

# A Framework Proposal for Quality and Safety Measurement in Gynecologic Emergency Care

Arnaud Fauconnier, MD, PhD, Johan Provot, MSc, Isabelle Le Creff, BSc, Rym Boulkedid, PhD, Françoise Vendittelli, MD, PhD, Muriel Doret-Dion, MD, PhD, Jérémy Sroussi, MD, Géraldine Giraudet, MD, Romain Jacobs, MD, Antoine Bourret, MD, Estelle Bauville, MD, Solenn Carvalho, BSc, Claire Tourette, MD, Martin Koskas, MD, PhD, Chérif Akladios, MD, PhD, Michelle Nisolle, MD, PhD, Christophe Lejeune, MSc, Cyrille Huchon, MD, PhD, Corinne Alberti, MD, PhD, Alexandre Dumont, MD, and Marie-Hélène Bouvier-Colle, PhD

**OBJECTIVE:** To define and assess the prevalence of potentially life-threatening gynecologic emergencies among women presenting for acute pelvic pain for the purpose of developing measures to audit quality of care in emergency departments.

**METHODS:** We conducted a mixed-methods multicenter study at gynecologic emergency departments in

France and Belgium. A modified Delphi procedure was first conducted in 2014 among health care professionals to define relevant combinations of potentially life-threatening conditions and near misses in the field of gynecologic emergency care. A prospective case-cohort study in the spring of 2015 then assessed the prevalence of these potentially life-threatening emergencies and

*From the Université Paris-Saclay, UVSQ, Unité de recherche 7285, Risques cliniques et sécurité en santé des femmes et en santé périnatale (RISCO), Montigny-le-Bretonneux, Centre Hospitalier Intercommunal de Poissy-Saint-Germain-en-Laye, Service de gynécologie & obstétrique, Poissy, Université Paris Diderot, Sorbonne Paris Cité, AP-HP; Inserm, Hôpital Robert Debré, Unité d'Epidémiologie Clinique, Paris, Université Clermont Auvergne, CHU Clermont-Ferrand, CNRS, SIGMA Clermont, Institut Pascal, Clermont-Ferrand, AUDIPOG, Université Claude Bernard Lyon 1, Laennec, Lyon, Service de Gynécologie Obstétrique, Hôpital Femme Mère Enfant, Hospices Civils de Lyon, Lyon, Service de Gynécologie Obstétrique Hôpital Lariboisière, Paris, Service de Gynécologie Obstétrique Hôpital Jeanne de Flandre CHRU, Lille, Service de Gynécologie Obstétrique CHI de Villeneuve-Saint-Georges, Villeneuve Saint-Georges, Service de Gynécologie, Obstétrique et Médecine de la Reproduction, CHU Cochin Paris, Université Paris Descartes, Paris Sorbonne Cité, Paris, Gynécologie chirurgicale, CHU de Rennes, Rennes, Service de gynécologie-obstétrique, hôpitaux de Nantes, CHU Hôtel-Dieu, Nantes, Université de Nantes, Nantes, Service de Gynécologie Obstétrique, hôpital de La Conception, Assistance publique-Hôpitaux de Marseille, Marseille, Service de gynécologie obstétrique, Hôpital Bichat, APHP, Paris, Université Diderot Paris, Paris, Unité de recherche EA 7285, Université Versailles St-Quentin (UVSQ), Montigny-le-Bretonneux, Centre Hospitalier Universitaire Haute-pierre, Hôpital de Haute-pierre, Strasbourg, Département de l'assurance qualité, de la gestion des risques et des droits du patient, hôpitaux Universitaires de Paris Nord Val de Seine, APHP, Paris, Unité d'Epidémiologie Clinique, URC Robert Debré, APHP, Paris, Inserm CIC-EC 1426; Inserm et Université Paris Diderot UMR 1123 ECEVE, Paris, Paris, Institut de recherche pour le développement (IRD), université Paris Descartes, UMR 196, CEPED, Paris, UMR 1153 Equipe EPOPé, INSERM, Paris, France; and CHR la Citadelle, Université de Liège, Belgium.*

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*For a list of investigators who are part of the URGO group, see Appendix 1 online at <http://links.lww.com/AOG/C86>.*

*Each author has confirmed compliance with the journal's requirements for authorship.*

*Corresponding author: Arnaud Fauconnier, MD, PhD, Department of Gynecology and Obstetrics, Intercommunal Hospital Center of Poissy-Saint-Germain-en-Laye, Université Paris-Saclay, UVSQ, 78303 Poissy, France; email: [Arnaud.Fauconnier@ght-yevelinesord.fr](mailto:Arnaud.Fauconnier@ght-yevelinesord.fr).*

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near misses among women of reproductive age presenting for acute pelvic pain. Women in the case group were identified at 21 participating centers. The control group consisted of a sample of women hospitalized for acute pelvic pain not caused by a potentially life-threatening condition and a 10% random sample of outpatients.

