

Pediatric EM

Unfavourable outcome for children leaving the emergency department without being seen by a physician

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ABSTRACT

Objective: To assess the prevalence of an unfavourable outcome among children leaving without being seen by a physician in the emergency department (ED).

Method: This was a prospective cohort study conducted over a complete year in a pediatric tertiary care ED. A random sample of all children younger than 19 years of age who left without being seen by a physician was contacted by phone 4 to 6 days following the ED visit. The primary outcome was the occurrence of an unfavourable outcome prospectively defined using a Delphi method among 15 pediatric emergency physicians. An unfavourable outcome was defined as hospitalization, the need for an invasive procedure (intravenous or intramuscular medication, fracture reduction, bone casting, or surgical intervention), suicide attempt, or death in the 72 hours following leaving without being seen by a physician. As a secondary outcome, multiple potential predictors were evaluated. The first analysis evaluated the proportion of unfavourable outcomes among children who left without being seen by a physician. Then logistic regression identified predictors of unfavourable outcomes.

Results: During the study period, 61,909 children presented to the ED, 7,592 (12%) left without being seen by a physician, and 1,579 were recruited. Thirty-eight (2.4%; 95% CI 1.7–3.2) patients fulfilled the criteria for an unfavourable outcome. On multiple logistic regression, chief complaints related to trauma and absence of nurse counseling had higher risks of unfavourable outcome.

Conclusions: Approximately 2% of children who left without being seen by a physician at a tertiary care pediatric ED had an unfavourable outcome.

RÉSUMÉ

Objectif: L'étude visait à évaluer la prévalence des événements défavorables survenus chez les enfants qui

quittent le service d'urgence (SU) sans avoir été vus par un médecin.

Méthode: Il s'agit d'une étude de cohortes prospective, d'une durée de 1 an, menée dans un SU de soins tertiaires en pédiatrie. Un certain nombre d'enfants choisis au hasard, parmi tous ceux qui avaient moins de 19 ans et qui avaient quitté le SU sans avoir été vus par un médecin, ont été joints par téléphone, de 4 à 6 jours après la demande de consultation. Le principal critère d'évaluation consistait en la survenue d'événements défavorables, définis de manière prospective, à l'aide de la méthode Delphi, par 15 pédiatres urgentologues. Les événements défavorables ont été définis comme l'hospitalisation, la nécessité d'une intervention effractive (administration intraveineuse ou intramusculaire de médicaments, réduction de fractures, pose d'un appareil plâtré, intervention chirurgicale), une tentative de suicide, ou la mort dans les 72 heures suivant le départ du SU sans examen préalable par un médecin. Quant au critère d'évaluation secondaire, plusieurs facteurs prévisionnels possibles d'événement défavorable ont fait l'objet d'évaluation. La première analyse visait à évaluer la proportion d'événements défavorables chez les enfants qui avaient quitté le SU avant d'avoir été vus par un médecin; la deuxième, celle de régression logistique, a permis de cerner un certain nombre de facteurs prévisionnels d'événement défavorable.

Résultats: Au cours de la période à l'étude, 61,909 enfants sont allés au SU; sur ce nombre, 7,592 (12%) sont partis avant d'avoir été vus par un médecin et, parmi ceux-ci, 1,579 ont été retenus pour l'étude. Finalement, 38 patients (2.4%; IC à 95% 1.7–3.2) satisfaisaient au critère d'événements défavorables. À l'analyse de régression logistique, les consultations ayant pour motif principal un trauma, et l'absence d'information donnée par le personnel infirmier se sont révélés des facteurs de risque élevé d'événement défavorable.

Conclusion: Environ 2% des enfants qui avaient quitté le SU de soins tertiaires en pédiatrie, sans avoir été vus par un médecin ont connu un événement défavorable.

