

# Contemporary hysterectomy practice in a busy tertiary centre: A retrospective cohort study of indications, histopathological concordance, surgical routes, and outcomes

## Abstract

**Introduction:** Hysterectomy is still a common gynaecological procedure that has undergone changes in indication and technique over recent decades. Data on hysterectomy practice must be up to date to reflect current trends and inform service planning and postgraduate training. The audit was undertaken to provide current data on hysterectomy for benign gynaecological conditions.

**Methods:** The Coombe hospital is a tertiary referral centre for gynaecological conditions with an electronic database of patients treated. All women who underwent hysterectomy for non-obstetric, non-oncological indications in 2024 were identified and their case notes examined by the study team. A dedicated study database was created and the results analysed.

**Results:** There were 216 cases that satisfied the inclusion criteria. There were 54.2% in the 45-64 age group and 37.5% had a BMI more than 30. Laparoscopy was used in 50.6% of cases and 50% were performed for prolapse and fibroids. Vaginal hysterectomy was usually performed for prolapse in older women (median age 66.9y) and was associated with an anterior/posterior colporrhaphy in 88.7% of cases. Vaginal hysterectomy patients had a significantly smaller perioperative haemoglobin drop (1.2g/dL) and shorter post-operative hospital stay (median 2.3d). There were 3(1.4%) cases of malignancy and 2 were unsuspected preoperatively.

**Conclusion:** This audit demonstrates the need for the continued service provision of laparoscopic services and the necessity to continue training in vaginal hysterectomy and pelvic floor surgery.

**Keywords:** hysterectomy, indication, abdominal, vaginal, laparoscopic

Volume 17 Issue 4 - 2026

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**Received:** July 18, 2026 | **Published:** July 29, 2026

## Introduction

Hysterectomy remains one of the most commonly performed major gynaecological operations worldwide and continues to represent the definitive treatment for a wide range of benign, premalignant and malignant conditions. Despite major advances in medical management and minimally invasive alternatives, hysterectomy remains an essential component of gynaecological practice when conservative treatments fail, symptoms are severe, pathology is extensive, or definitive management is preferred by the patient. In tertiary referral centres, where women with complex benign gynaecological disorders are frequently managed, hysterectomy continues to account for a substantial proportion of operative gynaecological activity.<sup>1,2</sup>

Over recent decades, the indications for hysterectomy have evolved considerably. Historically, abnormal uterine bleeding and uterine leiomyoma as represented the commonest indications for surgery.<sup>1</sup> However, increasing access to effective non-surgical interventions including hormonal intrauterine systems, endometrial ablation, hysteroscopic surgery, uterine artery embolization, and other conservative therapies has reduced the requirement for hysterectomy in many women.<sup>2,3</sup> Contemporary studies suggest that while the overall prevalence of hysterectomy for some benign indications may be declining in certain healthcare settings, symptomatic fibroids, adenomyosis, endometriosis, chronic pelvic pain, pelvic organ

prolapse, and premalignant pathology continue to represent important indications, particularly in specialist and tertiary services.<sup>2,4</sup>

Alongside changing indications, the route of hysterectomy has undergone a marked transformation. High-quality evidence consistently demonstrates that laparoscopic and vaginal hysterectomy are associated with reduced blood loss, lower postoperative morbidity, shorter hospital stay and faster recovery than abdominal hysterectomy when technically feasible.<sup>1</sup> Consequently, minimally invasive surgery is increasingly regarded as the preferred approach for benign disease, although variation persists between institutions owing to patient complexity, surgeon expertise, resource availability and local practice.<sup>4,5</sup>

Histopathological examination of the hysterectomy specimens remains an important component of quality assurance, informing patient counselling, diagnostic pathways, and clinical governance.<sup>5</sup> Correlation between the preoperative diagnosis and final histopathological findings validates clinical decision-making, identifies unsuspected pathology and provides valuable information for patient counselling and governance. Previous retrospective cohort studies have reported high clinicopathological concordance for uterine fibroids and abnormal uterine bleeding, while adenomyosis and chronic pelvic pain continue to present greater diagnostic challenges.<sup>5-7</sup>

