

Enhanced Recovery After Gynecologic Surgery in Austria: A National Survey of Implementation and Awareness

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Abstract

Background: Enhanced Recovery After Surgery (ERAS) pathways improve postoperative outcomes across surgical specialties; however, implementation in gynecologic surgery remains inconsistent. This study assessed national ERAS implementation in Austrian gynecologic departments and compared reported practices between departmental leadership and frontline clinicians.

Methods: A national cross-sectional survey was conducted using two structured online questionnaires targeting Heads of Department (HoDs) and residents and non-leadership specialists (“clinicians”). Survey items were derived from American College of Obstetricians and Gynecologists and ERAS Society recommendations. ERAS awareness and self-reported implementation were analyzed separately. Group comparisons were performed using Fisher’s exact test and Kruskal–Wallis testing; concordance between leadership and clinician response patterns was assessed using Kendall’s Tau-b correlation.

Results: Fifty of sixty one HoDs (82%) participated, representing university (16%), large non-university (59%), and small non-university hospitals (25%). Fifty–eight clinicians completed the survey. HoDs reported high adherence to several intraoperative and postoperative ERAS elements, including comorbidity assessment, antibiotic prophylaxis, and preference for minimally invasive surgery. In contrast, preoperative optimization measures showed consistently low adherence. Preoperative carbohydrate loading was reported as not implemented by 62% of HoDs and 60% of clinicians. No significant differences in ERAS adherence were observed between university and non-university hospitals for any key ERAS element. Preoperative nutritional screening (36% vs. 14%; $p < 0.001$) and nutritional supplementation in malnourished patients (66% vs. 14%; $p < 0.001$) were reported significantly more often by HoDs than by clinicians. Overall concordance between HoD and clinician response patterns was strong (Kendall’s $\tau = 0.65$; $p < 0.001$). Nearly all clinicians (98%) expressed interest in structured ERAS education.

Conclusion: ERAS implementation in Austrian gynecologic surgery remains heterogeneous, with consistent adoption of several intraoperative and postoperative elements but persistently low adherence to key preoperative optimization measures. Academic affiliation does not confer superior ERAS implementation. These findings highlight the need for structured education, standardized pathways, and coordinated national implementation strategies to improve guideline-consistent perioperative care.

Keywords: Enhanced recovery after surgery, Gynecologic surgery, Gynecology, Health education, Perioperative care

Introduction

Enhanced Recovery After Surgery (ERAS) is a multidisciplinary, evidence-based approach to perioperative care designed to attenuate the physiological stress response to surgery, promote early functional recovery, and improve patient outcomes [1,2]. Core ERAS components include preoperative

patient education, optimization of nutritional status, minimally invasive surgical techniques, multimodal opioid-sparing analgesia, early mobilization, and early resumption of oral intake. Collectively, these measures have been shown to reduce postoperative complications, shorten hospital stay, and improve patient satisfaction [3].

Initially developed for colorectal surgery, ERAS principles have since been adapted to a wide range of surgical specialties, including gynecology and obstetrics [4,5]. Professional organizations such as the American College of Obstetricians and Gynecologists (ACOG) and the ERAS Society have published specialty-specific recommendations addressing perioperative care in gynecologic and oncologic surgery, minimally invasive procedures, and cesarean delivery [6–8].

Despite increasing guideline endorsement, evidence suggests that ERAS implementation remains inconsistent. European and international surveys have demonstrated substantial variability in adherence to individual ERAS components, particularly in preoperative nutritional optimization, perioperative counseling, and catheter management [9,10]. In Austria, recent data on enhanced recovery after cesarean delivery similarly identified incomplete adoption of recommended practices, indicating that implementation gaps persist even within well-resourced healthcare systems [11].

Materials and Methods

Study design

We conducted a national, cross-sectional, descriptive survey to assess awareness and self-reported implementation of Enhanced Recovery After Surgery (ERAS) measures in gynecologic surgery across Austria.

Study population and survey distribution

Two independent online questionnaires were developed and administered using the SurveyMonkey® platform.

