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# Unplanned revisits of older patients to the emergency department

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**Introduction:** Older patients currently represent up to 12%–24% of all emergency department (ED) visits. While increasing in number, they are also at high risk of revisits once discharged. The rate of ED revisits within 72 h is a key indicator of the quality of care in emergency medicine and varies between 1% and 15%. The reasons for ED revisits are natural course of illness, misdiagnosis, lack of homecare, and self-discharge against medical advice. However, the risk factors for ED revisits have not been fully investigated. Therefore, this study aimed to analyze the incidence of ED revisits and identify the risk factors for ED revisits within 72 h after ED discharge.

**Methods:** In this retrospective study, older patients ( $\geq 70$  years) were consecutively enrolled if they presented with an Emergency Severity Index of 2 or 3 in a tertiary care ED in 2019, with discharge after the ED visit. The primary endpoint was the frequency of unplanned ED revisits within 72 h after ED discharge. The secondary endpoints were the reasons and potential risk factors for ED revisits. Univariate and multivariate logistic regression models were used.

**Results:** A total of 592 older patients were enrolled, of whom 30 (5.1%) revisited the ED within 72 h. Gastrointestinal diagnosis [odds ratio (OR), 2.9; 95% confidence interval [CI], 1.04–8.2;  $p = 0.043$ ] and nausea in particular (OR, 3.5; 95% CI, 1.3–9.4;  $p = 0.016$ ) were significant risk factors for ED revisits. Furthermore, discharge against medical advice (OR, 5.6; 95% CI, 1.7–18.1;  $p = 0.004$ ) and ED presentation during the night (OR, 2.7; 95% CI, 1.2–6.1;  $p = 0.014$ ) were significant risk factors for ED revisits within 72 h after discharge, respectively.

**Conclusion:** Although the frequency of ED revisits among older patients at 72 h after discharge tends to be low and most revisits were illness-related, all older patients need to be assessed for risk factors for ED revisits. Discharge should be carefully evaluated to improve patient safety and provide the best healthcare to this frail population.

## KEYWORDS

revisit, emergency medicine, emergency department, seniors, older person/people

## 1 Introduction

Older patients represent up to 12%–24% of all emergency department (ED) visits (1–4). The proportion of older people in society as well as in ED is constantly increasing (2, 3, 5–7). Current literature indicates that older patients are not only more likely to visit the ED but also stay longer and require more resources than younger patients (8). These patients often have multiple comorbidities that create complex health (and care) problems (1). In addition, difficult social conditions, decreased mobility, and functional capacity in older age complicate the ability to recover from illness or adapt to new circumstances after discharge (1).

Furthermore, older patients have a high risk of ED readmission (9, 10). The incidence of ED revisits after 72 h is often used as a key indicator of quality of care in emergency medicine and varies widely between 1.1% and 15.2% (11–17). The reasons for ED revisits are numerous, including natural course of an illness, misdiagnosis during ED visits, lack of care at home, or even an overly concerned reaction of a patient to discharge against medical advice (11–13, 18). Worldwide ED overcrowding is a serious issue (19). Therefore unplanned non-urgent revisits of older patients unnecessarily increases ED overcrowding (7). However, the characteristics of older and particularly vulnerable patients and causes of ED revisits have not been fully investigated. This is of considerable interest, as such information can improve patient safety and healthcare, especially for this frail population and can help prevent unnecessary ED overcrowding.

Therefore, the aim of the present study was to analyze the frequency of unplanned ED revisits and identify the reasons and risk factors for ED revisits, with focus on the older population.