The route by which hysterectomy is performed has similarly undergone substantial change over recent decades. While abdominal hysterectomy previously represented the predominant approach, increasing evidence supporting minimally invasive surgery has influenced surgical practice internationally.<sup>1</sup> Vaginal and laparoscopic hysterectomy are associated with several recognised advantages, including reduced intra operative blood loss, shorter hospitalisation, lower postoperative morbidity, and faster recovery compared with open surgery.<sup>1</sup> Consequently, professional bodies increasingly advocate minimally invasive approaches where technically feasible.<sup>1</sup> Despite this shift, variation in surgical practice persists between institutions, reflecting differences in case complexity, patient characteristics, local expertise, surgeon training, and resource availability. In parallel, concerns have emerged regarding declining rates of vaginal hysterectomy in some healthcare systems despite its recognised benefits in selected patients.<sup>8</sup>

Several studies have explored hysterectomy trends, indications, operative routes, and perioperative outcomes, demonstrating changing patterns in both patient selection and surgical approach.<sup>3,8</sup> Institution-specific data provide an opportunity to benchmark clinical practice, evaluate adherence to evolving standards of care, and identify areas for service development and quality improvement.<sup>8</sup>

The Coombe Hospital is a high-volume tertiary referral centre providing comprehensive gynaecological services, including benign gynaecological and minimally invasive surgical services. Despite the central role of hysterectomy in gynaecological care, contemporary data describing indications, histopathological concordance, surgical routes, and perioperative outcomes within this institution are limited.

This retrospective cohort study aimed to evaluate all hysterectomies performed for benign gynaecological indications at the Coombe Hospital during 2024. The objectives of the study were to describe patient demographics, determine the primary and secondary indications for hysterectomy, evaluate the distribution of surgical routes, assess concordance between preoperative clinical diagnoses and final histopathological findings, and evaluate perioperative outcomes and complications across different surgical approaches.

## Methodology

### Study design and setting

This study was conducted at the Coombe Hospital, a tertiary referral centre in Ireland. It is a retrospective cohort study evaluating hysterectomies performed for gynaecological indications over a one-year period from 1 January to 31 December 2024.

### Study population

All cases, who underwent hysterectomy for gynaecological indications between January and December 2024 were included. Patients with limited documentation or unavailable medical records were excluded from the analysis. Hysterectomies performed for obstetric reasons or with an oncological diagnosis were also excluded. There were 24 cases where there was a suspicion of malignancy but no preoperative diagnosis. A total of 216 hysterectomies met the inclusion criteria and were included in the study. No sampling strategy was employed, as the study aimed to include all eligible hysterectomies performed during the study period.

### Data collection

Eligible patients were identified through the hospital electronic database. Medical charts were retrieved, clinical notes, discharge summaries, laboratory results, and histopathology reports were

retrospectively reviewed. Data extraction was undertaken by two members of the research team using a standardised spreadsheet to ensure consistency.

Demographic and clinical variables including age at the time of surgery, parity and body mass index (BMI) were collected. Clinical data included the type and route of hysterectomy performed and the indications for hysterectomy as recorded preoperatively. Final histopathological reports were reviewed to determine postoperative diagnoses and assess concordance between preoperative clinical diagnosis and histopathological findings.

Postoperative outcome measures included:

- 1) Length of hospital stay, measured by postoperative inpatient nights
- 2) Readmission within 30 days following surgery
- 3) Change in hemoglobin (HB) concentration, calculated as the difference between preoperative haemoglobin level and the first postoperative haemoglobin value
- 4) Blood transfusion requirement
- 5) Complications recorded included:
  - 6) Intraoperative organ injury (bowel, bladder, ureteric, or vascular injury)
  - 7) Return to theatre
  - 8) Postoperative infection or sepsis
  - 9) Venous thromboembolism (VTE)
- 10) Admission to a high dependency unit (HDU) or intensive care unit (ICU)

### Data management and confidentiality

Data extracted from patient records were initially entered into a Microsoft Excel spreadsheet. Following data cleaning and verification, the dataset was transferred to the SPSS software version 29 (IMB corp. New York) for statistical analysis. No patient identifiers, including names, medical record numbers, addresses, or dates of birth, were collected or retained during the study. Access to the dataset was restricted to the research team to ensure confidentiality and compliance with institutional data governance standards.

### Statistical analysis

Descriptive statistics were used to summarise demographic characteristics, surgical indications, histopathological findings, routes of hysterectomy, perioperative outcomes, and complications.