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The constant imbalance between patient load and available resources has led to variable and growing wait times in emergency departments (EDs).^{1,2} Increasing wait time has been associated with an increase in the proportion of patients leaving the ED without being seen by a physician (LWBS).³⁻⁶ Recent publications report proportions of LWBS varying between 1 and 17%, with a mean of approximately 5%.^{4,6-9} As these patients may have important clinical outcomes, the rate of patients who LWBS has been considered one of the most important performance indicators for pediatric EDs.^{10,11}

There is very little information regarding the outcome of patients who LWBS and the morbidity engendered by the problem. Pediatric studies suggest that approximately 50% of these patients visit a physician within the following days^{7,12,13} and approximately 2% are hospitalized.^{3,7} The major limitations of these studies are related to the small number of participants and the lack of comprehensive evaluation of LWBS predictors. A literature review concluded in 2008 that “patients generally have very low rates of subsequent admission, and reports of serious adverse events are rare.”¹⁴ This may explain why some settings tolerate higher LWBS proportions. No study has evaluated predictive factors associated with an unfavourable outcome for children who LWBS. The primary goal of our study was to investigate the proportion of children who LWBS who had an unfavourable outcome as defined by expert consensus. Second, as an exploratory study, we aimed to identify potential predictors of unfavourable outcome.

METHODS

Study design

This was a prospective cohort study using a phone follow-up among a random sample of children who LWBS from a pediatric ED.

Study setting

The study was performed in a pediatric, university-affiliated, tertiary care ED with an annual census of approximately 60,000 patient-visits. To avoid biases engendered by seasonal variation, data were collected

from May 2, 2010, until April 30, 2011. However, the study was suspended for 2 weeks between December 20, 2010, and January 5, 2011, due to a shortage of research assistants. Patients visiting the ED at any time of the day were eligible.

Population

Eligible participants were all patients younger than 19 years of age triaged in the ED who LWBS. Exclusion criteria were language barrier, inability to reach the patients by phone, and refusal to participate in the study.

Study protocol

The research setting's way of functioning has been previously described elsewhere.⁶ In brief, patients were triaged by a registered nurse using the Canadian Triage and Acuity Scale for children.¹⁵ After variable waiting times, patients were evaluated by a physician. Patients were assigned an LWBS status when they did not present to see a physician after being called three times at more than 15 minutes apart or when they advised a nurse of their desire to leave prematurely.

All children who LWBS were identified using the computerized database. Every day, a random sample of 20% of the patients who LWBS was identified using a computerized random number generator. Identified patients were reached by telephone by a research assistant 4 to 6 days following the ED visit. Three telephone calls were performed for each potential participant at different times of the day and on different days. If no answer was obtained after three calls, the patient was excluded and a new participant was randomly identified. After obtaining verbal informed consent from the parent, the research assistant performed a standardized phone questionnaire. This questionnaire was developed by the principal investigator and validated for content validity with a focus group of several pediatric emergency physicians and pediatric nurses for this study. It was also initially validated for ease of use with three nurses and research assistants. Criterion validity could not be assessed given that no gold standard exists to which our tool could be compared. Also, reliability could not be measured as the ED visit is a one-time event and because the patient's health status could evolve from one moment to another. Finally, the computerized database of the ED was used to

compare the demographic data of the participants and nonparticipants.

Outcome measures

The primary outcome was the presence of an unfavourable outcome in the 72 hours following the departure from the ED. Unfavourable outcome was prospectively defined using a modified Delphi method^{16,17} among the 15 full-time pediatric emergency physicians working in the setting where the study was conducted. Each round of discussion was done through a Web survey. All invited physicians agreed to participate in all four rounds of discussion. The first round of discussion used an open question asking participants to name potential unfavourable outcomes. Seventeen potential outcomes were suggested. The second round of discussion asked participants to choose among the 17 potential outcomes. They identified five variables selected by more than 75% of the experts. The third round permitted clarification of two more variables selected by more than 60% of the participants. Finally, the last round was conducted to ask physicians what the best time frame for the outcomes would be (72 hours). At the end, after merging duplicates, four variables were identified as unfavourable outcomes. Thus, an unfavourable outcome was defined as the occurrence of hospitalization, the occurrence of an invasive procedure (intravenous or intramuscular medication, fracture reduction, bone casting, or surgical intervention), suicide attempt, or death. Casting was defined as all patients who had a cast or splint application, excluding those who only had application of a sling. Secondary outcome variables included medical consultation, visit to an ED, worsening of the disease according to the parent, and prescription of medication by a physician. Parental satisfaction regarding the initial ED visit and their main reason for premature departure were also evaluated.

