be one of the top priorities of any healthcare where surgical procedures are carried out. Major abdominal surgical operations ideally require pain management services, regular pain assessment, and timely management of breakthrough pains in the postoperative period. Gynecological surgery is one of the most common abdominal surgeries performed and a proper strategy needs to be formulated to provide uniform pain control. Postoperative analgesia can be provided with non-steroidal anti-inflammatory drugs, patient-controlled intravenous analgesia, intravenous opioid, and epidural analgesia<sup>[13,14]</sup>.

Untreated postoperative pain prolongs hospital stay, delays wound healing, and increase the risk of developing (deep vein thrombosis, pulmonary embolism, coronary ischemia, and myocardial infarction), pneumonia, insomnia, demoralization, physiological, psychological, and financial consequences, and patient dissatisfaction<sup>[2,6]</sup>.

In Ethiopia, some studies considering both obstetric and gynecologic surgical procedures shows 57–88.2% of moderate to severe postoperative pain, indicating postoperative pain management is inadequate and not in line with international recommendations<sup>[12,15,16]</sup>.

Previously published articles on gynecologic surgical procedures show that the prevalence of acute postoperative pain has large gaps, and in sub-Saharan Africa, limited evidence was known regarding predictors associated with postoperative pain following gynecologic surgical procedures<sup>[9,10,16,17]</sup>.

The objective of this study was aimed to determine the prevalence and factors associated with acute postoperative pain in elective gynecologic surgical patients.

## Methods

After ethical clearance was obtained with an approval number of *MHSC19/03/2021* a cross-sectional study was conducted on elective gynecologic surgical patients at Minilik and Zewditu Referral hospitals in Addis Abeba, from October to December 2021. Written informed consent was obtained from patients before data collection. The trained data collectors were aware of the purposes of the study to patients before data collection. Data were obtained from interviewing patients, reviewing medical charts, and nurses' patient records. The questionnaire was pre-tested on 5% of the total sample size. The preoperative and intraoperative information were documented on the pretested questionnaire in 2 h following surgery and the postoperative level of pain was assessed at the 2, 12, and 24 h through a numerical rating scale (NRS)<sup>[18]</sup>. In addition, all analgesics administered in the first 24 h following surgeries were documented.

All elective surgical patients above the age of 18 years with American Society of Anesthesiologists physical status (ASA I and ASA II) were included whereas patients, who have a psychiatric disorder, refuse to participate, Patients discharged before 24 h postoperatively, patients having chronic pain, and patients admitted to the intensive care unit were excluded from this study.

## Variables of the study

### Independent Variables

**Socio-demographic variables:** age, height, weight, BMI, residence, religion, marital status, education, and ethnicity.

**Preoperative variables:** ASA physical status, Pre-emptive analgesia, pain, and anxiety.

**Intraoperative variables:** type of anesthesia, abdominal field block (Trans abdominal plain block, hernia block, rectus sheath block), duration of surgery, type of surgery, incision type, length of incision, analgesic drugs.

**Dependent Variable:** postoperative pain.

### Operational definitions

Controlled pain is stated as a pain score of less than or equal to three in the NRS, whereas poorly controlled pain is stated as a pain score of 4–10 in the NRS.

The NRS is a pain screening tool, commonly used to assess pain severity at that moment in time using a 0–10 scale, described as 0 no pain, 1–3 mild pain, 4–6 moderate pain, and 7–10 severe pain<sup>[18]</sup>.

Pre-emptive analgesia: is the administration of an analgesic before a painful stimulus in an attempt to obtain better pain relief compared with when the same analgesic intervention is used after the painful stimulus<sup>[19]</sup>.

Clinically significant anxiety was stated as a state-trait anxiety inventory score of 44 and above<sup>[20]</sup> was assessed in the preoperative period.

**Formal education-** is an organizational education model, structured, and administered by laws and norms and subject to strict curriculum, objectives and methodology, and content (involves the instructor, student, and institution). Participants are expected to attend classes and subject themselves to assessment that is means to take learning to the next stage and it results in the attainment of diplomas and degrees<sup>[21]</sup>.