Continuous variables were presented as medians with range due to the non-normal distribution of the sample. Categorical variables were summarised using frequencies and percentages.

Comparative analyses were undertaken to evaluate differences in perioperative outcomes and complications across hysterectomy routes and relevant clinical groups. Categorical variables were analysed using the chi-square test. Continuous variables were compared using Kruskal-Wallis test. Statistical significance was defined as a two-sided p-value of <0.05.

### Institutional approval

Approval for this study was obtained from the Audit and Quality Advisory (AQUA) group at the Coombe Hospital (AQUA-

2026-05-05). Given the retrospective nature of the study and the use of anonymised routinely collected clinical data, individual patient consent was not required.

## Results

Table 1 demonstrates that during the audit period, 216 hysterectomies were performed for gynaecological indications at The Coombe Hospital. Four of these cases had limited documented information available for review. The cohort predominantly consisted of women aged 45–64 years (54.2%), representing the peak age group for hysterectomy, followed by 25–44 years (25.9%) and ≥65 years (19.9%).

**Table 1** Selected demographic and clinical variables

| Variable            | Number (percentage) |
|---------------------|---------------------|
| <b>Age</b>          |                     |
| 25–44               | 56 (25.9%)          |
| 45–64               | 117 (54.2%)         |
| 65 and above        | 43 (19.9%)          |
| Nullipara*          | 18 (9.1%)           |
| Previous Caesarean† | 66 (31.4%)          |
| <b>BMI‡</b>         |                     |
| 18.5–24.9           | 32 (14.8%)          |
| 25–29.9             | 75 (34.7%)          |
| 30–34.9             | 45 (20.8%)          |
| 35–39.9             | 25 (11.6%)          |
| ≥40                 | 11 (5.1%)           |

\*missing in 18 patients

†missing in 6 patients

‡missing in 28 patients

Nulliparous women accounted for 9.1% of cases, and 31.4% had at least one previous caesarean section, reflecting an important surgical consideration influencing operative complexity and route selection.

The population demonstrated a high prevalence of overweight and obesity, with nearly two-thirds of patients having a BMI ≥25 kg/m<sup>2</sup>. The missing data is regrettable but not unusual in a large clinical data set.

No statistically significant difference in BMI was observed between hysterectomy groups ( $p = 0.1$ ), suggesting BMI alone did not determine surgical approach in this cohort.

## Surgical approach and indications

The dominant surgical approach was total laparoscopic hysterectomy (TLH) (48.6%), followed by vaginal hysterectomy (VH) (28.2%) and total abdominal hysterectomy (TAH) (19%), with

only a very small proportion of subtotal or laparoscopy-assisted vaginal procedures. This distribution highlights a clear institutional preference towards minimally invasive surgery, with laparoscopic and vaginal approaches accounting for over three-quarters of procedures (Table 2).

**Table 2** Distribution of type and route of hysterectomy

| Type and route of hysterectomy      | Number (percentage) |
|-------------------------------------|---------------------|
| <b>Subtotal</b>                     |                     |
| Laparoscopic                        | 1 (0.5%)            |
| Abdominal                           | 5 (2.3%)            |
| <b>Total</b>                        |                     |
| Abdominal (TAH)                     | 40 (18.5%)          |
| Laparoscopic (TLH)                  | 106 (49.1%)         |
| Vaginal (VH)                        | 62 (28.7%)          |
| Laparoscopy assisted vaginal (LAVH) | 2 (1.0%)            |

The most common indications for surgery were prolapse (27.8%), fibroids (22.2%), and menorrhagia with/without dysmenorrhoea (19.0%). VH was strongly associated with prolapse surgery 58/62 (93.6%), whereas TLH and TAH were used in prolapse treatment in 1/140 cases (0.7%). TLH was the preferred minimally invasive approach for most benign gynaecological conditions (Table 3).