**RESULTS:** Eight gynecologic emergencies and 17 criteria for near misses were identified using the Delphi procedure. Among the 3,825 women who presented for acute pelvic pain, 130 (3%) were considered to have a potentially life-threatening condition. The most common diagnoses were ectopic pregnancies with severe bleeding (n=54; 42%), complex pelvic inflammatory disease (n=30; 23%), adnexal torsion (n=20; 15%), hemorrhagic miscarriage (n=15; 12%), and severe appendicitis (n=6; 5%). The control group comprised 225 hospitalized women and 381 outpatients. Diagnostic errors occurred more frequently among women with potentially life-threatening emergencies than among either hospitalized (odds ratio [OR] 1.7, 95% CI 1.1–2.7) or outpatient (OR 14.7, 95% CI 8.1–26.8) women in the control group. Of the women with potentially life-threatening conditions, 26 met near-miss criteria compared with six with not potentially life-threatening conditions (OR 25.6, 95% CI 10.9–70.7).

**CONCLUSIONS:** Potentially life-threatening gynecologic emergencies are high-risk conditions that may serve as a useful framework to improve quality and safety in emergency care.

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Gynecologic emergencies represent a significant proportion of women's non-trauma-related emergency department visits.<sup>1</sup> Diagnoses may include gynecologic conditions, complications related to early pregnancy, and nongynecologic conditions such as appendicitis, which can mimic several gynecologic conditions. As a group, they share a common symptom of acute pelvic pain that may make an accurate clinical diagnosis difficult.<sup>2</sup> Severe complications of gynecologic emergencies may be life-threatening, affect fertility, or cause residual impairment.<sup>3–5</sup> Compared with maternal and perinatal health care, quality and safety measures for gynecologic emergencies remain underdeveloped.<sup>6,7</sup>

The concept of the near miss has proved useful in assessing maternal health care quality.<sup>8</sup> Adverse outcomes of near misses or deaths provide an unstructured, retrospective approach for identifying cases to review and learn from, but may not be appropriate for a systematic approach to quality and safety improvement.<sup>9</sup> Inversely, collecting large quantities of data prospectively might help to identify safety issues and

hazards before events occur.<sup>10</sup> To apply Donabedian's model,<sup>11</sup> desired or adverse outcomes must be defined and a causal link established with an appropriate or substandard process of care.<sup>12</sup> The progression of specific clinical conditions (ie, ectopic pregnancy) to undesirable outcomes (ie, massive hemoperitoneum) can involve a deficiency in quality of care (ie, delayed diagnosis).<sup>13</sup> Developing meaningful disease-outcome pairs relevant to the setting of gynecologic emergency departments is a first step to designing future patient safety interventions and improving quality of care.<sup>14</sup>

The major acute gynecologic conditions at risk for morbidity and mortality are not currently well defined and a system to catalog these conditions for their acuity would be helpful from a quality assessment perspective. Identification of these conditions as potentially life-threatening gynecologic emergencies, defining measurable outcomes (ie, the progression to near misses) and assessing their relative frequencies and severity are important first steps in measuring deficiencies of care to design interventions for improving the quality of care.<sup>15</sup>

The objectives of this study were to identify what conditions should be considered potentially life-threatening gynecologic emergencies, establish criteria for near misses and assess the magnitude of the problem.

## METHODS

We conducted a mixed-methods multicenter study at gynecologic emergency departments associated with a public maternity ward from European French-speaking regions (France, Belgium, Switzerland) that had been asked to participate in the URGO (URgences Gynécologiques et Obstétricales, ie, ob-gyn emergency department) project to construct a sentinel network for gynecologic emergencies. Centers had to have a dedicated 24/7 gynecologic emergency department supervised by a board-certified obstetrics and gynecology specialist, 24/7 access to pelvic ultrasonography, and manage more than 50 resulting hospitalizations per year. In these centers, all women with acute pelvic pain or vaginal bleeding, pregnant or not, are primarily seen at the gynecologic emergency department (or immediately referred for those who presented first to the general emergency department).

The first stage of the study was a modified Delphi procedure among a panel of medical experts and other health care professionals experienced in gynecologic emergencies. The list of diagnoses constituting potentially life-threatening gynecologic emergencies (see complete definition I.1 in Box 1) was developed

by two questionnaire rounds and a final in-person meeting of the panelists.<sup>16</sup> The Delphi procedure also elaborated on recommended criteria for identifying near misses, adapted from the World Health Organization definition of maternal near-miss criteria.<sup>8</sup> Briefly, near misses correspond to events when a gynecologic (or pelvic or linked to early pregnancy) emergency progresses to a severe critical condition that endangers the patient and which, in other circumstances, could result in death or permanent damage (see definition I.4 in Box 1). Near-miss indicators were proposed under three subheadings: clinical, biological, and patient management. The panelists involved in the Delphi procedure included obstetrician-gynecologists (ob-gyns), midwives, emergency specialists, nurses, and intensivists from participating hospitals.