Heads of Department (HoDs)

A 34-item survey was distributed via email to all 61 Heads of Department of public gynecology units in Austria. HoDs were defined as physicians with overall clinical and administrative responsibility for their departments. The survey assessed institutional ERAS implementation, perioperative care pathways, and adherence to guideline-based recommendations. The full questionnaire is provided in **Supplementary Table 1**.

Residents and specialists (Clinicians)

A separate 30-item survey was disseminated to residents in training and board-certified specialists without departmental leadership roles. Distribution occurred through the Austrian national trainee network (“Junge Gyn der OEGGG”) and professional medical publications. At the time of the survey, 416 residents were registered with the Austrian Society for Gynecology and Obstetrics (OEGGG). This questionnaire focused on individual familiarity with ERAS principles, self-reported implementation in routine clinical practice, and

educational needs. The full questionnaire is provided in **Supplementary Table 2**. For clarity, residents and specialists are collectively referred to as “clinicians” in the *Results* section.

Participants in both surveys were unaware of the parallel questionnaire to ensure independent responses. Data collection was conducted between March 23 and October 30, 2025.

ERAS measures assessed

Survey items were derived from the ACOG Committee Opinion No. 750 (2018) [6] and the ERAS Society guidelines for gynecology and gynecologic oncology [5], and were adapted to reflect Austrian clinical practice.

Statistical analysis

Survey responses were recorded on ordinal Likert scales. Awareness (knowledge and familiarity with ERAS principles) and implementation (routine clinical application of ERAS measures) were analyzed as distinct outcomes. Adherence to ERAS recommendations was summarized descriptively using agreement rates across survey items.

To explore institutional differences, responses from Heads of Department to five predefined key ERAS elements were stratified by hospital type (university hospitals, large non-university hospitals performing ≥ 20 gynecologic procedures per week, and small non-university hospitals performing < 20 procedures per week). For subgroup analyses, Likert responses were dichotomized into agreement (Likert 4–5) and disagreement (Likert 1–2), while neutral responses (Likert 3) were excluded. Differences in ordinal response distributions across hospital types were assessed using the Kruskal–Wallis test. A two-sided p -value < 0.05 was considered statistically significant.

Comparisons between HoDs and clinicians for identical survey items were performed using Fisher’s exact test after dichotomization. Concordance in response patterns between leadership and clinicians was evaluated using Kendall’s Tau-b correlation coefficient.

Ethical considerations

Participation was voluntary and anonymous, and the study involved healthcare professionals only. No patient data, interventions, or sensitive personal information were collected. According to Austrian research regulations and institutional policies, anonymous non-interventional surveys among healthcare professionals are generally exempt from mandatory ethics committee approval. Completion of the questionnaire implied informed consent. Generative AI tools (Chat GPT, version 4.0 and 5.2) were used solely for language editing and consistency checks; all analyses were performed by the authors.

Results

Heads of Department

Fifty of sixty one Heads of Department (HoDs) from public gynecologic institutions in Austria completed the survey, corresponding to a response rate of 82%. Respondents represented large non-university hospitals performing at least 20 gynecologic procedures per week (n = 29; 59%), small non-university hospitals performing fewer than 20 procedures per week (n = 12; 25%), and university hospitals (n = 8; 16%); one respondent did not specify hospital type.

High levels of agreement were reported for several core ERAS elements. All HoDs endorsed preoperative assessment and optimization of comorbidities, and nearly all reported a preference for minimally invasive surgical approaches and timely intravenous antibiotic prophylaxis. Restriction of surgical drain use to selected indications and use of multimodal postoperative analgesia were also widely supported. Early removal of urinary catheters within 24 hours postoperatively and early mobilization following minimally invasive procedures were reported by the majority of respondents.

Moderate levels of agreement were observed for avoidance of prolonged preoperative fasting, early postoperative oral intake within hours after surgery, and nutritional supplementation in malnourished patients.

Low agreement was observed for preoperative carbohydrate loading. Only a minority of HoDs reported routine implementation of this measure, whereas the majority explicitly indicated non-adherence. Early mobilization on the day of surgery following laparotomy was also infrequently endorsed.