**Table 3** Distribution of primary indication and route of hysterectomy

| Primary indication          | TLH | VH | TAH | Other* LAVH | Total |
|-----------------------------|-----|----|-----|-------------|-------|
| Prolapse                    | 1   | 58 | 0   | 1           | 60    |
| Fibroids                    | 29  | 1  | 16  | 2           | 48    |
| Menorrhagia & dysmenorrhoea | 31  | 1  | 6   | 3           | 41    |
| Malignancy Suspicion        | 12  | 2  | 8   | 2           | 24    |
| Heavy Menstrual Bleeding    | 13  | 0  | 3   | 0           | 16    |
| Chronic pelvic pain         | 6   | 0  | 5   | 0           | 11    |
| Endometriosis               | 7   | 0  | 1   | 0           | 8     |
| Abnormal Uterine Bleeding   | 6   | 0  | 1   | 0           | 7     |
| Adenomyosis                 | 1   | 0  | 0   | 0           | 1     |
| Total                       | 106 | 62 | 40  | 8           | 216   |

\*Other procedures include subtotal abdominal hysterectomy, laparoscopic subtotal hysterectomy, and laparoscopically assisted vaginal hysterectomy.

Patients who underwent vaginal hysterectomy were significantly older (median 66.9 years vs. 46.5 for TLH vs. 48.8 for TAH,  $p < 0.001$ ). However, previous caesarean section was significantly more common in the TLH group (40.4%), compared to VH (25%) and TAH (18.4%) ( $p < 0.05$ ). This likely reflects avoidance of vaginal surgery in patients with potential adhesions or altered pelvic anatomy (Table 4).

**Table 4** Differences in surgical approach based on median age, mean BMI parity and history of previous caesarean delivery

| Variable                                | TLH N=106        | VH N=62        | TAH N=40         | Statistical test                       |
|-----------------------------------------|------------------|----------------|------------------|----------------------------------------|
| Median age (range) (year)               | 46.5 (31.8–77.8) | 66.9 (39–82.6) | 48.8 (35.1–69.3) | Kruskal-Wallis = 71.4 ( $p < 0.001$ )  |
| Median BMI (range) (kg/m <sup>2</sup> ) | 29 (18–46)       | 28 (19–38)     | 29 (21–49)       | Kruskal-Wallis = 4.4 ( $p = 0.1$ , NS) |
| Nulliparity*                            | 8 (7.8%)         | 3 (5.6%)       | 5 (14.3%)        | Chi-Sq = 13.7 ( $p = 0.09$ , NS)       |
| Previous Caesarean†                     | 42 (40.4%)       | 15 (25%)       | 7 (18.4%)        | Chi-Sq = 16.2 ( $p < 0.05$ )           |

\*Chi-square analysis performed across the full range of parity

†Chi-square analysis performed across the full range of previous caesarean sections

NS = not significant ( $p > 0.05$ )

## Postoperative outcomes and complications

Table 5 summarises the distribution of postoperative outcomes and complication rates within the hysterectomy subgroups. The cumulative

complication rates in this cohort were low. Blood transfusion rate remained low overall (1.9%), with a non-significant trend towards higher rates in TAH (4.9%).

**Table 5** Distribution of postoperative outcomes and complication rates within the hysterectomy subgroups

| Variable                                     | TLH N=106      | VH N=62         | TAH N=40        | Statistical test                 |
|----------------------------------------------|----------------|-----------------|-----------------|----------------------------------|
| Median preop HB(range) (g/dL)                | 13 (9.2-16.3)  | 13 (9-14.8)     | 12.7 (8.8-15.4) | Kruskal-Wallis = 0.13(p=0.9, NS) |
| Median postop HB(range) (g/dL)               | 11 (7.2-15.2)  | 11.4 (7.8-13.2) | 11 (7.9-13.1)   | Kruskal-Wallis = 1.7(p=0.4, NS)  |
| Median drop in HB (range)(g/dL)              | 1.6 (-2.0-3.8) | 1.2 (-0.5-5.0)  | 1.5 (-2.0-3.8)  | Kruskal-Wallis = 6.6(p<0.05)     |
| Complications (n,%)                          | 2 (1.9%)       | 3 (4.8%)        | 6 (15.0%)       | Chi-sq= 18.9 (p<0.001)           |
| Median length of hospital stay(range) (days) | 3.1 (1.3-6.4)  | 2.3 (1.3-14.1)  | 3.3 (2.1-8.3)   | Kruskal-Wallis = 27.5(p<0.001)   |

NS = not significant (p>0.05)

Readmission within 30 days was also low (2.8%), with a higher proportion observed in TAH (7.3%) compared to TLH (2.9%) and none in VH. Although these differences did not have statistical significance, the trend consistently favours minimally invasive approaches.