The second stage was to apply these definitions in a prospective case-cohort study of women presenting for acute pelvic pain at 21 centers that agreed to participate (20 in France, one in Belgium). Approximately 12% of all French births take place in these hospitals. We therefore estimated that a similar percentage of women seek care in the gynecologic emergency departments.

We included as in the case group all women of childbearing age (except those more than 15 weeks pregnant), with a first visit for acute pelvic pain in a participating center. Acute pelvic pain was defined as lower abdominal pain affecting the hypogastrum or the right or the left iliac fossa, or any combination of them, for less than a month, with an intensity measured (by a visual analog or numeric rating scale) at 4 out of 10 or higher at its worst moment or at the time of the visit.<sup>17</sup>

Women with current pelvic cancer, pain related to pelvic surgery, an induced or medication abortion or a previously diagnosed disorder responsible for chronic pelvic pain (ie, constant or intermittent pelvic pain for 6 months or longer)<sup>18</sup> were excluded, as were those who had given birth within the previous 6 weeks.

Each woman's final outpatient or discharge diagnosis was recorded after all required diagnostic procedures were completed, including any return visits or hospitalizations in the month after the index visit. The last diagnosis was considered for women with more than one episode of care. When women were transferred or subsequently admitted to another hospital, we retrieved the complete report of her care from the receiving establishment and all necessary information for reaching a final diagnosis. The investigators used a detailed internet-based data collection form to finalize

reports for all women admitted from the gynecologic emergency department for acute pelvic pain and their final status as a potentially life-threatening emergency or not, and, in either case, whether it was also a near miss. The diagnoses were made and near-miss criteria determined by applying the definitions previously selected during the Delphi procedure (Appendix 2, available online at <http://links.lww.com/AOG/C86>). The case definitions for potentially life-threatening emergencies depended on the specific condition; most required surgical or histologic confirmation, or both. Near-miss criteria were collected at the end of each woman's follow-up, and the presence of one or more met the definition of near miss.

After data collection, a clinical research assistant checked the files of all women included during the collection phase and a random sample of 10% of the outpatients (control group) included during the same period. A previous preliminary study<sup>19</sup> led us to expect a ratio of one reported case (potentially life-threatening emergency or near-miss case) for five control group participants and, thus, an audit of approximately 500 files to estimate the prevalence of these emergencies and near-miss cases with sufficient precision.

The rates of potentially life-threatening emergencies and near misses were determined for the entire population of women with a first visit for acute pelvic pain during the study period and for the hospitalized women. A weighted average of the centers' results was calculated by the inverse variance method and each center's weight by the binomial equation for variance. The Freeman-Tukey transformation was used to stabilize the variance.<sup>20</sup>

To assess the relation between potentially life-threatening emergencies and near misses, we compared the near-miss rate among the group of women diagnosed with a potentially life-threatening condition and those who were not. The control group included 1) all the women hospitalized for acute pelvic pain and diagnosed with a non-life-threatening emergency, and 2) the random sample of nonhospitalized patients.

Categorical variables were analyzed by  $\chi^2$  tests and continuous variables by analysis of variance or the Kruskal-Wallis test for nonnormal distribution. Generalized linear mixed models with binomial logistic distribution and center as a random effect were used to estimate the association between near misses and potentially life-threatening conditions.

Diagnostic errors were defined as diagnoses that were either wrong or had been missed at the end of the first visit.<sup>21</sup> The diagnostic error rate was the ratio of the number of incorrect diagnoses at the end of the

**Box 1. Proposals for Standard Definitions to Measure Quality of Care at Gynecologic Emergency Departments for Potentially Life-Threatening Gynecologic Emergencies and Near-Miss Cases (From the URGO Delphi Process)**

- I. Conditions (includes diagnoses and outcomes)
  - I.1 G-PLEs are symptomatic gynecologic (or pelvic or early pregnancy-related) conditions that must be diagnosed to prevent progression to severe complications likely to cause residual impairment or death within a short period in the absence of appropriate emergency treatment. Frequent examples are complicated ectopic pregnancies with severe bleeding, complicated pelvic inflammatory disease, adnexal torsion, hemorrhagic miscarriages, and complicated appendicitis (because it may mimic several gynecologic conditions).
  - I.2 A G-PLE case is a G-PLE condition diagnosed in the patient's initial diagnostic phase, during follow-up, or after autopsy.
  - I.3 The G-PLE rate refers to the number of women diagnosed with a G-PLE condition among the women presenting for acute pelvic pain (pregnant or not).
  - I.3 Near misses are gynecologic (or pelvic or early pregnancy-related) emergencies that have progressed to a severe critical condition that endangers the patient and that, in other circumstances (ie, in the absence of luck or appropriate care), would have resulted in death or permanent damage. They could possibly be the basis of morbidity and mortality conferences or other methods of incident reporting intended to identify, examine, and learn from inappropriate patient management.
  - I.4 The near-miss rate refers to the number of women meeting one or more criteria for a near miss, either on admission or during follow-up, among the women with symptomatic gynecologic (or pelvic or early pregnancy-related) conditions.
  - I.5 The case fatality rate refers to the proportion of G-PLE cases followed by death from any cause within 30 days after the first ED visit.
- II. Medical problems (errors and delays)
  - II.1 In-hospital time to treatment: time elapsed between the woman's arrival at the health facility and the administration of adequate and appropriate treatment (pharmacologic treatment or surgical, endoscopic, and radiologic interventions). Because patients with G-PLEs must receive treatment immediately on diagnosis, the first treatment time (excluding symptomatic treatment) may be used to estimate time to diagnosis. Time to diagnosis may not be directly available because the progressive nature of diagnostic processes (need for correct examination and correct interpretation) can make it difficult to determine the exact moment of diagnosis.