Several ERAS items demonstrated marked variability in reported practice, defined by the absence of a clear majority agreement or disagreement. These included

preoperative patient information specifically addressing ERAS principles, routine preoperative nutritional screening, timing of hospital admission for otherwise healthy patients undergoing procedures such as vaginal hysterectomy, bowel preparation strategies when bowel involvement was anticipated, routine use of epidural anesthesia for laparotomy, use of local or regional pain block techniques, avoidance of routine intraoperative urinary catheterization, postoperative counseling regarding nicotine abstinence, and postoperative explanation of ERAS recommendations and their rationale. When bowel involvement was anticipated, nearly all HoDs reported use of at least one form of bowel preparation. Detailed Likert-scale response distributions are shown in **Table 1**.

To explore whether institutional characteristics influenced ERAS implementation, responses to five predefined ERAS elements were stratified by hospital type (**Table 2**). The five ERAS elements included in the hospital-type sub analysis were selected a priori based on three criteria: (1) their prominence in ERAS Society guidelines for gynecologic surgery, (2) their established impact on postoperative recovery, metabolic optimization, and length of stay, and (3) their consistently variable implementation in international ERAS surveys [1,5,9]. Agreement, neutral responses, and disagreement were analyzed separately. Across all five ERAS elements—preoperative carbohydrate loading, avoidance of routine urinary catheterization, early mobilization after laparotomy, early postoperative oral intake, and early discharge pathways—no statistically significant differences in ordinal response distributions were observed between university hospitals, large non-university hospitals, and small non-university hospitals (all Kruskal–Wallis $p > 0.05$). Preoperative carbohydrate loading showed uniformly low agreement across all settings, and none of the remaining elements demonstrated a consistent advantage for university hospitals. Overall, hospital type was not associated with higher reported adherence to key ERAS elements.

Table 1. ERAS item adherence – Heads of department (n=50).

ERAS Item	Strongly agree	Rather agree	Partly	Rather disagree	Disagree	Missing
Comorbidity management	42 (84%)	8 (16%)	0	0	0	0
Preference for minimally invasive surgery	49 (98%)	1 (2%)	0	0	0	0
Antibiotic prophylaxis within 60 min (n=49)	45 (92%)	2 (4%)	1 (2%)	1 (2%)	0	0
Preoperative carbohydrate loading	6 (12%)	6 (12%)	7 (14%)	11 (22%)	20 (40%)	0
Preoperative nutritional screening (n=49)	10 (20%)	8 (16%)	17 (35%)	10 (20%)	4 (8%)	1 (2%)
Nutritional supplementation if malnourished	17 (34%)	16 (32%)	9 (18%)	8 (16%)	0	0
Use of local or regional pain blocks	9 (18%)	11 (22%)	12 (24%)	9 (18%)	9 (18%)	0
Multimodal postoperative analgesia (n=49)	37 (76%)	11 (22%)	0	0	1 (2%)	0
Early postoperative oral intake	24 (48%)	17 (34%)	6 (12%)	2 (4%)	0	1 (2%)

Table 2. HoD responses to five predefined ERAS elements stratified by hospital type.

ERAS element	University (n)		University Disagree		University Missing		Large Agree		Large Neutral		Large Disagree		Small Agree		Small Neutral		Small Disagree		Small Missing		Kruskal-Wallis p
	Agree	Neutral	Disagree	Missing	Agree	Neutral	Disagree	Missing	Agree	Neutral	Disagree	Missing	Agree	Neutral	Disagree	Missing	Agree	Neutral	Disagree	Missing	
Preoperative carbohydrate loading	2 (25.0%)	2 (25.0%)	4 (50.0%)	0 (0.0%)	8 (27.6%)	3 (10.3%)	18 (62.1%)	0 (0.0%)	2 (16.7%)	2 (16.7%)	8 (66.7%)	0 (0.0%)	0 (0.0%)	2 (16.7%)	2 (16.7%)	8 (66.7%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0.885
Avoidance of routine urinary catheterization	2 (25.0%)	2 (25.0%)	4 (50.0%)	0 (0.0%)	11 (37.9%)	7 (24.1%)	11 (37.9%)	0 (0.0%)	3 (25.0%)	3 (25.0%)	3 (25.0%)	0 (0.0%)	0 (0.0%)	6 (50.0%)	3 (25.0%)	3 (25.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0.894
Early mobilization after laparotomy	2 (25.0%)	0 (0.0%)	6 (75.0%)	0 (0.0%)	11 (37.9%)	0 (0.0%)	18 (62.1%)	0 (0.0%)	3 (25.0%)	3 (25.0%)	8 (66.7%)	0 (0.0%)	0 (0.0%)	1 (8.3%)	8 (66.7%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0.758
Early postoperative oral intake	6 (75.0%)	2 (25.0%)	0 (0.0%)	0 (0.0%)	22 (75.9%)	4 (13.8%)	2 (6.9%)	1 (3.4%)	12 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0.403
Early discharge pathways	8 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	29 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	12 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0.494

