Emergency department crowding: Factors influencing flow
van der Linden, Christien

Citation for published version (APA):

General rights
It is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), other than for strictly personal, individual use, unless the work is under an open content license (like Creative Commons).

Disclaimer/Complaints regulations
If you believe that digital publication of certain material infringes any of your rights or (privacy) interests, please let the Library know, stating your reasons. In case of a legitimate complaint, the Library will make the material inaccessible and/or remove it from the website. Please Ask the Library: http://uba.uva.nl/en/contact, or a letter to: Library of the University of Amsterdam, Secretariat, Singel 425, 1012 WP Amsterdam, The Netherlands. You will be contacted as soon as possible.
Part IV

OUTPUT OF THE EMERGENCY DEPARTMENT
Chapter 9

Walkouts from the emergency department: characteristics, reasons and medical care needs

M. Christien van der Linden
Robert Lindeboom
Naomi van der Linden
Crispijn L. van den Brand
Rianne C. Lam
Cees Lucas
Steven J. Rhemrev
Rob J. de Haan
J. Carel Goslings

European Journal of Emergency Medicine, 2014; 21(5):354-359
ABSTRACT

Objectives
The aim of this study was to assess the walkout rate and to identify influencing patient- and visit characteristics on walkout. Furthermore, we assessed the reasons for leaving and medical care needs after leaving.

Methods
In a 4-month population-based cohort study, the characteristics and influencing factors of walkout from two emergency departments in the Netherlands were studied. Afterwards, a follow-up telephone interview was conducted to assess the reasons for leaving and medical care needed.

Results
A total of 169 out of 23,780 (0.7%) registered patients left without treatment, of whom 62% left after triage. Of the triaged walkouts, 26% had urgent or highly urgent medical complaints and target times to treatment had elapsed for 54% of the triaged walkouts. Independent predictors of leaving without treatment included being self-referred, arriving during the evening or night or during crowded conditions, and relatively lower urgency triage allocation. Ninety (53%) walkouts were contacted afterwards by phone. Long waiting time (61%) was the most-cited prime reason for leaving. Medical problems had resolved spontaneously in 19 of the 90 (21%) walkouts and 47 (52%) walkouts reported having sought medical care elsewhere. For 24 of the 90 (27%) walkouts with persisting complaints, medical care was advised during the follow-up telephone phone call.

Conclusions
The average observed daily walkout rate was 1.4 patients over the 4-months period. In general, walkouts are self referrals with lower urgent complaints, arriving during the evening or night shift or during crowded conditions. Most walkouts leave because of perceived long waiting times.
INTRODUCTION

Emergency department (ED) crowding is associated with long waiting times for patients before evaluation. This can lead to patients leaving the emergency department without being seen by a physician [1,2]. Patients who fail to wait for medical assessment are referred to as ‘walkouts’, ‘did not wait’, or patients ‘leaving without being seen (LWBS)’. Reported percentages of LWBS vary from 0.06% to 20% [3-6]. Previous international studies on the outcomes of walkouts showed that the rates of reported adverse events are low [7,8]. Still, as often a large proportion of patients are unaccounted for because of poor response rates, walkouts are of concern to emergency departments.

In the Netherlands, the percentage, profile and outcomes of ED walkouts are unknown. There are about 2 million ED visits per year, with an average growth rate of 2% to 4% [9]. General practitioner (GP) services are available 24/7 and there is basic health insurance available to all. The state of ED crowding is unknown, although it is assumed that crowding is not a major issue [10]. Little is known about ED walkouts in countries with well-established primary care systems. Therefore, the aims of this study were to describe 1) the number of walkouts and their triage status, 2) predictors of walkout, 3) reasons for leaving, including the influence of crowding on walkout rate and 4) walkouts’ medical care needs.

METHODS

Study sample, setting and data collection
This prospective cohort study was carried out in a Dutch hospital with two locations: a level 1 trauma centre with ±52,000 ED patient visits per year and a level 3 emergency department with ±22,000 ED patient visits per year. Both emergency departments treat adults as well as children. We included all walkouts who left the emergency department before or immediately after triage during November 1, 2010 and February 28, 2011 as identified by daily review of the patient records. Patients who left against medical advice after being treated were excluded as they have a different pathology [11], higher emergent hospitalization rates and higher triage levels compared with patients who leave without treatment [12].

Variables, collected from the hospitals’ database and retrieved manually from the patients’ medical records for all patients included in this study, were based on previous walkout research. Variables collected from the hospitals’ database included arrival time (day, evening, or night shift) [7,13-15], age [3,7,15], sex [15], arrival transport mode (ambulance or not) [7,14], referral source (self-referred or non-self-referred) [14] and waiting time [7,14].
Variables retrieved manually from the patients’ medical records and the hospitals’ database were ‘having a GP’, ‘having a health insurance’ [3,14,16], the number of ED visits [3] and admissions in the previous 12 months, crowding index, triage level [13] and target time to treatment [7].