**Proposals for Standard Definitions to Measure Quality of Care at Gynecologic Emergency Departments for Potentially Life-Threatening Gynecologic Emergencies and Near-Miss Cases (From the URGO Delphi Process) (continued)**

- II.2 Diagnostic delay: a woman with a G-PLE condition who did not undergo a specialized examination that documented abnormal findings at a definite timepoint and that would have revealed the correct diagnosis (depending on the condition; eg, failure to perform transvaginal ultrasound scan or test for serum hCG during a first ED visit for complicated ectopic pregnancy, lack of basic laboratory testing for complicated appendicitis).
- II.3 Diagnostic errors: a woman with a G-PLE condition whose diagnosis was delayed, wrong, or missed by the practitioner who performed the first-line evaluation. It could be measured at a different timepoint, for example, at the end of the first ED visit. It may or may not relate to the failure of the diagnostic process. Diagnostic errors for G-PLE conditions are major errors that are likely to lead to delays in treatment.
- II.4 The rate of diagnostic error in G-PLE conditions is the ratio between: 1) how often such a G-PLE condition is incorrectly diagnosed (ie, the number of diagnostic errors) at a definite timepoint (eg, at first visit), and 2) the number of times that a G-PLE condition is diagnosed during an audited follow-up period (including return visits, repeat hospitalizations, or after autopsy in case of death).
- II.5 Nonadherence to diagnostic or therapeutic guidelines regarding G-PLEs
- III. Professional practice assessment proposals
  - III.1 Development of a routine data-collection tool for G-PLE cases by the use of appropriate coding procedures common within a health facility or a sentinel care and research network.
  - III.2 Development of diagnostic and therapeutic guidelines and procedures for G-PLEs that are easily accessible and regularly updated in the G-ED.
  - III.3 Review of G-PLE cases involving near misses or death by morbidity and mortality conferences (or other methods of incident reporting) in the G-ED.
  - III.4 Development of prospective process assessment (including diagnostic and therapeutic procedures), with clinical audits of G-PLE conditions performed regularly in the G-ED.

G-PLE, potentially life-threatening gynecologic emergency; ED, emergency department; hCG, human chorionic gonadotropin; G-ED, gynecologic emergency department.

first visit to the number of women diagnosed at the end of the audited follow-up (including return visits, repeat hospitalization, or after autopsy). We estimated

intrahospital time to diagnose a potentially life-threatening emergency by intrahospital time to treatment (Box 1, II.1): the interval between arrival at the (general or gynecologic) emergency department and the first appropriate therapeutic care.<sup>22</sup>

Statistical tests were 2-sided, and  $P > .05$  was defined as significant. Analyses were performed with SPSS 22 and R 3.5.1.

No written informed consent was required by French law for this observational, noninterventional study (Huriet-Serusclet law, December 20, 1998). However, all women received information about it and could decline to participate. The Ethics Committee of Ile-de-France VII (PP 13-040, November 27, 2013) approved the study.

## RESULTS

The Delphi phase took place from January to November 2014. Appendix 2, <http://links.lww.com/AOG/C86>, presents the final list of the eight diagnoses constituting a potentially life-threatening emergency and the 17 near-miss criteria as defined by the Delphi process. Among the 17,436 women presenting at a participating gynecologic emergency department from March 9 to April 13, 2015, 3,825 had first visits for acute pelvic pain (Fig. 1) with a median maximum pain intensity of 7 (interquartile range 3). Nearly all women had first-line transvaginal ultrasound scans ( $n=3,456$ , 90.3%). During follow-up, 355 women were admitted after one or more visits (9.3%, 95% CI 7.8–10.8).