Responses are shown as Agree (Likert 4–5), Neutral (Likert 3), Disagree (Likert 1–2), and Missing. Differences in ordinal response distributions across hospital types were assessed with the Kruskal-Wallis test.

Residents and specialists

A total of 58 residents and non-leadership specialists (“clinicians”) completed the survey, including junior residents, senior residents, and board-certified specialists. Respondents worked across university hospitals, large non-university hospitals, and small non-university hospitals.

High levels of agreement were reported for preference for minimally invasive surgical approaches and for mobilization on the day of surgery following minimally invasive procedures. Agreement was also common for early postoperative urinary catheter removal, restriction of drain use to selected indications, preoperative comorbidity assessment, early postoperative oral intake, and multimodal postoperative analgesia.

In contrast, low agreement was observed for several preoperative ERAS elements. Routine preoperative nutritional screening and nutritional supplementation in malnourished patients were infrequently reported, and preoperative carbohydrate loading was not implemented by the majority of clinicians.

Several ERAS elements demonstrated substantial variability in reported practice. Avoidance of routine intraoperative urinary catheterization and use of local or regional pain block techniques showed heterogeneous response patterns, with similar proportions of agreement, disagreement, and neutral responses. Variability was also observed in ERAS-related perioperative counseling, including recommendations for preoperative alcohol abstinence and postoperative nicotine abstinence. Despite these gaps, nearly all clinicians expressed

support for structured ERAS protocol implementation. Detailed response distributions are provided in **Table 3**.

Exploratory subgroup analyses suggested that familiarity with ERAS principles increased with professional seniority, although higher awareness did not consistently translate into higher reported implementation. Preoperative alcohol abstinence counseling was reported more frequently with advancing training level. Due to small and imbalanced subgroup sizes, institutional comparisons among clinicians are reported descriptively only.

Comparative analysis: Heads of Department versus clinicians

Comparative analysis of 17 ERAS items common to both surveys demonstrated both concordance and divergence between departmental leadership and clinicians (**Table 4**). High levels of agreement were observed in both groups for several intraoperative and postoperative elements, including restriction of drain use, early urinary catheter removal, and avoidance of postoperative fluid overload.

Statistically significant differences were observed for multiple preoperative ERAS elements. HoDs reported substantially higher adherence to preoperative nutritional screening and nutritional supplementation in malnourished patients than clinicians. Preference for minimally invasive surgery and preoperative optimization of comorbidities were also reported more frequently by HoDs. In contrast, several ERAS elements—including avoidance of routine urinary catheterization, use of local or regional pain block techniques,

Table 3. ERAS item adherence reported by clinicians (residents and specialists; N=58). Values are % (n).