Independent variables

Potential predictors of unfavourable outcome were suggested by the 15 experts in pediatric emergency medicine. These variables were related to patients' characteristics (age, sex), disease (chief complaints, triage level), or setting (day of the week, time of visit, season, or proximity of residence). Other independent variables were arrival by ambulance and access to a family physician. Finally, in some situations, the

parents or patients notified triage nurses of their intention to leave and therefore received information about their child's illness and when to return to the ED. Such counseling was registered in the computerized database, and its impact was evaluated. Except for access to a family physician status, all independent variables were retrieved through the computerized database. A potential predictive factor, wait time or crowding status, was not available using the computerized database and was thus not included in the analysis.

During the analysis phase, it was suggested to review the medical charts of patients who had an unfavourable outcome. A single investigator (J.G.) reviewed the medical charts of participants who had an unfavourable outcome using a standardized approach. To do so, he evaluated the index visit and all subsequent visits to the study setting. This permitted reporting of the outcomes of the participants who had an unfavourable outcome according to the chart.

Analysis

All data were entered on an *Excel* spreadsheet (Microsoft Inc., Richmond, WA) and analyzed using *SPSS v17* software (SPSS Inc., Chicago, IL). The 95% confidence intervals were measured for every result.

The primary analysis was the calculation of the proportion of children who LWBS and the proportion who had an unfavourable outcome. Comparison of baseline characteristics for study participants and for all children visiting the ED and all children who LWBS during the study period was performed using the computerized database of the ED.

Among all participants, the distribution of all predictors was measured for children who had an unfavourable outcome and for those who did not. Simple logistic regression was used to evaluate the association between independent variables and unfavourable outcome. Then all potential predictors were included in a multiple logistic regression to identify those characteristics, which were independent predictors of unfavourable outcome. We elected not to correct for multiple comparisons as these comparisons were planned a priori.¹⁸

Sample size

According to previous medical literature, approximately 2% of patients who LWBS are hospitalized in

the following days.^{7,12} Using a proportion of unfavourable outcome of 3%, it was calculated that the recruitment of 1,667 participants would yield at least 50 children with an unfavourable outcome. The computerized database of the study setting reported that more than 10,000 children per year left prematurely in the 2 previous years. Based on this, it was calculated that recruitment of 20% of the children who LWBS for each day during a complete year would provide 2,000 participants.

Ethical Issues

All children/parents received an information letter during their ED visit, which also offered the possibility of opting out of the study. All parents provided verbal informed consent at the beginning of the phone

questionnaire. The study was approved by the Institutional Review Board. Because of the use of anonymous data, no informed consent was deemed necessary to investigate the computerized database for the nonparticipants.

RESULTS

During the study period, 61,909 children visited the ED and 7,592 (12.2%) LWBS (Figure 1). Among them, 1,686 (22% of all LWBS) were invited by phone to participate in the study and 1,579 (94%) accepted and were included. The main reasons for exclusion were parental refusal (66%) and language barrier (26%). Study participants had baseline demographics similar to those of patients who refused participation and all patients who LWBS during the study period