### Statistical analysis

The collected data were entered, into Epi Data version 4.4.2 and were imported to SPSS version 25 (Statistical Package for the Social Sciences) software program. Descriptive statistics were computed and presented using tables, graphs, and plain text. Multicollinearity was checked to see the linear correlation among the independent variables by using the standard error. Variables with a standard error of greater than 2 were dropped from the multivariable logistic regression analysis. Crude and adjusted odds ratios were used to see the independent variable strength of the association with the univariable and multivariable logistic regression, respectively. This univariable and multivariable logistics regression was analyzed at a 12 h point since having higher pain of prevalence on descriptive analysis at this point to not miss all possible predictors. All independent variables with a *P*-value less than 0.2 in the bi-variable logistic regression were reanalyzed with multivariable logistic regression at 95% CI to identify factors associated with postoperative pain, and a *P*-value of less than 0.05 was considered statistically significant. The current study was registered with researchregistry8534 and reported in line with strengthening the reporting of cohort, cross-sectional and case-control studies in surgery (STROCSS) guidelines<sup>[22]</sup>.

**Result**

**Socio-demographic characteristics of study participants**

A total of 368 eligible patients were involved in the study period, out of this, 11 patients were discharged before 24 h, four patients refuse to participate, two incomplete documentation, and one patient was admitted to the ICU. Therefore, in this study, 350 patients were involved with a response rate of 95.1%. Among those 350 patients, 73.1% of respondents experienced at least one episode of moderate to severe postoperative pain within the first 24 h. The majority of participants (53.4%) were 28 years or younger patients. In this study, 89.7% of participants were with BMI of less than 30 kg/m<sup>2</sup>. The median age and BMI were 27 [23–34] years, and 21.5 (21.3–27.4) Kg/m<sup>2</sup>, respectively. The majority of patients 283 (80.9%) were ASA I, and 233(66.5%) of the study subjects have formal education. Around 45.7% of participants were orthodox Christians followed by Muslims (27.4%), as shown in (Table 1).

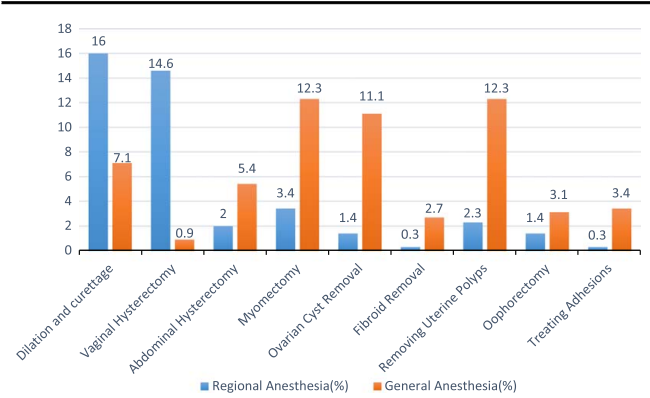
In this study, most commonly performed elective gynecologic surgical procedures under regional anesthesia were dilatation and curettage (16%), vaginal hysterectomy (14.6%), and myomectomy (3.4%) whereas common procedures with general anesthesia were myomectomy and removing uterine polyps (12.3%), and ovarian cyst removal (11.1%) as shown in (Fig. 1).

**Postoperative pain after gynecologic surgery**

Figure 2 compares the distribution of pain scores at different time points. At all three time points, the incidences of postoperative

**Table 1**  
Socio-demographic and clinical characteristics of elective gynecologic surgery 2021 (N = 350)

Variable	Frequency	Percentage	
Age	< 28 years	187	53.4
	≥ 28 years	163	46.6
BMI (kg/m <sup>2</sup> )	< 30	314	89.7
	≥ 30	36	10.3
Residence	Urban	320	91.4
	Rural	30	8.6
Religion	Orthodox	160	45.7
	Muslim	96	27.4
	Protestant	72	20.6
	Catholic	22	6.3
Ethnicity	Amhara	153	43.8
	Oromo	135	38.5
	Others	62	17.7
Formal Education	Yes	233	66.5
	No	117	33.5
Marital status	Not married	65	18.6
	Married	285	81.5
ASA status	ASA I	283	80.9
	ASA II	67	19.1
Anxiety	Yes	213	60.9
	No	137	39.1
pre-emptive analgesia	Yes	120	34.3
	No	230	65.7
Type of Anesthesia	General	54	15.4
	Spinal	296	84.6
Surgical time	< 60 min	72	20.5
	≥ 60 min	278	79.5