A potentially life-threatening emergency was diagnosed for 130 women: 3.4% (3.0–4.1%) of those presenting for acute pelvic pain and 36.5% (30.7–42.7%) of those hospitalized (Appendix 3, available online at <http://links.lww.com/AOG/C86>). Simultaneously, 32 women met at least one near-miss criterion: 0.9% of all emergency department visits (0.5–1.3%) and 9.3% of hospitalized women (6.1–13.0%). We observed no deaths. Appendix 4 (available online at <http://links.lww.com/AOG/C86>) presents the detailed activity of all 21 centers and the distribution of the cases. The potentially life-threatening emergency rates were similar between centers, but the hospitalization rate showed statistically significant heterogeneity. The near-miss rate showed some non-significant heterogeneity between centers; seven centers had no near misses during the study period (Appendix 3, <http://links.lww.com/AOG/C86>).

Table 1 describes the main characteristics of the care paths and conditions for women with potentially life-threatening emergencies, women hospitalized for emergencies that were not potentially life-threatening,

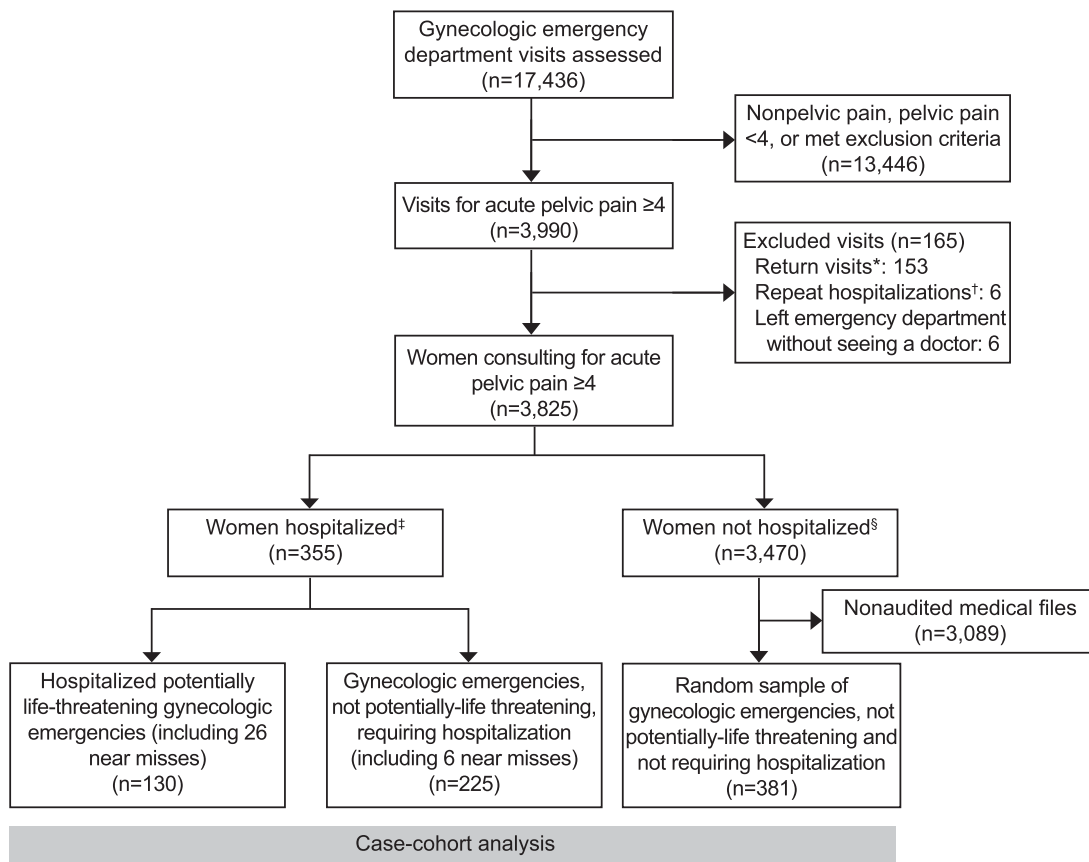
and the random sample of nonhospitalized women. Those with potentially life-threatening emergencies were older than the others and had more frequently been referred or transferred from other departments or hospitals. They were more likely to have been examined by a board-certified ob-gyn and to have experienced diagnostic errors more often than either the hospitalized (odds ratio [OR] 1.7, 95% CI 1.1–2.7) or outpatient women in the control group (OR 14.7, 95% CI 8.1–26.8). About 8.5% of women with potentially life-threatening emergencies were discharged after their first visit and thus diagnosed during follow-up (Table 1). Among the 135 women with diagnostic errors, 30 (22.2%) were diagnosed after one or more return visits, and 15 (11.1%) had delayed surgery (Table 1).

Among the 130 women with potentially life-threatening emergencies, 26 were near misses (pooled rate: 20.6%, 13.7–28.4%) compared with six of the 606 women in the control group (pooled rate: 1.6%, 0.7–2.8%) (Table 2). Near-miss criteria were strongly associated with potentially life-threatening conditions (adjusted OR 25.6, 95% CI 10.9–70.7) with no center effect (intraclass correlation coefficient=0.02). The rate of near misses was similar among women who experienced diagnostic errors than those who did not (adjusted OR 1.1, 95% CI 0.5–2.5).