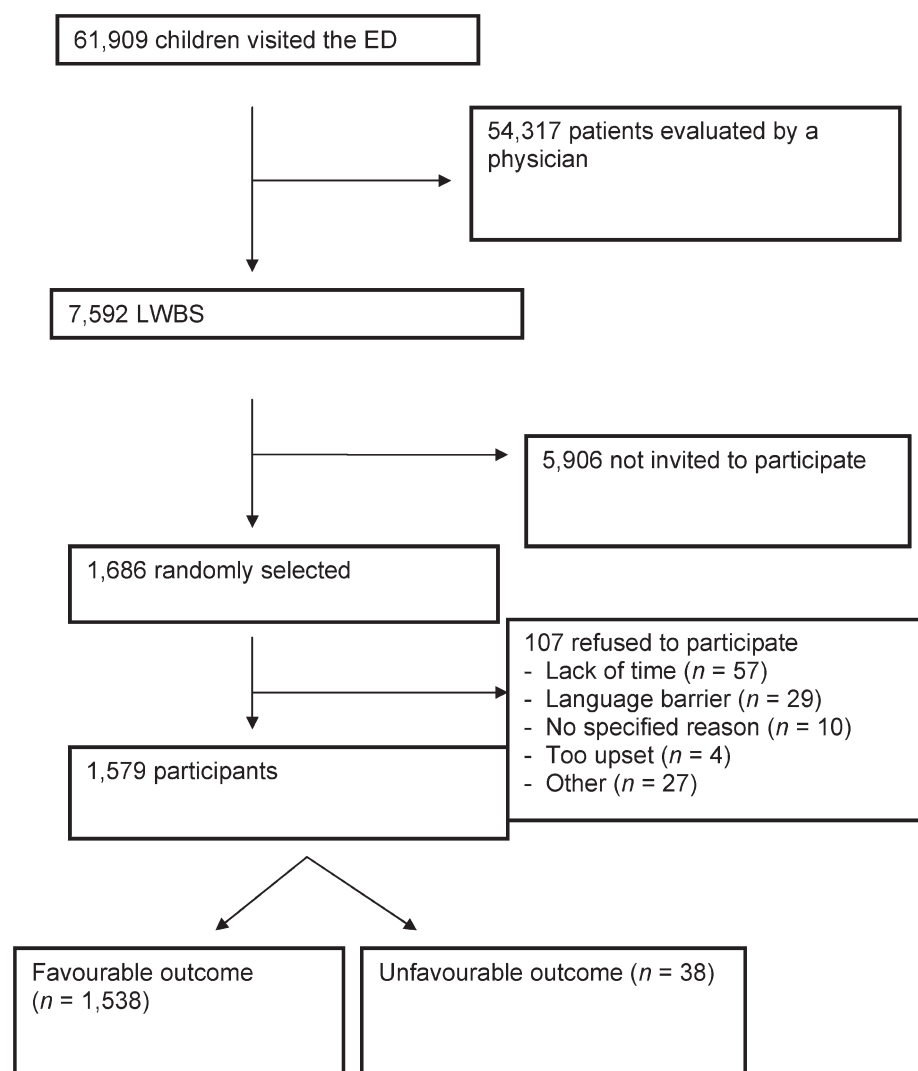


Figure 1. Flow chart of patients' distribution. ED = emergency department; LWBS = left without being seen.

(Table 1). Among the participants, the main reasons for premature departure were wait times (47%), reassurance from the triage nurse regarding the benign nature of the child's condition (37%), and improvement of the child's health status in the waiting room (8%). A total of 838 of 1,579 (53%) participants received nurse counseling before premature departure.

Table 2 reports the outcome of the participants. Among them, 38 (2.4%; 95% CI 1.7–3.2) patients fulfilled the criteria for an unfavourable outcome that were all related to the initial visit. The main reasons for this were hospitalization (21 patients) and the need for intravenous access (21 patients). Also, six patients needed a surgical procedure, of which three

Table 1. Baseline characteristics of all children who LWBS during the study period