## 2 Materials and methods

In this retrospective study, patients were consecutively enrolled if they were 70 years or older, visited the tertiary care ED at the University Hospital of Zurich from January 1, 2019, to December 31, 2019, and were not hospitalized after the ED visit. Furthermore, patients were enrolled only if they were triaged as Emergency Severity Index (ESI) level 2 or 3. In Switzerland, emergency consultations in hospitals are carried out by direct referrals from e.g., general practitioners or paramedics, but also by self-referrals from patients. A large proportion of emergency patients are “walk-in” patients and come to the ED for clarification of complaints. When presenting in the ED each patient is assessed and triaged by a trained ED nurse. Patients are assigned to a medical area, and labeled according to the severity and suspected origin of their symptoms. ED patients are triaged in accordance with the ESI. ESI is a five-level triage system used to indicate the urgency of medical care and prioritize patients (20, 21). ESI level 1 demands immediate lifesaving medical attention, whereas levels 2 and 3 demand medical attention within 10–30 min and more than two resources for investigation, respectively. Medical staff response can be further delayed in levels 4 and 5, given that both do not require urgent measures and, by definition, demand either only one or no further medical resources (20, 21). Patients were excluded if they were younger than 70 years, with ESI level 1, 4, or 5, and/or were hospitalized directly in the ED. An ethic approval was given by the local ethic committee of the canton Zurich. Each patient included has given informed consent.

### 2.1 Endpoints

The primary endpoint was the frequency of unplanned ED revisits within 72 h after discharge from the index ED. Unplanned ED revisits were defined as any revisit to the ED within 72 h without a pre-scheduled appointment in the ED. Secondary endpoints were reasons and potential risk factors for ED revisits after 72 h.

TABLE 1 Patients' characteristics.

	All older patients N = 592	No ED revisit within 72 h N = 562	ED revisits within 72 h N = 30
Age, yrs*	78 (6)	78 (6)	79 (6)
Female sex (%)	254 (42.9%)	240 (42.7%)	14 (46.7%)
Charlson co-morbidity index	5 (4–6)	5 (4–6)	5 (4–6)
- < 4	128 (21.6%)	123 (21.9%)	5 (16.7%)
- ≥ 4	464 (78.4%)	439 (78.1%)	25 (83.3%)
Arterial hypertension (%)	392 (66.2%)	373 (66.4%)	19 (63.3%)
Rheumatoid disease (%)	257 (43.4%)	244 (43.4%)	13 (43.3%)
Coronary heart disease (%)	195 (32.9%)	183 (32.6%)	12 (40.0%)
Chronic kidney disease (%)	166 (28.0%)	160 (28.5%)	6 (20.0%)
Diabetes mellitus (%)	120 (20.3%)	112 (19.9%)	8 (26.7%)
Malignant disease (%)	81 (13.7%)	76 (13.5%)	5 (16.7%)
- Metastatic disease (%)	50 (8.5%)	48 (8.5%)	2 (6.7%)
- Ongoing chemotherapy (%)	28 (4.7%)	27 (4.8%)	1 (3.3%)
Cerebrovascular disease (%)	75 (12.7%)	72 (12.8%)	3 (10.0%)
Peripheral artery disease (%)	71 (12.0%)	69 (12.3%)	2 (6.7%)
Malnutrition (%)	52 (8.9%)	48 (8.5%)	4 (13.3%)
Chronic obstructive pulmonary disease (%)	50 (8.5%)	50 (8.9%)	0%
Incontinence (%)	19 (3.2%)	17 (3.0%)	2 (6.7%)
Dementia (%)	13 (2.2%)	13 (2.3%)	0%
Psychiatric disease** (%)	71 (12.0%)	65 (11.6%)	6 (20.0%)
- Depression	31 (5.2%)	30 (5.3%)	1 (3.3%)
- Anxiety disorder	11 (1.9%)	10 (1.8%)	1 (3.3%)
- Chronic drug, alcohol or medication abuse	11 (1.9%)	10 (1.8%)	1 (3.3%)
- Other psychiatric diseases	28 (4.7%)	24 (4.3%)	4 (13.3%)
Polypharmacy (%)			
- Number of medicaments/day*	6 (3–9)	6 (3–9)	6 (4–9)
- > Five medicaments/day	365 (61.7%)	348 (61.9%)	
Using immunosuppression medication (%)	103 (17.4%)	99 (17.6%)	4 (13.3%)
Social demographics			
Housing (%)			
- Living alone	102 (17.2%)	98 (17.4%)	4 (13.3%)

(Continued)

TABLE 1 (Continued)

	All older patients N = 592	No ED revisit within 72 h N = 562	ED revisits within 72 h N = 30
- Living with others	338 (57.1%)	317 (56.4%)	21 (70.0%)
- Nursing home	18 (3.0%)	18 (3.2%)	0%
- Home for the aged	14 (2.4%)	14 (2.5%)	0%
- Not reported	120 (20.3%)	115 (20.5%)	5 (16.7%)
Care at home (%)	57 (9.6%)	53 (9.4%)	4 (13.3%)
- Medical therapy	8 (1.4%)	7 (1.2%)	1 (3.3%)
- Body care	7 (1.2%)	6 (1.1%)	1 (3.3%)
- Household service	2 (0.3%)	2 (0.4%)	0%
- Meal service	1 (0.2%)	1 (0.2%)	0%

ED, Emergency Department; \*Results were presented as mean (standard deviation) or median (25th–75th percentile). \*\*Patients may have more than one underlying psychiatric diseases.