Median total intrahospital time to treatment for gynecologic emergencies was 4.25 hours (interquartile range 8). This interval did not differ between women with potentially life-threatening conditions, who did or did not have a near miss (3.87 [interquartile range 7] vs 4.53 [interquartile range 8], Mann-Whitney,  $P=.425$ ). Heterogeneity between centers was not statistically significant (Kruskal-Wallis,  $P=.21$ ), but three centers had a median time greater than the 75th percentile (Appendix 5, available online at <http://links.lww.com/AOG/C86>). Similar results were found with intradepartment times to treatment. Diagnostic errors significantly increased the total intrahospital time to treatment (8.83 [interquartile range 12] vs 3.66 [interquartile range 4], Mann-Whitney,  $P > .001$ ).

## DISCUSSION

We constructed, through a consensus definition with experts, a category of diagnoses of potentially life-threatening gynecologic emergencies defined as painful conditions at high risk of progression to severe morbidity as assessed by near-miss indicators. Prospectively collected data show that this category of diagnoses was not uncommon, accounting for 3–4% of women seen at gynecologic emergency departments for acute pelvic pain; it occurred at similar rates



**Fig. 1.** Flow chart of the case-cohort study with selection of 736 women presenting for acute pelvic pain during the prospective data-collection phase of the study. \*Women who were discharged from the emergency department after their first visit and who returned to the gynecologic emergency department for the same condition during the study period. †Women who were discharged from the hospital after their first hospitalization and who were readmitted to the hospital for the same condition during the study period. ‡Either in the gynecology department or another department after one or more emergency department visits. §Visits not resulting in hospitalization or return visit during the study period.

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between centers and accounted for 37% of women hospitalized from these emergency departments. Compared with women with benign conditions, those with potentially life-threatening conditions were more frequently subject to diagnostic errors and ran a higher risk of progression to a near miss.

The most common potentially life-threatening gynecologic emergencies were ectopic pregnancies with severe bleeding, complex pelvic inflammatory disease, adnexal torsion, hemorrhagic miscarriage, and complicated appendicitis (because it may mimic several acute gynecologic conditions). Grouping potentially life-threatening conditions together makes sense in a framework for quality assessment: they are conditions commonly seen in gynecologic emergency departments, and are homogeneous relative to quality of care and safety outcomes.<sup>14</sup> The prevalence of the potentially life-threatening emergencies we measured

in the participating gynecologic emergency departments, as well as the risk of near misses associated with them, underlines their importance for patient safety. First, the frequency of these emergencies is fairly homogeneous throughout our 21 centers. Their occurrence thus does not depend on the medical or socioeconomic context and is not per se a preventable adverse outcome. Second, they share a common precursor signal, acute low abdominal pain, easily recordable at the time of triage.<sup>17</sup> Third, they carry a high risk of progression to serious life-threatening complications. These three features suggest their criticality,<sup>23</sup> as understood in the field of risk analysis engineering that is, their combined probability and severity. This is essential information for identifying the situations most important to learn how to prevent. They must therefore be prioritized to enable the development and implementation of corrective or preventive

**Table 1. Characteristics, Care Paths, and Conditions Encountered in Women With and Without Potentially Life-Threatening Gynecologic Emergencies (Case-Cohort Study)**