Characteristic	All children visiting the ED (%) (N = 61,909)	All patients who LWBS (%) (N = 7,592)	Eligible patients who refused to participate (%) (n = 107)	Study participants (%) (n = 1,579)
Age category				
< 3 mo	3,718 (6.0)	225 (3.0)	5 (4.6)	69 (4.3)
3–11 mo	8,602 (14)	1,243 (16)	14 (13)	320 (20)
1–2 yr	19,491 (32)	2,701 (36)	38 (36)	565 (36)
3–4 yr	8,582 (14)	1,187 (16)	18 (17)	248 (16)
5–11 yr	13,425 (22)	1,552 (20)	21 (20)	285 (18)
> 11 yr	8,090 (13)	684 (9.0)	11 (10)	91 (5.8)
Triage level*				
1	379 (0.6)	0	0	0
2	4,850 (7.8)	3 (0.01)	0	0
3	19,478 (32)	210 (2.8)	3 (2.8)	54 (3)
4	32,718 (53)	5,162 (68)	76 (71)	1,126 (71)
5	4,159 (6.7)	1,889 (25)	28 (26)	398 (25)
Unknown	325 (0.5)	328 (4.3)	0	0
Patients living near the hospital (< 10 km)	7,643 (12)	1,121 (15)	18 (17)	224 (14)
Arrival by ambulance	4,262 (6.8)	200 (2.6)	2 (1.9)	33 (2)
Season of visit				
Summer	16,787 (27)	1,074 (14)	21 (20)	237 (15)
Fall	17,045 (28)	1,972 (26)	16 (15)	413 (26)
Winter	14,284 (23)	2,072 (27)	36 (34)	422 (27)
Spring	13,793 (22)	2,474 (33)	35 (33)	507 (32)
Day of visit				
Weekday	42,792 (69)	4,844 (64)	65 (62)	1,005 (64)
Holiday (weekday)	899 (1.4)	155 (2.0)	1 (0.9)	29 (1.8)
Weekend day	18,218 (29)	2,593 (34)	41 (38)	545 (35)
Time of arrival at the ED				
Day (8:00–16:00)	28,441 (46)	2,481 (33)	31 (29)	487 (31)
Evening (16:00–24:00)	25,370 (41)	4,261 (56)	53 (50)	906 (57)
Night (0:00–8:00)	8,098 (13)	850 (11)	23 (21)	186 (12)
Chief complaints				
Fever	7,529 (12)	901 (12)	16 (13)	213 (14)
Vomiting/diarrhea	6,471 (10)	878 (12)	12 (11)	202 (13)
Skin problem	3,893 (6.3)	761 (10)	7 (6.5)	163 (10)
Abdominal problem	3,395 (5.5)	354 (4.7)	7 (6.5)	76 (5)
Respiratory and fever	10,164 (16)	1,064 (14)	14 (11)	224 (14)
Respiratory without fever	5,729 (9.3)	854 (11)	17 (13)	189 (12)
Trauma	9,601 (16)	915 (12)	12 (11)	183 (12)
Psychiatric disorder	744 (1.2)	24 (0.3)	1 (0.9)	5 (0.3)
Other	14,383 (23)	1,841 (24)	21 (20)	324 (20)

ED = emergency department; LWBS = left without being seen.
*Using the Canadian Triage and Acuity Scale.

Table 2. 72-hour outcomes following leaving the ED without being seen (N = 1,579)

Outcome	n (%)
Use of any medical resources*	
No	935 (58)
Same ED	104 (7)
Another ED	68 (4)
Family physician	188 (12)
Physician in a clinic	253 (16)
Other	39 (2)
Hospitalization	21 (1.3)
Intravenous access	21 (1.3)
Intramuscular medication	2 (0.1)
Surgical procedure	6 (0.3)
Bone immobilization	13 (0.8)
Fracture reduction	1 (0.01)
Suicide attempt	0
Death	0
Medication prescription	345 (22)
Any unfavourable outcome [†]	38 (2.4)
Patient's outcome according to the parents [‡]	
Important deterioration	20 (1)
Small deterioration	34 (2)
Stable	213 (14)
Small improvement	397 (25)
Important improvement	910 (58)
Parental satisfaction regarding the ED visit	
Very satisfied	559 (35)
Satisfied	287 (18)
Neutral	130 (8)
Unsatisfied	180 (11)
Very unsatisfied	418 (27)
Refused to answer	4 (0.2)

ED = emergency department.
 *May have multiple answers.
[†]Defined as the occurrence of hospitalization, the need for an invasive procedure (intravenous or intramuscular medication, fracture reduction, bone casting, and surgical intervention), suicide attempt, or death.
[‡]Data unknown for five patients.

were performed in the operating room. There were no suicidal attempts or death. All patients who had unfavourable outcomes are described in the Appendix. There was no contradiction in the outcomes measured using chart review compared to the phone questionnaire. Nineteen (50%) of them were treated in a health care setting different from that of their primary visit. According to the parents, the health status of most children (83%) improved during the 3 days following departure from the ED. However, 418 (27%) parents reported being very unsatisfied with their ED visit.

Table 3 reports associations between independent variables and unfavourable outcomes. On univariate logistic regression, a more acute triage level was

associated with a higher risk of unfavourable outcome. Also, chief complaints related to trauma had more unfavourable outcomes compared to the others who LWBS. Finally, patients who received counseling from the nurse before premature departure had a lower proportion of unfavourable outcome. On multiple logistic regression, triage level was not associated with unfavourable outcome. Nurse counseling was associated with a lower risk of unfavourable outcome (OR 0.21; 95% CI 0.09–0.50). Also, chief complaints related to trauma were associated with a higher proportion of unfavourable outcome. Indeed, using a chief complaint of trauma as the reference standard for analysis, the ORs for all the other chief complaints were statistically lower than 1 (see Table 3). Overall, the final multivariate logistic regression model demonstrated good fit based on the Hosmer-Lemeshow goodness-of-fit test (chi-square = 66.740; *df* = 52; *p* = 0.082).