## 2.2 Assessment of other parameters

Further clinical and demographic parameters were assessed from KISIM, the hospital digital clinical information system, in order to characterize the study population: age, sex, comorbidities, Charlson comorbidity index (22, 23), prior hospital admissions or ED visits 6 months before the index ED visit, time of ED presentation (day, middle, or night shift), main symptoms, examinations (e.g., serum blood analysis, ultrasound, x-rays, computed tomography, or electrocardiography), and social variables such as need for care at home, housing conditions (e.g., living alone, living with others, living in a nursing home), and marital status.

## 2.3 Statistical analysis

The distribution of variables was tested for normality using the Kolmogorov-Smirnov test; normally distributed data were reported as means and standard deviations, whereas non-normally distributed data were reported as medians and interquartile ranges. Categorical data are reported as frequencies with percentages.

The regression model analyzes the association between the dependent variable (outcome) and the number of independent variables by estimating probabilities. The first endpoint (number of ED revisits) and all other secondary endpoints were compared between patients with and without ED revisits within 72 h in univariate and multivariate logistic regression models, respectively. The multivariable model was adjusted for a priori defined and known potential confounders such as age, sex, Charlson comorbidity index ( $<4/\geq 4$ ), and computed tomography examination during the index ED visit.

For all results, we reported the point estimates, 95% confidence intervals (CIs), and p-values (with  $p < 0.05$  considered as statistically significant). Statistical analyses were performed using STATA SE version 16 (Stata Corp., College Station, TX, USA).

## 3 Results

In 2019, more than 45,000 patients visited the ED of the University Hospital of Zurich. After excluding patients who did not meet the inclusion criteria, 592 patients were included in the analysis. Of these 592 patients, 30 (5.1%) revisited the ED within 72 h after discharge. The majority of patients ( $n = 566$ , 95.6%) were triaged as ESI level 3, whereas 26 patients (4.4%) were triaged as ESI level 2.

Patient characteristics and comorbidities were compared between the groups that revisited the ED within 72 h and those that did not (Table 1). The most common comorbidities were arterial hypertension, rheumatoid disease, coronary heart disease, and chronic kidney disease. Polypharmacy, defined as the intake of more than five different drugs per day (24), was present in the majority of patients (Table 1).

Most patients were living with other people, whereas only a few were living in a nursing home or home for older people). Almost one-fifth (17.2%) of the patients were living alone. Up to 10% were receiving some type of care at home, including medical therapy, body care, household care, or meal services (Table 1).

Regarding the medical examinations performed during the index ED visit, no significant differences were observed between patients who revisited the ED within 72 h and those who did not (Supplementary material 1).

Varying numbers of main symptoms led older patients to visit the ED. All symptoms that led to the index presentation in the ED are summarized in Supplementary material 2.

### 3.1 Gastrointestinal diagnosis at index ED visits causing revisits within 72 h

When a gastrointestinal diagnosis was made at the index emergency presentation, patients were significantly more likely to revisit the ED within 72 h [adjusted odds ratio (OR), 2.9; 95% CI, 1.04–8.2;  $p = 0.043$ ] (Table 2). A more detailed sub-analysis of the symptoms causing gastrointestinal diagnosis identified that nausea at the index ED visit significantly increased the risk of ED revisits within 72 h (adjusted OR, 3.5; 95% CI, 1.3–9.4;  $p = 0.016$ ). Further potential risk factors for ED revisits within 72 h were vomiting (adjusted OR, 2.8; 95% CI, 0.9–9.0;  $p = 0.077$ ) and abdominal pain (adjusted OR, 2.2; 95% CI, 0.95–5.3;  $p = 0.065$ ).