## Concurrent procedures

There was a strong association between surgical route and concurrent procedures where pelvic floor repair was performed with 88.7% of VH, whereas salpingectomy and/or salpingo-oophorectomy were more associated with TLH and TAH (Table 6). This reflects appropriate tailoring of surgical approach based on underlying pathology, particularly prolapse versus adnexal disease.

**Table 6** Distribution of concurrent procedures performed at the time of hysterectomy

| Additional procedure                   | TLH N=106  | VH N=62    | TAH N=40   |
|----------------------------------------|------------|------------|------------|
| Anterior/posterior colporrhaphy (n, %) | 1 (1%)     | 55 (88.7%) | 0          |
| Salpingectomy (n, %)                   | 68 (64.8%) | 2 (3.2%)   | 19 (46.3%) |
| Salpingo-oophorectomy (n, %)           | 33 (31.4%) | 3 (4.8%)   | 21 (51.2%) |

## Histopathological findings

Unexpected malignancy was identified in 3 cases (1.4%), despite presumed benign indications (Table 7). This highlights the importance of routine histopathological evaluation following hysterectomy.

**Table 7** Distribution of final histology results among the different primary indications for hysterectomy

| Primary indication          | Benign histology n=213 | Malignant histology n=3 | Unknown/Missing | Total |
|-----------------------------|------------------------|-------------------------|-----------------|-------|
| Prolapse                    | 59                     | 1                       | 0               | 60    |
| Fibroids                    | 48                     | 0                       | 0               | 48    |
| Menorrhagia & Dysmenorrhoea | 41                     | 0                       | 0               | 41    |
| Malignancy Suspicion        | 23                     | 1                       | 0               | 24    |
| Heavy Menstrual Bleeding    | 16                     | 0                       | 0               | 16    |
| Chronic Pelvic Pain         | 10                     | 1                       | 0               | 11    |
| Endometriosis               | 8                      | 0                       | 0               | 8     |
| Abnormal Uterine Bleeding   | 7                      | 0                       | 0               | 7     |
| Adenomyosis                 | 1                      | 0                       | 0               | 1     |

## Discussion

This retrospective cohort study provides a contemporary overview of hysterectomy practice for benign gynaecological disease in a large tertiary referral centre in Ireland. The principal findings demonstrate that minimally invasive hysterectomy has become the predominant surgical approach, accounting for almost 80% of all procedures, with total laparoscopic hysterectomy (TLH) representing the most frequently performed route. Vaginal hysterectomy (VH) remained the preferred approach for pelvic organ prolapse, while abdominal hysterectomy (TAH) was reserved for selected complex cases. Overall perioperative outcomes were favourable, with low rates of complications, blood transfusion and hospital readmission, together with a low incidence of unexpected malignancy on final histopathology.

The increasing adoption of minimally invasive hysterectomy observed in this study reflects the substantial evolution of gynecological

surgical practice over the past two decades. International evidence has consistently demonstrated a progressive transition away from abdominal hysterectomy towards laparoscopic and vaginal approaches owing to improvements in surgical technology, increasing surgeon experience and the growing body of evidence supporting enhanced perioperative outcomes. The most recent Cochrane systematic review concluded that minimally invasive hysterectomy is associated with shorter hospital stay, more rapid postoperative recovery and reduced postoperative morbidity compared with abdominal hysterectomy while maintaining comparable safety and effectiveness for benign disease.<sup>1</sup> Similar trends have been reported in large population-based studies, where increasing institutional surgical volume and expertise have been associated with greater utilization of laparoscopic hysterectomy and improved clinical outcomes.<sup>3,4,8</sup>

In the present study, TLH accounted for approximately half of all hysterectomies and represented the preferred approach for most benign uterine pathology. This pattern is consistent with international

recommendations advocating laparoscopic hysterectomy whenever vaginal hysterectomy is not feasible.<sup>1,2</sup> Lin et al. demonstrated that increasing access to minimally invasive gynecological surgery substantially increased the proportion of laparoscopic hysterectomies while reducing the need for open abdominal surgery without compromising patient safety.<sup>4</sup> Luchristt et al. similarly reported sustained improvements in operative outcomes despite increasing surgical complexity.<sup>8</sup>