	Overall Case-Cohort Population (N=736)	G-PLE (n=130)	No G-PLE		Between-Group <i>P</i>
			Hospitalized (n=225)	Nonhospitalized (n=381)	
Women's characteristics					
Age (y)	30.6±7.4	33.0±7.0	30.6±7.9	29.8±7.0	<.001
Reason for visit, data available	673	110	182	381	
Pain only	378 (56.2)	58 (52.7)	94 (51.6)	226 (59.3)	
Pain and other reason	272 (40.4)	47 (42.7)	78 (42.9)	147 (38.6)	.14
Other reasons	23 (3.4)	5 (4.5)	10 (5.5)	8 (2.1)	
VAS or NRS (0–10)	7 [3]	8 [4]	8 [3]	7 [2]	<.001
Data available	712	118	215	378	
Care path					
Referral, data available	726	128	217	381	
Self-referral	538 (74.0)	63 (49.2)	134 (61.8)	340 (89.2)	
GP or ob-gyn	60 (8.3)	19 (14.8)	23 (10.6)	18 (4.7)	
Ambulance	37 (5.1)	13 (10.2)	14 (6.5)	10 (2.6)	<.001
Transferred from ED at the same hospital	63 (8.7)	22 (17.2)	28 (12.9)	13 (3.4)	
Transferred from another hospital	29 (4.0)	11 (8.6)	18 (8.3)	0 (0.0)	
Night visit	226 (30.7)	44 (33.8)	103 (45.8)	79 (20.7)	<.001
Analgesics on admission, data available	709	123	215	371	
Received analgesics at admission	192 (27.7)	48 (39.0)	81 (37.7)	67 (18.1)	<.001
Attending physician, data available	731	130	222	380	
Board-certified ob-gyn	90 (12.3)	41 (31.5)	30 (13.6)	19 (5.0)	
Ob-gyn resident	489 (66.9)	71 (54.6)	166 (75.1)	252 (66.3)	<.001
Emergency medicine resident	152 (20.8)	18 (13.8)	25 (11.3)	109 (28.7)	
1st-line emergency transvaginal ultrasonography, data available	733	129	223	381	
Examination performed	715 (97.4)	125 (96.9)	216 (96.9)	373 (97.9)	.68
Final decision after 1st visit					
Discharge	417 (56.6)	11 (8.5)*	36 (16.0) <sup>†</sup>	370 (97.1)	
Discharge after transfer to general ED	11 (1.5)	0 (0.0)	0 (0.0)	11 (2.9)	<.001
Hospitalized in gynecology department	292 (39.7)	114 (87.7) <sup>‡</sup>	178 (79.1)	0 (0.0)	
Hospitalized in another department	16 (2.2)	5 (3.8)	11 (4.9)	0 (0.0)	
No. of G-ED visits by patient before final diagnosis	1 [0] (5)	1 [0] (5)	1 [0] (5)	1 [0] (3)	<.001
1	685 (93.1)	117 (90.0)	189 (84.0)	379 (99.5)	
2	32 (4.3)	9 (6.9)	22 (9.8)	1 (0.3)	
3	9 (1.2)	2 (1.5)	6 (2.7)	1 (0.3)	<.001
4	5 (0.7)	1 (0.8)	4 (1.8)	0 (0.0)	
5	5 (0.7)	1 (0.8)	4 (1.8)	0 (0.0)	
Taken to operating room	209 (28.4)	117 (90.0)	225 (40.9)	381 (0.0)	<.001
Admitted to intensive care unit	1 (0.1)	1 (0.8)	0 (0.0)	0 (0.0)	.10
Patients meeting near-miss criteria	32 (4.3)	26 (20.0)	6 (2.7)	0 (0.0)	<.001
Diagnostic error at 1st visit	135 (18.3)	53 (40.8)	65 (28.9)	17 (4.5)	<.001
Diagnosis error outcomes					
1 or more return visits	30 (22.2)	8 (15.1)	20 (30.8)	2 (11.8)	0.07
1st intent operating room	57 (42.2)	37 (69.8)	20 (30.8)	0 (0.0)	<.001
Delayed operating room <sup>§</sup>	15 (11.1)	8 (15.1)	7 (10.8)	0 (0.0)	

G-PLE, potentially life-threatening gynecologic emergency; VAS, Visual Analog Scale; NRS, Numeric rating scale; GP, general practitioner; ob-gyn, obstetrician-gynecologist; ED, emergency department; G-ED, gynecologic emergency department.

Data are mean±SD, n (%), n, median [interquartile range], or median [interquartile range] (maximum) unless otherwise specified.

\* Ten were hospitalized in the gynecology department and one in another department after one or more return visits.

<sup>†</sup> Thirty-six were hospitalized in the gynecology department after one or more return visits.

<sup>‡</sup> Two were hospitalized twice before the diagnosis was made.

<sup>§</sup> After one or more return visits.

**Table 2. Final Diagnosis and Frequency of Women Meeting the Near-Miss Criteria With and Without a Potentially Life-Threatening Gynecologic Emergency**

Final Diagnosis*	All Women (N=736)	Women Meeting Near-Miss Criteria* (n=32)
G-PLE conditions		
Complicated ectopic pregnancy with severe bleeding	54 (7.3)	14 (44)
Hemorrhagic miscarriage	15 (2.0)	9 (28)
Complicated pelvic inflammatory disease	30 (4.1)	2 (6)
Adnexal torsion	20 (2.7)	0 (0)
Complicated appendicitis	6 (0.8)	1 (3)
Bowel obstruction	1 (0.1)	0 (0)
Acute pyelonephritis during pregnancy	4 (0.5)	0 (0)
Non-G-PLE conditions		
Ectopic pregnancy	45 (6.1)	1 (3)
Complete or incomplete miscarriage	91 (12.4)	1 (3)
Ongoing ectopic pregnancy	137 (18.6)	0 (0)
Resolved pregnancy of unknown location	28 (3.8)	0 (0)
Pelvic inflammatory disease	35 (4.8)	0 (0)
Benign complication of ovarian cysts	79 (10.7)	0 (0)
Acute complications of fibroids	13 (1.8)	2 (6)
Dysmenorrhea and other menstrual cycle-related pain <sup>†</sup>	33 (4.5)	0 (0)
Appendicitis	3 (0.4)	0 (0)
Constipation or irritable bowel syndrome pain	2 (0.3)	0 (0)
UTI and uncomplicated pyelonephritis	10 (1.4)	0 (0)
Renal colic	8 (1.1)	0 (0)
Unspecified pelvic pain	82 (11.1)	0 (0)
Other diagnoses <sup>‡</sup>	40 (5.4)	2 (6)
Total	736 (100)	32 (100)

G-PLE, potentially life-threatening gynecologic emergency; UTI, urinary tract infection.