**Figure 1.** The common Gynecologic surgical procedures performed, 2021 (N = 350).

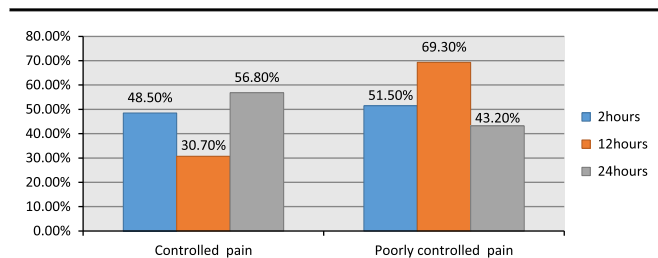
controlled pain were 48.5% at 2 h, 30.5% at 12 h, and 56.8% at 24 h. On the other hand, the incidence of participants experiencing moderate to severe pain increased from 51.1% at 2 h to 69.3% at 12 h and then reduced to 43.2% at 24 h postoperatively (Fig. 2).

Out of the total respondents, 73.1% experienced at least one episode of moderate to severe postoperative pain within the first 24 h as shown in (Fig. 3).

In this study, the use of multimodal analgesia was poorly utilized, which shows 37% of participants received only one type of analgesic drug, 28% received a combination of tramadol and diclofenac, 19% received multiple drugs, and 16% received no analgesics. Intramuscular diclofenac and IV tramadol were the most prescribed analgesics to manage acute postoperative pain regardless of the type of anesthesia and type of surgery (Table 2).

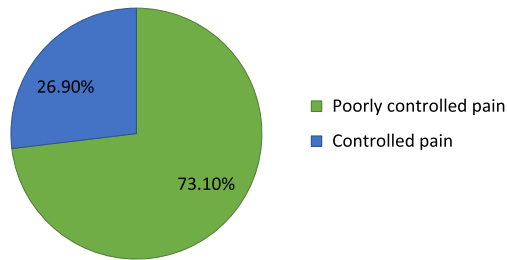
**Predictive factors of postoperative pain following elective gynecologic procedures**

In this study, preoperative anxiety was 2.2 times more likely to have moderate to severe acute postoperative pain than those who were not anxious (AOR: 2.2, 95% CI: 1.2, 5.1). Similarly, moderate to severe postoperative pain was 2.3 times (AOR: 2.3, 95% CI: 1.2, 5.0) higher among patients who came from urban areas as compared to those coming from rural areas. The study also revealed that the likelihood of having moderate to severe postoperative pain after gynecologic surgery was 2.5 times (AOR: 2.5, 95% CI: 1.3, 4.1) higher among those who have formal education compared to those having not formal education as shown (Table 3).



**Figure 2.** The incidence of postoperative pain after elective gynecologic surgery at the 2nd, 12th, and 24th postoperative hours, 2021 (N = 350).

The overall prevalence of moderate to severe pain in elective gynecologic surgical patients



**Figure 3.** The overall incidence of moderate to severe pain in elective gynecologic surgical patients, 2021 ( $N = 350$ ).

Patients who do not take pre-emptive analgesia were 2.7 times more likely to have moderate to severe postoperative pain compared to those taking pre-emptive analgesia. Patients undergoing gynecologic surgery taking a surgical time of 60 min and above were 2.3 times (AOR: 2.3, 95% CI: 1.1, 3.1) more likely to have moderate to severe postoperative pain than those having operations for less than 60 min, abdominal incision greater than 10 cm 3.5 times (AOR: 3.5, 95% CI: 2.1, 7.2) more likely to have acute postoperative pain and ASA II patients were 2.3 times more likely to have the outcome compared to ASA I ( $P = 0.02$ ) as shown in (Table 3).

## Discussion

Adequate perioperative pain management is integral to patient care and outcomes<sup>[2]</sup>. This study is an exploratory survey designed to measure the prevalence and factors associated with postoperative pain following elective gynecologic surgical procedures within the first 24 h. In this study, the overall incidence of moderate to severe postoperative pain was 73.1% (95% CI: 57.1–82.5%), which is in line with previous study findings<sup>[23]</sup>, and lower than a study done in Brazil with an incidence of 78.4%<sup>[8]</sup>. This might be explained that previously published articles include both gynecologic and nongynecologic surgical procedures<sup>[16,17,24]</sup>. In the current study, pre-emptive analgesia, type of surgical approach, surgical duration, length of incision, education, ASA physical status, preoperative anxiety, and residency were significantly associated with postoperative pain following gynecologic surgical procedures.