ERAS item	Fully agree	Rather agree	Partly	Rather disagree	Disagree	Missing
Comorbidity management	50.0% (29)	34.5% (20)	8.6% (5)	5.2% (3)	1.7% (1)	0.0% (0)
Preference for minimally invasive surgery	82.8% (48)	15.5% (9)	0.0% (0)	0.0% (0)	1.7% (1)	0.0% (0)
Antibiotic prophylaxis within 60 min	79.3% (46)	15.5% (9)	1.7% (1)	0.0% (0)	3.4% (2)	0.0% (0)
Preoperative carbohydrate loading	5.2% (3)	3.4% (2)	10.3% (6)	17.2% (10)	60.3% (35)	3.4% (2)
Preoperative nutritional screening	6.9% (4)	6.9% (4)	10.3% (6)	29.3% (17)	46.6% (27)	0.0% (0)
Nutritional supplementation if malnourished	5.2% (3)	8.6% (5)	12.1% (7)	27.6% (16)	43.1% (25)	3.4% (2)
Preoperative alcohol cessation counseling	27.6% (16)	15.5% (9)	10.3% (6)	31.0% (18)	13.8% (8)	1.7% (1)
Preoperative smoking cessation counseling	44.8% (26)	20.7% (12)	10.3% (6)	15.5% (9)	6.9% (4)	1.7% (1)
Avoidance of prolonged preoperative fasting	25.9% (15)	29.3% (17)	13.8% (8)	17.2% (10)	10.3% (6)	3.4% (2)
Use of local or regional pain blocks	13.8% (8)	22.4% (13)	29.3% (17)	10.3% (6)	19.0% (11)	5.2% (3)
Drain use restricted to selected indications	65.5% (38)	20.7% (12)	10.3% (6)	3.4% (2)	0.0% (0)	0.0% (0)
Multimodal postoperative analgesia	48.3% (28)	32.8% (19)	6.9% (4)	3.4% (2)	0.0% (0)	8.6% (5)
Urinary catheter removal within 24 h	62.1% (36)	34.5% (20)	3.4% (2)	0.0% (0)	0.0% (0)	0.0% (0)
Early postoperative oral intake	48.3% (28)	41.4% (24)	5.2% (3)	3.4% (2)	0.0% (0)	1.7% (1)

Table 4. Comparative analysis of agreement rates between Heads of Department (n=50) and clinicians (n=58) across 17 shared ERAS items. Agreement = Likert 4–5; Disagreement = Likert 1–2; neutral/missing excluded from Fisher’s exact test. Values are agreement % of total group N.

ERAS item	HoDs agree (%)	Clinicians agree (%)	Difference (pp)	p-value
Patient informed pre-op ERAS	46.0	43.1	+2.9	p = 0.090
Nutritional screening	36.0	13.8	+22.2	p < 0.001
Supplement malnourished	66.0	13.8	+52.2	p < 0.001
Smoking cessation recommended	70.0	65.5	+4.5	p = 0.325
Alcohol abstinence recommended	56.0	43.1	+12.9	p = 0.146
Comorbidities optimized preop	100.0	84.5	+15.5	p = 0.118
Carbohydrate loading	24.0	8.6	+15.4	p = 0.033
Avoidance of prolonged fasting	76.0	55.2	+20.8	p = 0.162
IV antibiotics timely	94.0	94.8	-0.8	p = 1.000
Minimally invasive surgery preferred	100.0	98.3	+1.7	p = 1.000
Restricted drain use	96.0	86.2	+9.8	p = 0.496
Use of local pain blocks	40.0	36.2	+3.8	p = 1.000
Avoidance of routine urinary catheter	32.0	46.6	-14.6	p = 0.367
Early catheter removal <24h	100.0	96.6	+3.4	p = 1.000
Early oral intake	82.0	89.7	-7.7	p = 1.000
Multimodal pain therapy	96.0	81.0	+15.0	p = 1.000
Postop nicotine abstinence counseling	54.0	36.2	+17.8	p = 0.075

P-values from Fisher’s exact test; values <0.001 reported as p < 0.001.

and ERAS-related patient counseling—showed marked variability in both groups.

Despite these differences, overall concordance between HoD and clinician response patterns was strong, as demonstrated by Kendall’s Tau-b correlation, indicating broadly aligned priorities across professional hierarchies.

Discussion

This national survey provides a comprehensive overview of the current status of Enhanced Recovery After Surgery (ERAS) implementation in gynecologic surgery across Austria, incorporating perspectives from both departmental leadership and frontline clinicians. Despite broad international endorsement of ERAS pathways and a robust evidence base supporting their effectiveness, our findings demonstrate substantial heterogeneity in adherence, particularly for preoperative ERAS components [1,5].

Among Heads of Department, several intraoperative and postoperative ERAS elements—such as preference for minimally invasive surgery, timely antibiotic prophylaxis, restriction of drain use, and multimodal postoperative analgesia—were widely reported as implemented. This pattern is consistent with previous international surveys and

reviews showing that ERAS components closely integrated into established surgical and anesthetic workflows are more readily adopted in routine practice [1,3,5].