Data are n (%).

\* Woman could have only one diagnosis but several near-miss case indicators (32 patients had at least one near-miss case criterion).

<sup>†</sup> Including seven cases of endometriosis discovery.

<sup>‡</sup> Pain with intrauterine device placement, 10; ovarian hyperstimulation, 6; sigmoiditis, 4; pelvic adhesions, 2; abnormal uterine bleeding, 3; benign endometrial pathology, 3; pubic abscess, 2; vaginitis, 2; pelvic thrombophlebitis, 2; acute mesenteric adenolymphitis, 1; urachal cyst, 1; Crohn's disease, 1; sciatica, 1.

actions to improve quality and safety in gynecologic emergency departments.<sup>9,12</sup>

From a patient safety viewpoint, the conditions we define as potentially life-threatening share a medically plausible link between undesirable outcome and the inpatient process of care,<sup>14</sup> in that a likely outcome of diagnostic error or therapeutic delay is progression toward severe morbidities that may cause temporary or permanent disability or even death.<sup>3,24,25</sup> From the perspective of organization of care, appendicitis has nothing to do with gynecologic emergency departments, but our study shows that diagnostic errors lead not uncommonly to the initial management of these cases in gynecology, which represents the loss of an opportunity to resolve or treat them as early as possible, before they become critical. This is equally applicable to settings where most patients use a general emergency department for triage; there are often delays in gynecologic emergency diagnoses and unnecessary diagnostic tests that add to delays and costs.

One strength of this study is the specificity of emergency gynecologic care in France and Belgium in which all women with acute gynecologic symptoms, pregnant or not, are seen at gynecologic emergency departments. This model of care is similar to those of "acute gynecology units" tested in the United Kingdom and Australia.<sup>26</sup> Accordingly, on-call obstetrics and gynecology residents or board-certified specialists perform initial patient evaluations, including vaginal examinations and routine bedside transvaginal ultrasonography. This provides an ideal setting for defining potentially life-threatening emergencies and near misses in the field of gynecology and assessing their relative frequencies.

One major limitation of our study is that we have not explained the relation between potentially life-threatening conditions and near misses in terms of the actual quality of care provided. Understanding why near misses occur and whether their cause is related to a chronologic series of delays or errors is essential.<sup>27</sup> If most women already meet near-miss criteria when



they arrive at the emergency department, the cause is not the inpatient process of care but is related instead to the woman herself or her primary care.

Secondly, not all potentially life-threatening conditions have the same criticality. We observed no near misses among women with adnexal torsion, yet this condition can affect fertility and potentially lead to life-threatening complications due to necrosis and thrombophlebitis.<sup>28,29</sup> Another point concerns the definition of the clinical conditions included in what we have meant as potentially life-threatening gynecologic emergencies. We have defined them as “pelvic” conditions in the sense of anatomic and physiologic pathways that are responsible for acute pelvic pain symptoms.<sup>30</sup> The aim was to take into account the diagnoses most frequently encountered in gynecologic emergency departments, both those that are relevant to acute gynecologic (or early pregnancy) conditions and those mimicking these conditions. Notably, the symptoms of women with appendicitis frequently mimic those of acute gynecologic conditions. When a woman comes for emergency care for acute pain, neither she nor the doctor who sees her knows whether it is appendicitis or another condition. Appendicitis may thus be considered a potentially life-threatening emergency from the perspective of risk management. Certainly, severe appendicitis was a not uncommon diagnosis in our study. On the other hand, neither acute pyelonephritis nor bowel obstruction meet the definition of potentially life-threatening gynecologic emergencies (Box 1) for they were rarely diagnosed and never linked to a near miss.

Potentially life-threatening gynecologic emergency and near-miss data are key outcomes that can contribute to patient quality and safety improvement, in accordance with Donabedian’s framework<sup>12</sup> by making it possible to develop process measures (Box 1). Attention to the diagnostic or therapeutic processes related to these gynecologic emergencies can positively affect adverse outcomes.<sup>12</sup> We therefore suggest that these conditions be routinely collected as “tracer pathologies” for periodic quality assurance audits so that the reliability of the care and professional practices can be tested.<sup>31</sup> Review criteria, in the form of clinical practice guidelines, exist for most of these conditions. Furthermore, the systematization of the collection of these gynecologic emergencies and related indicators might also enable standardization for comparisons between health facilities. Knowledge of differences between health care organizations is useful for improving the quality and safety of health care and defining interventions to improve systems.<sup>10</sup>

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