Some studies in Ethiopia shows that the incidence of moderate to severe postoperative pain ranges from 57–88.2%<sup>[12,16,25]</sup>, which shows inadequate treatment of acute postoperative pain in the country. A prospective cohort study done in the United States of America showed that the incidence of severe acute pain within

the first 48 postoperative hours was 10.9%<sup>[26]</sup>, which is much lower compared to our findings. The variations could be explained with a study in the United States conducted, better resources, and better pain management in developed countries, in addition, the current study only accounts for the first 24 h.

Another prospective survey in Uganda reported that the incidence of moderate to severe acute pain at three time points of 0, 6th, and 24 h were 33, 39, and 29%, respectively<sup>[4]</sup>. In contrast, the incidence of postoperative pain was much higher in our study at all-time points. The discrepancy could be due to the difference in time points of assessment and study clients were assessed for pain as soon as arrived at the recovery room (0 h), and at this time-point spinal anesthesia might not wear off and poor practice of acute postoperative pain management in the study setting.

Preoperative anxiety, which is one of the predicting factors in this study were 2.2 times more likely to complain of moderate to severe postoperative pain than those who were not anxious, which is supported by a study finding in Brazil revealed that the likelihood of having moderate to severe postoperative pain was 1.6 times in patients who were anxious during the preoperative period than in those who were not anxious<sup>[8]</sup>. In addition, the current study showed that about 70.7% of patients had preoperative anxiety due to a fear of postoperative pain, which is supported by previously published study findings<sup>[16,23]</sup>, so the current study finding has been supported by various literature and concludes that the prevalence of postoperative pain depends on multidimensional variables.

Pre-emptive analgesia is any treatment given to the patient before surgery, to reduce or prevent subsequent pain<sup>[27]</sup>. Patients who do not take pre-emptive analgesia were 2.7 times more likely to complain of moderate to severe postoperative pain than those who were taking pre-emptive analgesia, which is supported by Katz *et al.* in a study with 141 patients undergoing major gynecological surgery with pre or postincisional analgesia supporting the effect of pre-emptive analgesia. Patients who received incisional pre-emptive analgesia had lower pain scores at 24 h<sup>[28]</sup>.

In this study, surgical duration greater than or equal to 60 min were 2.3 times more likely to have moderate to severe postoperative pain than that surgical duration less than 60 min, this finding is in line with a study in the USA that showed that a longer duration of surgery was associated with increased severity of acute postoperative pain<sup>[29]</sup>. In this study, patients having formal education was another determinant of postoperative pain severity were 2.5 times more likely to have moderate to severe postoperative pain than those who did not have a formal education. The results of this study countered by a study done in Korea showed that patients with lower education were found to experience more pain than patients of higher education<sup>[30]</sup>, the reason might be explained as poor understanding of preoperative

**Table 2**

The postoperative analgesic consumption of gynecologic surgical patients within the first 24 h postoperative ( $N = 350$ )

Commonly used analgesics	Patients under regional anesthesia (range)	Patients under general anesthesia (range)
Tramadol in 24 h postoperatively (mean $\pm$ SD)	140 $\pm$ 67 (71–203)	185 $\pm$ 79 (95–253)
Diclofenac in 24 h postoperatively (mean $\pm$ SD)	109 $\pm$ 38 (61–125)	190 $\pm$ 68 (97–256)
Pethidine in 24 h postoperatively (mean $\pm$ SD)	90 $\pm$ 45 (53–131)	130 $\pm$ 75 (80–210)
Morphine in 24 h postoperatively (mean $\pm$ SD)	30 $\pm$ 15 (23–60)	67 $\pm$ 35 (56–113)

hr. = hour, mean  $\pm$  SD.

**Table 3**  
**Predictive factors of postoperative pain following elective gynecologic surgical procedures, 2021, (X-tab and Odds Ratio with 95% CI)**  
**(N = 350)**