In contrast, preoperative optimization measures, most notably nutritional screening, nutritional supplementation, and carbohydrate loading, were consistently underutilized across all hospital types. Preoperative carbohydrate loading showed uniformly low adherence regardless of institutional setting. This finding aligns with European ERAS surveys and international audits demonstrating that nutritional ERAS elements remain among the least implemented components despite strong supporting evidence [9,10].

The lack of institutional differences is one of the most notable findings of this study. Contrary to the assumption that academic centers demonstrate superior guideline implementation, university hospitals did not outperform either large or small non-university hospitals for any of the five predefined ERAS elements analyzed. These elements—preoperative carbohydrate loading, avoidance of routine urinary catheterization, early mobilization after laparotomy, early postoperative oral intake, and early discharge pathways—represent core components of ERAS Society recommendations and are consistently associated with improved postoperative recovery, metabolic stability, and reduced length of stay [1,5].

The uniformly low uptake of carbohydrate loading mirrors findings from systematic reviews and randomized trials showing that, while carbohydrate loading is safe and associated with reduced insulin resistance and modest reductions in length of stay, its clinical adoption remains limited [12,13]. Although gynecologic surgery may impose a lower metabolic burden than colorectal surgery, ERAS Society guidelines explicitly recommend nutritional screening, supplementation, and carbohydrate loading for major gynecologic and gynecologic oncologic procedures [5]. The consistently low adherence observed in Austria therefore reflects an evidence–practice gap rather than uncertainty in guideline recommendations.

Comparison between departmental leadership and frontline clinicians revealed both conceptual alignment and implementation discrepancies. While overall response patterns were strongly correlated, Heads of Department consistently reported higher adherence to several preoperative ERAS measures than clinicians, particularly nutritional screening and supplementation. Similar discrepancies between perceived institutional practice and frontline implementation have been described in gynecologic oncology and colorectal surgery, highlighting the limitations of relying solely on leadership-reported adherence [4,5].

Marked variability persisted across both groups for ERAS-related patient counseling, avoidance of routine urinary catheterization, use of regional analgesic techniques, and bowel preparation strategies. Evidence increasingly supports omission of routine bowel preparation in gynecologic surgery without bowel resection and incorporation of multimodal analgesia including regional techniques where appropriate [1,5]. The heterogeneity observed in these domains likely reflects a combination of legacy practices, local traditions, and variable interdisciplinary engagement.

Importantly, interest in structured ERAS education was nearly universal among clinicians. This finding aligns with prior evidence demonstrating that successful ERAS implementation depends less on guideline availability and more on structured institutional change, multidisciplinary ownership, and continuous audit. Formal ERAS pathway introduction combined with education and audit has been shown to improve adherence and clinical outcomes in gynecologic surgery [14]. Our findings support the need for coordinated, system-level implementation strategies rather than isolated guideline dissemination.

Conclusion

ERAS implementation in Austrian gynecologic surgery remains heterogeneous. While several intraoperative and postoperative elements are widely adopted, adherence to key

preoperative optimization measures is consistently low across all hospital types. University hospitals do not demonstrate superior ERAS implementation compared with non-university institutions, highlighting that academic affiliation alone is insufficient to ensure guideline-concordant care. These findings support the need for structured national standards, integration of ERAS principles into residency training, and institution-level implementation strategies emphasizing multidisciplinary collaboration, continuous education, and audit.

Ethics Statement

The study involved anonymous, voluntary participation by healthcare professionals only and did not include patients, clinical interventions, or the collection of sensitive personal data. In accordance with Austrian institutional and regulatory frameworks, such minimal-risk professional surveys are exempt from mandatory ethics committee approval. Participation was entirely voluntary, and informed consent was implied by completion of the questionnaire after accessing the survey link.

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Author Contributions

Conceptualization: TLP; Methodology: TLP, CH, IT, KT; Formal analysis: TLP, CH, IT, KT; Investigation: TLP, CH, KT; Writing – Original Draft: TLP, KT; Writing – Review & Editing: TLP, CH, IT, KT; Supervision: IT, KT.

Conflict of Interest

The authors declare no conflicts of interest.

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AI Statement

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