### 3.2 Further risk factors for ED revisits

Risk factor analysis showed that age, sex, or any comorbidity was significantly associated with ED revisits (Supplementary material 3). Furthermore, none of the living conditions (with others, alone, or care at home) or hospital stay 6 months prior to the index ED visit were significant risk factors for emergency revisits within 72 h (Supplementary material 3).

Meanwhile, risk analysis showed that older patients who were discharged against ED physician's recommendation showed a significantly increased risk of visiting the ED within 72 h (unadjusted OR, 5.6; 95% CI, 1.7–18.1;  $p =$

TABLE 2 Diagnosis at the index ED visit causing ED revisits within 72 h.

	No ED revisit within 72 h N = 562	ED revisits within 72 h N = 30	Unadjusted OR (95% CI, p-value)	Adjusted OR (95% CI, p-value)
Neurological disorders (%)	7 (1.3%)	0%	-	-
Psychiatric disorders (%)	4 (0.7%)	1 (3.3%)	4.8 (0.5–44.4, p = 0.17)	-
Pulmonary disorders (%)	31 (5.5%)	1 (3.3%)	0.6 (0.1–4.5, p = 0.61)	-
Cardiac disorders (%)	84 (15.0%)	4 (13.3%)	0.9 (0.3–2.6, p = 0.81)	-
Gastrointestinal disorders (%)	43 (7.7%)	5 (16.7%)	2.5 (0.9–6.8, p = 0.08)	2.9 (1.04–8.2, p = 0.043)
Uro-genital disorders (%)	36 (6.4%)	1 (3.3%)	0.5 (0.1–3.8, p = 0.51)	-
Traumatological disorders (%)	97 (17.3%)	2 (6.7%)	0.3 (0.1–1.5, p = 0.15)	-
Rheumatoid disorders (%)	20 (3.6%)	2 (6.7%)	1.9 (0.4–8.7, p = 0.39)	-
Dermatological disorders (%)	9 (1.6%)	0%	-	-
Immunological disorders (%)	8 (1.4%)	0%	-	-
Endocrinological disorders (%)	1 (0.2%)	0%	-	-
Angiological disorders (%)	9 (1.6%)	0%	-	-
Ophthalmological disorders (%)	2 (0.4%)	0%	-	-
Hematological disorders (%)	2 (0.4%)	0%	-	-
Intoxication (%)	4 (0.7%)	0%	-	-
Medication misuse/induced (%)	14 (2.5%)	0%	-	-
Problems with drainages, catheters (%)	22 (3.9%)	0%	-	-
Complications after surgery or intervention	25 (4.5%)	2 (6.7%)	1.5 (0.3–6.8, p = 0.57)	-
Infections of unknown origin (%)	3 (0.5%)	0%	-	-
Reduction of general condition without specific specialty	141 (25.1%)	12 (40.0%)	1.7 (0.8–3.6, p = 0.19)	1.7 (0.8–3.7, p = 0.18)

ED, Emergency Department; OR, Odds Ratio; CI, Confidence Interval; results are adjusted for age, sex, Charlson co-morbidity index (<4/≥4) and performed computer tomography during the index ED visit (no/yes). No adjustment was performed if <5 events occur in one of the groups.

TABLE 3 Further risk factors for unplanned ED revisit after ED discharge.

	No ED revisit within 72 h N = 562	ED revisits within 72 h N = 30	Unadjusted OR (95% CI, p-value)	Adjusted OR (95% CI, p-value)
Emergency severity index level 2 (%)	24 (4.3%)	2 (6.7%)	1.6 (0.4–7.1, p = 0.54)	1.6 (0.3–7.0, p = 0.56)
Index visit during day shift (%)	272 (48.4%)	11 (36.7%)	0.6 (0.3–1.3, p = 0.21)	0.6 (0.3–1.4, p = 0.27)
Index visit during middle shift (%)	208 (37.0%)	9 (30.0%)	0.7 (0.3–1.6, p = 0.44)	0.7 (0.3–1.6, p = 0.42)
Index visit during night shift (%)	82 (14.6%)	10 (33.3%)	2.9 (1.3–6.5, p = 0.008)	2.7 (1.2–6.1, p = 0.014)

OR, Odds Ratio; CI, Confidence Interval; results are adjusted for age, sex, Charlson co-morbidity index (<4/≥4) and performed computer tomography in the index ED visit (no/yes); No adjustment was performed if <5 events occur in one of the groups.