Independent variables	postoperative pain		Odds ratio (95% CI)			
	Controlled N (%)	Poorly controlled N (%)	Crude odds ratio (COR)	Adjusted odds ratio (AOR)	P	
Age	< 28 years	21 (36.2)	166 (56.8)	0.8 (0.25, 2.3)	0.7 (0.93, 3.1)	0.078
	≥ 28 years	37 (63.8)	126 (43.2)	1	1	
BMI (kg/m <sup>2</sup> )	< 30	28 (48.3)	286 (97.9)	0.3 (0.1, 1.5)	0.67 (0.34, 2.0)	0.21
	≥ 30	30 (51.7)	6 (2.10)	1	1	
Residence	Urban	43 (74.1)	277 (94.9)	1.9 (0.7, 3.1)	2.3 (1.2, 5.0)	0.009*
	Rural	15 (25.9)	15 (5.10)	1	1	
Formal education	Yes	31 (53.4)	202 (69.2)	1.5 (0.9, 2.6)	2.5 (1.3, 4.1)	0.031*
	No	27 (46.6)	90 (30.9)	1	1	
Marital status	Not married	13 (22.4)	52 (17.80)	2 (1.9, 5.8)	1.53 (1.4, 7.2)	0.32
	Married	45 (77.6)	240 (82.2)	1	1	
ASA status	ASA I	37 (63.8)	246 (84.2)	1	1	0.02*
	ASA II	21 (36.2)	46 (15.8)	3 (2.9, 5.9)	2.3 (1.8, 4.2)	
Anxiety	Yes	41 (70.7)	172 (58.9)	3.1 (1.1, 5.7)	2.2 (1.2, 5.1)	0.004*
	No	17 (29.3)	120 (41.1)	1	1	
pre-emptive analgesia	Yes	39 (67.2)	81 (27.7)	1	1	< 0.001*
	No	19 (32.8)	211 (72.3)	2.3 (0.1, 4.8)	2.7 (1.3, 3.6)	
Type of anesthesia	General	23 (39.70)	197 (67.5)	1.8 (1.7, 0.4, 7)	0.35 (0.21, 4.7)	0.087
	Spinal	35 (60.30)	95 (32.5)	1	1	
surgical time (min)	< 60	29 (50.0)	64 (21.9)	1	1	0.023*
	≥ 60	29 (50.0)	228 (78.1)	2.9 (2.0, 5.3)	2.3 (1.1, 3.1)	
Abdominal incision	> 10 cm	24 (39.30)	196 (67.5)	2.7 (2.3, 8.5)	1	0.001*
	≤ 10 cm	34 (60.70)	96 (32.5)	1	1	
Abdominal field blocks	Yes	16 (25.1)	14 (5.9)	1	1	0.19
	No	42 (74.9)	278 (94.1)	2.9 (1.8, 6.3)	2.3 (1.2, 5.0)	

\* = significantly associated.

information, suboptimal request, and use of analgesia, and perception of an avoidable of pain following surgery in lower educated patients.

The residence was another risk factor for the incidence of moderate to severe postoperative pain. The odds of having moderate to severe postoperative pain were 2.3 times higher among patients who came from urban areas compared to those coming from rural areas. This is supported by a study done in Colombia, which shows that those coming from urban areas were 1.71 times more likely to have moderate to severe postoperative pain compared to those from rural areas<sup>[14]</sup>.

### Strengths and limitations of the study

This study was conducted specifically on elective gynecologic surgical patients.

In this study, mix of surgical and anesthesia (spinal or general) procedures were involved. In the setting, there were inconsistent pre-emptive analgesia and postoperative pain management. In addition to sampling from all eligible patients, and the subjectivity of the outcome.

### Relevance and implications of the study

This study can be used as a baseline for researchers to assess the causal relationship relatively with a strong study design.

In the current study, postoperative pain management in gynecologic surgical procedures are inconsistent and needs a

standardized pain management protocol. The prevalence of pain in the study area is unacceptably high and needs active collaboration of hospital administrations, and operational and recovery room staff to manage it.

Patients performed under regional block or general anesthesia with the abdominal field block is best practice to decrease the incidence of acute postoperative pain, so training should be prepared to perform the abdominal field block by all responsible anesthetists in the operation room.

### Conclusion

In this study, the overall incidence of moderate to severe postoperative pain after gynecologic surgery was unacceptably high, and patients undergoing gynecologic surgical procedures suffer sufficient postoperative pain need of intervention.

### Ethics approval and consent to participate

Ethical approval was obtained from kotebe University of Education, Menelik II Health Science College with approval number MHSC19/03/2021, and written informed consent before study initiation, was obtained.

### Consent to publication

Not applicable.

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## Authors' contributions

W.D.A.: substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; S.D.B.: significant contributions to analysis, or interpretation of data for the work, final approval of the version to be published; M.B.F.: important contributions to drafting the work or revising it critically for important intellectual content.

## Conflicts of interest disclosure

The authors declare that there is no conflict of interest.

## Research registration unique identifying number (UIIN)

1. Researchregistry8534.

## Provenance and peer review

Not commissioned, externally peer-reviewed .

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