DISCUSSION

Using a Delphi method among several pediatric emergency physicians, we defined an unfavourable outcome for children who LWBS as the occurrence of hospitalization, an invasive procedure, a suicide attempt, or dying. Physicians provided a broad definition to include a range of outcomes that might be considered adverse, from both a clinician's and a parent's perspective. Using this definition, the present study reports that between 1.5 and 3% of the children who LWBS had an unfavourable outcome. Patients with a chief complaint related to trauma had a higher risk of unfavourable outcome. Also, those who did not receive counseling from the nurse before premature departure were at higher risk for unfavourable outcome.

The small proportion of unfavourable outcomes reported in the present study is similar to those reported in the three previous studies evaluating the outcome of children who LWBS. The first study, published in 1994, reported a hospitalization rate of 1.7% and no deaths among 419 children who LWBS in a pediatric ED.¹² A second study reported that 63% of children who LWBS consulted elsewhere for medical care, although only one child was finally hospitalized among 158 children who LWBS during a 4-month period.⁷ However, the small sample size and the recruitment of patients strictly during the summer months limit conclusions regarding the proportion of

Table 3. Association between patient and visit characteristics and the risk of unfavourable outcome among patients who left the ED without being seen (N = 1,579)

	Univariate logistic regression	Multivariate logistic regression
	Odds ratio (95% CI)	Adjusted odds ratio (95% CI)
Age category		
< 3 mo	1.66 (0.17–16.5)	5.15 (0.33–80.65)
3–11 mo	0.47 (0.5–4.30)	0.86 (0.07–10.22)
1–2 yr	1.08 (0.14–8.37)	1.81 (0.18–18.2)
3–4 yr	0.61 (0.07–5.58)	1.06 (0.9–12.37)
5–11 yr	1.13 (0.14–9.06)	1.86 (0.18–19.46)
> 11 yr	1.0 ref	1.0 ref
Season of the visit		
Spring	1.0 (0.49–2.15)	1.05 (0.46–2.39)
Summer	0.54 (0.17–1.67)	0.60 (0.18–2.00)
Fall	0.39 (0.14–1.09)	0.46 (0.15–1.38)
Winter	1.0 ref	1.0 ref
Time of day		
Night	1.11 (0.41–2.97)	1.03 (0.35–3.05)
Day	0.93 (0.45–1.93)	0.95 (0.43–2.11)
Evening	1.0 ref	1.0 ref
Day of the week*		
Holiday	0 (0–?)	0.0 (0–?)
Regular weekday	1.18 (0.59–2.36)	0.91 (0.43–1.93)
Weekend	1.0 ref	1.0 ref
Proximity to hospital (< 10 km)	1.09 (0.2–2.83)	0.86 (0.31–2.38)
Arrival by ambulance	1.27 (0.17–9.57)	1.58 (0.19–13.44)
Access to a family physician	0.71 (0.32–1.56)	1.70 (0.74–3.9)
Triage level		
3	7.62 (1.05–55.22)	2.61 (0.31–21.99)
4	6.17 (1.48–25.80)	3.50 (0.69–17.7)
5	1.0 ref	1.0 ref
Nurse counseling	0.27 (0.13–0.57)	0.21 (0.09–0.50)
Chief complaints		
Fever	0.41 (0.15–1.12)	0.23 (0.07–0.70)
Vomiting/diarrhea	0.36 (0.13–1.05)	0.24 (0.07–0.75)
Skin problem	0.09 (0.01–0.68)	0.10 (0.01–0.84)
Abdominal problem	0.39 (0.08–1.76)	0.28 (0.06–1.38)
Respiratory and fever	0.26 (0.08–0.82)	0.17 (0.05–0.39)
Respiratory without fever	0.15 (0.03–0.69)	0.08 (0.01–0.70)
Trauma	1.0 ref	1.0 ref

ED = emergency department.
*95% CI not calculated because no patients who were seen during a holiday had an unfavourable outcome.