0.004) (Supplementary material 3). Risk analysis showed that if patients were referred to the ED by a general practitioner or an established specialist, the risks of revisiting the ED (unadjusted OR, 0.3; 95% CI, 0.1–0.98; p = 0.045) was significantly lower (Supplementary material 3).

An index ED visit during the night significantly increased the likelihood of an ED revisit within 72 h (adjusted OR, 2.7; 95% CI,

1.2–6.1; p = 0.014). In comparison, index visits during the day or middle shift showed no increased risk for ED revisits (Table 3).

Many patients experienced a reduced general condition as the main symptom during emergency presentation. However, reduction in general condition as the main symptom did not show a significant association (adjusted OR, 1.7; 95% CI, 0.8–3.7; p = 0.18) with increased ED revisits within 72 h after the index visit (Table 2).

TABLE 4 Reasons for unplanned ED revisits.

	ED revisits within 72 h N = 30
Identical symptoms as index ED visit (%)	20 (66.7%)
Other symptoms as index ED visit (%)	10 (33.3%)
Pain exacerbation (%)	8 (26.7%)
Care reasons (%)	1 (3.3%)
Social reasons (%)	2 (6.7%)
Psychiatric reasons (%)	2 (6.7%)
Medical reasons (%)	18 (60.0%)
Handling problems with urine catheters, drainage etc. (%)	0%
Accident (%)	0%
Need for hospital stay after ED-re-visit (%)	22 (73.3%)
- due to identical symptoms	14 (63.7%)
- due to other symptoms	8 (36.4%)

ED, Emergency Department; \* Patients may have more than one reason for ED re-visit.

### 3.3 Reasons for unplanned ED revisits

Table 4 presents the reasons for unplanned ED revisits within 72 h. The main symptoms were mostly (66.7%) identical to those at the index ED visit. Only a few patients revisited the ED for care (3.3%) or social problems (6.7%) (Table 4). Most unplanned ED revisits were for medical reasons (60%). Of the 30 patients who revisited the ED within 72 h after the index ED visit, 22 (73.3%) were admitted (Table 4).

## 4 Discussion

Older patients represent a large proportion of all patients who present to the ED (1–4). Considering their increasing numbers (2, 3, 5, 6) these specific older populations were analyzed, focusing on ED revisits after the index ED discharge. One in 20 older patients presented again within 72 h of discharge from the ED. Three major risk factors for ED revisits within 72 h were identified: gastrointestinal diagnosis, especially those who experienced nausea during the index visit; an index ED visit during the night; self-discharge from the ED against physicians' recommendations.

The rate of ED revisits is often used as a key indicator of the quality of care in the ED (15, 25). In the present study, the ED readmission rate within 72 h was 5.1%. This value is lower than that of other studies, which have readmission rates ranging from 1.1% to 15.2% (11–17), indicating a very good quality of care. We assume that these results were achieved through good and evidence-based emergency medicine and care, focusing on rapid medical clarification, correct diagnosis, and timely provision of medication, information, and instructions as well as a close linkage between patients and primary care physicians. In the future, discharge should be carefully considered in older emergency patients with nausea and/or gastrointestinal disorders, and the possible advantages and disadvantages should be well discussed.

Particularly in this frail population, emergency revisits within a few hours or days are costly and worsen overall outcomes.

One of the three main reasons for ED revisits within 72 h was gastrointestinal diagnosis made during the index ED visit. This result is supported by existing literature (1, 11, 14, 26–28). In the present sub-analysis, nausea was found to be a significant risk factor for ED revisits. In the literature, abdominal symptoms are mostly grouped and analyzed together (10, 24–26). To the best of our knowledge, abdominal pain is the only gastrointestinal symptom that has been regularly analyzed as a separate risk factor. Abdominal pain was also analyzed as a risk factor in the current study and showed a clear trend with an increased OR; however, it was not a significant risk factor owing to a low event rate in the patient population. Similar results were obtained for vomiting. Nonetheless, Wu et al. stated that symptom-based diagnosis, including nausea, is a significant risk factor for ED revisits (11). We interpret this increased number of revisits as gastrointestinal symptoms, including nausea, which are often non-specific and have multiple differential diagnoses.