Despite the increasing dominance of laparoscopy, vaginal hysterectomy continues to play an essential role in modern gynecological practice. In this cohort, almost all women undergoing vaginal hysterectomy presented with pelvic organ prolapse, and over 88% underwent concurrent anterior and/or posterior colporrhaphy. Patients managed vaginally were significantly older than those undergoing laparoscopic or abdominal hysterectomy, reflecting appropriate patient selection. Although several countries have reported declining rates of vaginal hysterectomy with increasing use of laparoscopy, maintaining competency in vaginal surgery remains essential, particularly within tertiary urogynecology services and postgraduate surgical training programs.<sup>1,2,7</sup>

Consistent with previously published evidence, patients undergoing abdominal hysterectomy experienced less favorable perioperative outcomes than those managed using minimally invasive techniques. Although only one-fifth of procedures were performed abdominally, this group demonstrated significantly higher complication rates together with trends towards increased blood transfusion requirements, longer postoperative hospital stay and higher readmission rates. These findings should be interpreted in the context of case complexity, as abdominal hysterectomy was generally reserved for women with large fibroids, extensive pelvic pathology, previous complex surgery or suspected malignancy. Nevertheless, the findings support the evidence demonstrating the benefits of minimally invasive surgery whenever clinically appropriate.<sup>1,5,9,10</sup>

A systematic review of hysterectomy for benign disease<sup>1</sup> included randomized controlled trials however this data represents the full spectrum of clinical practice and included patients with complex problems that would not be suitable for randomization. Nevertheless the complication rate and length of hospital stay is comparable in the current study. The review found that the length of hospital stay for VH was 1.7d less than after TAH and 0.6d less than after a TLH.<sup>1</sup> This is similar to the current data documenting a median stay of 2.3 v 3.1 v 3.3d for VH, TLH and TAH respectively.

Although the reduction in postoperative hemoglobin differed significantly between surgical approaches, this did not translate into clinically significant differences in blood transfusion requirements. Vaginal hysterectomy was associated with the smallest median hemoglobin decline, while overall transfusion rates remained low across all groups, suggesting effective perioperative blood management. Similar observations have been reported in systematic reviews.<sup>1,6</sup>

Patient characteristics also appeared to influence surgical decision-making. Previous Caesarean delivery was more frequent among women undergoing laparoscopic hysterectomy, while BMI did not differ significantly between surgical groups despite a high prevalence of obesity. This suggests obesity alone did not preclude minimally invasive surgery and is supported by previous studies demonstrating favorable laparoscopic outcomes in obese women.<sup>9,10</sup>

Histopathological examination confirmed benign disease in 98.6% of cases, with only three women (1.4%) demonstrating malignant pathology. The low incidence of unexpected malignancy

is comparable with previous histopathological audits demonstrating good clinicopathological concordance for benign indications while recognizing that adenomyosis and chronic pelvic pain remain more difficult to diagnose preoperatively.<sup>5-7</sup> These findings support routine histopathological assessment of all hysterectomy specimens.

Overall institutional performance was favorable, with an overall complication rate of 5.1%, blood transfusion rate of 1.9% and 30-day readmission rate of 2.8%, comparing favorably with published international series.<sup>1,3,8</sup> The systematic review quotes acute complication rates of 4.9% and 7.4% and 7.6% for VH, TLH and TAH if undiagnosed febrile episodes are not counted<sup>1</sup> thus comparable to the current study. Major complication rates from a National database quotes 3.1% for VH and 2.6% for TLH.<sup>8</sup>

Strengths of this study include the inclusion of all consecutive hysterectomies over one year and comprehensive review of operative, pathological and outcome data. Limitations include the retrospective single-center design, dependence on routine documentation, lack of patient-reported outcome measures, and potential selection bias in surgical route.

In conclusion, minimally invasive hysterectomy has become the standard surgical approach for benign gynecological disease within our tertiary referral center, with excellent perioperative outcomes and a low incidence of major complications. These data support prioritizing minimally invasive surgical techniques for benign hysterectomies where feasible. Continued investment in laparoscopic services including access to laparoscopic training for fellows, together with preservation of vaginal hysterectomy skills is essential. Future research should include prospective multicenter registries incorporating patient-reported outcomes, quality-of-life assessment and long-term follow-up.

## Acknowledgments

None.

## Funding

None.

## Conflicts of interest

The authors declare no potential conflicts of interest.

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