patients who go on to be hospitalized. Finally, a 2006 study reported that approximately 70% of 159 children who LWBS visited a physician in the following 48 hours and six (4%) were eventually hospitalized.¹³ The limitations of this study were the small sample size and low recruitment rate (26%). A major difference between our study and the three previous studies is the higher proportion of LWBS (12% v. approximately 3%). Another important difference stems from the

definition used for an unfavourable outcome. Although all previous studies reported hospitalization, medical consultation, and/or death, no previous study evaluated all unfavourable outcomes as defined by expert consensus. The absence of death or suicide attempts among the study participants is concordant with a literature review revealing only one case of suicide attempt in a prospective study of adult patients who LWBS.¹⁹ Finally, our results are in agreement with a

recent study suggesting that patients who LWBS are at lower risk for death or second admission in the following week when adjusted for triage level and patients' hospital and period characteristics.²⁰ We used a broad definition of an unfavourable outcome, including children who only needed an intravenous access or a delayed casting. Many unfavourable outcomes were more of a delay in treatment and diagnosis as opposed to an adverse event per se. Consequently, our study limited the risk of underestimating the prevalence of future problems and may be more pessimistic than the reality.

This study was the first attempt to identify predictive factors of unfavourable outcome among children who LWBS. Among the potential predictors, two were statistically associated in multivariate analysis. Patients who received counseling from the ED nurse before premature departure had a lower proportion of unfavourable outcomes. This result is in concordance with the conclusion of a previous retrospective study: "Of patients who LWBS, those who receive counseling by a nurse have less return visits in the following 48 hours."²¹ However, multiple potential selection biases could influence this relationship. For example, patients at higher risk who sought counseling may have been convinced to stay. Another explanation is that patients who ask for counseling may have a different risk than those who leave without noticing the medical staff. The impact of nurse counseling should further be evaluated in a clinical trial. Chief complaint was a good predictor of unfavourable outcome. For example, trauma patients had a risk of unfavourable outcome 5 to 10 times higher than those with respiratory problems.

Although the probability of unfavourable outcome may seem low, the total number of patients with unfavourable outcomes may be high in settings with a high proportion of LWBS. For example, we can infer that approximately 180 children who LWBS have an unfavourable outcome each year in our setting. Moreover, using an LWBS rate of approximately 6% reported for 9 tertiary care pediatric EDs across Canada,²² we can infer that more than 1,000 children suffer from an unfavourable outcome following LWBS in these nine tertiary care pediatric EDs each year. In the future, identification of predictors of unfavourable outcome may be used to minimize the morbidity associated with LWBS. For example, one might suggest upgrading triage levels for some chief complaints

related to trauma or improving the counseling given by ED nurses after they triage children.

The high proportion of children who LWBS reported in this study may limit generalization of the results.⁶ It could be expected that with a higher proportion of patients who LWBS, sicker patients are leaving; therefore, higher rates of unfavourable outcome would be found, biasing our results toward a higher proportion of unfavourable outcome. The study was conducted in a single setting and should be replicated in multiple settings to improve generalizability. Exclusion of children who could not be reached by phone is another limitation because these patients may have had a different clinical outcome. However, the baseline demographics of the study participants are similar to those of the general population of children who LWBS. Also, in the province where the study was performed, practically every child lives in a setting that has access to a telephone. This was the first attempt to identify factors associated with a higher risk of unfavourable outcome. By doing so, many potential predictors were screened, and it is possible that the associations highlighted are purely coincidental. Also, the small number of children with an unfavourable outcome limits the power of our study to identify predictors. The absence of a comparison group is an important limitation of our study. This limited our ability to account for the normal worsening of the disease. It is possible that some of the participants would have had the same outcome if they had been evaluated by a physician on their first visit to the ED. However, the description of the patients in the Appendix shows that most unfavourable outcomes could have been detected or treated at the first visit. Also, a recent study suggested that there is selection bias because patients who LWBS have a better outcome than those who stay to be seen by a physician in the ED.²⁰ In a future study, the use of a comparison group could strengthen the conclusions. This comparison group could be formed by patients visiting the same ED, the same day for the same chief complaints and triage level.