In the current investigation, index ED presentation during the night was also a significant risk factor for revisiting the ED within 72 h. Soh et al. (27) reported that 23.7% of all ED patients visited during the night, and among those who visited the ED again, patients with an index ED visit during the night comprise an increased percentage of 30.1%. Shy et al. (13) reported that 43.8% of the patients present during the night at the index ED visit, and the rate increased to 54.8% in the analysis of revisits. Other studies showed no association between the timing of the index presentation and the rate of revisits (16). ED presentation at night as a risk factor is likely dependent on the particular hospital and its resources and responsibilities (13). We are a tertiary care hospital, and most critically ill patients in the region are transferred to our ED. In addition, as it is located in the city center, our hospital has a high number of walk-in patients. Owing to the retrospective nature of this study, it was not possible to evaluate why nighttime emergency presentation is a risk factor for older patients. One possible explanation could be that the overnight assessment and therapy in the ED stabilized older patients to such an extent that they were confident to go home in the morning. Older patients are often hesitant about admission because they are reluctant to leave their functional environments. Further studies are needed to determine the reason for such a finding.

Furthermore, early discharge against doctors' recommendations also contributed significantly to unplanned revisits within 72 h. Other studies have confirmed that discharge against medical advice is a risk factor for ED readmission in general, within 72 h, within 14 days, and within 30 days (12, 13, 27, 29–32). The main reasons for discharge against medical advice are financial burden, homelessness, and multiple comorbidities (29, 30, 33). Furthermore, dissatisfaction about a delay in treatment may be another reason for early discharge against medical advice (33), while trust in the physician does not seem to be disturbed (34). In the current study, the reason for discharge against medical advice could not be determined from the medical records. In a few cases, older patients did not want to remain hospitalized despite detailed information and increased risk because they had pets and had no one to look after them or they simply did not want any further therapy at that time.

A referral to the ED from a general practitioner or an established specialist was a protective factor. This could be explained by better follow-up care. Other studies have shown that well-organized follow-up can reduce the number of ED revisits (35).

Our data showed that a reduction in one's general condition was not a significant risk factor for ED revisits in older patients. This is in line with other studies that suggest no increased risk for unscheduled ED return in patients with a worsening general state (18, 36).

## 4.1 Limitation and strength

This single-center study was conducted in a city with a high density of hospitals offering emergency care. It is possible that ED revisits were missed owing to presentation to other EDs in the area. The relatively small sample size resulting from the strict in- and exclusion criteria can be seen as a further limitation. This enabled a specific analysis but nonetheless the small sample size must still be taken into account and further studies in this vulnerable patient population are needed in the future. Given the hospital information system and the extensive set of data used for this study, we do not consider our retrospective design as a limitation, especially since we had no missing data in the endpoints. Additionally, we minimized confounding bias by performing a regression analysis.

## 5 Conclusion

The frequency of ED revisits at 72 h after ED discharge was low and was mostly illness-related. ED revisits are associated with gastrointestinal diagnoses and symptoms, index presentation during the night, and self-discharge against medical advice. All older patients should be assessed for risk factors for ED revisits. With decreased ED revisits, we can redirect resources toward improving patient safety, providing the best healthcare to this frail patient population, and reducing ED staff workload and overcrowding.

## Data availability statement

The original contributions presented in the study are included in the article/[Supplementary material](#), further inquiries can be directed to the corresponding authors.

## Ethics statement

The studies involving humans were approved by the Ethic Committee of Canton Zürich, Switzerland. The studies were conducted in accordance with the local

legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

## Author contributions

JM: Data curation, Visualization, Writing—original draft, Writing—review & editing. DK: Investigation, Supervision, Visualization, Writing—original draft, Writing—review & editing. KS: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Supervision, Visualization, Writing—original draft, Writing—review & editing.

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## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

The author(s) declared that they were an editorial board member of *Frontiers*, at the time of submission. This had no impact on the peer review process and the final decision.

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## Supplementary material

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/femer.2024.1342904/full#supplementary-material>

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