CONCLUSIONS

This study demonstrated that 2.4% of the children who LWBS in a pediatric ED had an unfavourable outcome, defined as the occurrence of hospitalization, an invasive procedure (intravenous or intramuscular

medication, fracture reduction, bone casting, or surgical intervention), suicide attempt, or death. More importantly, no death or suicide attempt was reported. Exploratory analysis of the data suggests that participants who received nurse counseling before premature departure had a lower proportion of unfavourable outcomes. This may be related to selection bias or to the effect of the counseling. Also, children with chief complaints related to trauma had more unfavourable outcomes compared to the others who LWBS. This finding opens the discussion on the triage level assigned to children suffering from trauma for the next revision of the Canadian Triage and Acuity Scale. Before this, our findings would need to be replicated in a study involving multiple emergency departments.

Competing interests: None declared.

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Appendix. Description of 38 participants with an unfavourable outcome

Age	Chief complaint (1st visit)	Clinical evolution	Unfavourable outcome
15 yr	Finger trauma	5th finger fracture	Cast
24 mo	Fever, dysuria	Treated outside primary setting	Hospitalization IV hydration
11 mo	Vomiting 3 times	Gastroenteritis	Admission to observation unit Bolus IV hydration
20 mo	Vomiting and diarrhea for 9 h	Gastroenteritis	Hospitalization IV rehydration
15 mo	Leg trauma	Treated outside primary setting	Cast
5 yr	Ankle trauma	Treated outside primary setting	Cast
26 mo	Vomiting 4 times	Gastroenteritis	Observation unit IV bolus hydration
33 mo	Mouth abscess	Tooth abscess that was drained	Surgery
4 yr	Wrist trauma	Nondisplaced radial fracture	Cast
5 yr	Foot trauma	Nondisplaced metatarsal fracture	Cast
7 mo	Fever	Urinary tract infection	Hospitalization IM medication
5 yr	Shoulder trauma	Clavicle fracture	Splint
13 yr	Foot trauma	Nondisplaced metatarsal fracture	Cast
1 mo	Vomiting	Treated outside primary setting	Hospitalization IV hydration
4 yr	Abdominal pain	Persistent vomiting and abdominal pain	IV hydration Observation
5 yr	Tooth pain	Treated outside primary setting	Dental surgery
31 mo	Fever of unknown origin	Treated outside primary setting	Hospitalization IV medication
9 yr	Abdominal pain Vomiting	Diagnosis of appendicitis 15 h later	Hospitalization IV medication Surgery
9 mo	Fever of unknown origin	Urinary tract infection	Admission to day treatment centre IV medication
10 yr	Pancorporal rash	Treated outside primary setting	Hospitalization
23 mo	Fever and respiratory problems	Treated outside primary setting	Admitted to observation unit
4 yr	Ankle trauma	Treated outside primary setting	Cast
17 yr	Teeth pain post-dental surgery	Treated outside primary setting	Dental surgery
14 yr	Clavicle trauma	Treated outside primary setting	Splint
2 mo	Respiratory problem	Bronchiolitis	Hospitalization
31 mo	Fever	Severe pneumonia	Admission to day centre IV medication
5 yr	Elbow trauma	Elbow fracture	Cast
28 mo	Fever and respiratory problem	Pneumonia	Hospitalization IV medication and hydration
27 mo	Fever	Treated outside primary setting	IV medication
33 mo	Cannot tolerate antibiotics for pneumonia	Treated outside primary setting	Hospitalization IV medication
14 yr	Foot trauma	Treated outside primary setting	Hospitalization IV hydration Surgery
13 mo	Skin rash following antibiotics	Treated outside primary setting	Immobilization Hospitalization IV hydration
2 wk	Nose congestion	Treated outside primary setting	Hospitalization
8 mo	Skin rash	Treated outside primary setting	IV hydration

Appendix. Continued			
Age	Chief complaint (1st visit)	Clinical evolution	Unfavourable outcome
16 mo	Ankle trauma	Treated outside primary setting	Hospitalization IV medication
16 mo	Fever and respiratory problem	Mastoiditis	Hospitalization IV medication
28 mo	Dysuria	Treated outside primary setting	Hospitalization IV medication Surgery Immobilization
20 mo	Fever and respiratory problem	Ear infection	IV hydration

IM = intramuscular; IV = intravenous.