Waiting time was defined as leaving time minus arrival time for walkouts and treatment time minus arrival time for patients who stayed for treatment. Crowding index was defined as the number of patients presenting within the same hour and in the hour before the ED visit of a patient [17]. Triage levels were assigned to patients according to the Manchester Triage System: immediate (level 1), very urgent (level 2), urgent (level 3), standard (level 4) and non-urgent (level 5) [18]. For the analysis, level 1 was combined with level 2 and level 4 was combined with level 5 because of small numbers of patients with level 1 and 5.

In the second phase of the study, a telephonic interview was conducted 3-8 days after the ED visit to assess a walkouts’ reason for leaving prematurely and to enquire whether they had obtained medical care elsewhere after leaving the emergency department. Verbal consent was obtained at the beginning of the semi-structured interview. A maximum of five attempts at different times were made to contact each walkout. All telephone calls were made by the ED social worker, using a sheet with standardised set of open-ended questions, on the basis of previous research [19]. Walkouts were asked their reason for LWBS, perceived waiting time, what could have prevented them from leaving and whether they had sought any medical care after leaving the emergency department. If participants indicated that they had not obtained medical care but still needed medical care, the social worker advised the appropriate service to them according to protocol (e.g., return to the emergency department, go to their GP or pharmacy). The social worker wrote down the exact answers of the participants on the sheet. Categorisation of the themes was performed by two researchers (RCL. and MCL) working independent of each other. If no agreement between the two researchers was noted in categorisation, the case was reviewed by a third researcher (NL) and assigned to the category on which two of three researchers agreed.

The dataset analysed did not contain individual identifiers to ensure anonymity of subjects. The regional medical research ethics committee and the institutional review board approved the study; no participant informed consent was necessary.
Statistical analysis
All variables were compared between walkouts \((n = 169)\) and a random sample of patients who stayed for treatment \((n = 338)\), to detect a weak to moderate association (odds ratio \((OR) \approx 1.5\)) between the variable and walkout, with 80% power (see the Results section).

The independent impact of patient and visit characteristics on the presence of walkout was analysed using logistic regression, adjusting for the other variables. Adjusted ORs are provided with their 95% confidence intervals (CIs) to indicate the likelihood of walkout for each explanatory variable adjusted for the other variables. A final model was constructed using a backward elimination procedure. The calibration and overall discriminative capacity of the final model were assessed using the Hosmer-Lemeshow test and the area under the receiver operating characteristic curve [20].

Responses to the questions used in the telephonic interview were summarised using simple descriptive statistics. Differences between the patients who were interviewed and the patients who were not interviewed were analysed using \(t\) tests (age, crowding index) and \(\chi^2\) tests (sex, triage levels, self-referral).

Data were analysed using PASW (Predictive Analytics Software, version 18, Chicago, Illinois, USA).

RESULTS

Number and triage status of walkouts
During the study period, 16,590 patients registered for care in the level 1 emergency department and 7,190 patients in the level 3 emergency department, totalling 23,780 patients. There were 169 patients (0.7%) who left without treatment (walkouts): 0.89% of the level 1 ED patients and 0.29% of the level 3 ED patients. The average observed daily walkout rate was 1.4 walkouts over the 4-month observation period. The 169 walkout patients were compared with a random sample of 338 patients who stayed for treatment. With this number of patients, we could statistically detect an OR for walkout of 1.40.

Sixty-four (38%) walkouts left before triage. Target times to treatment had elapsed for 57 walkouts at the moment of leaving (54% of the triaged walkouts \((n = 105)\)). For patients who stayed for treatment, target times to treatment had elapsed for 61 patients (19% of the triaged patients who stayed for treatment, \(n = 322\)) at the start of their treatment. Walkouts were more often standard/non-urgent patients: 74.3% of the walkouts compared with 48.1% of the patients who stayed were triaged standard/non-urgent.
**Risk factors for walkout**

Table 1 shows the adjusted OR and 95% CI of each predictor of walkout. Arriving during the evening and night (OR 2.14, 95% CI 1.23 to 3.70 and OR 4.40, 95% CI 2.00 to 9.67, respectively) or during crowded conditions (OR 1.06, 95% CI 1.01 to 1.10) was significantly associated with walkout. Age, sex, ambulance arrival, having a GP, being uninsured, number of ED visits and number of hospital admissions of the patient in the previous year were not significant in our model. The odds of walkout increased significantly when the patient was self-referred (OR 2.81, 95% CI 1.46 to 5.41) and when allocated triage a standard/non-urgent triage level (OR 5.53, 95% CI 1.82 to 16.79). The Hosmer-Lemeshow goodness-of-fit test $P$ value was 0.09. Accuracy of the model as obtained by the receiver operating characteristic area under the curve was 0.74 (95% CI 0.69 to 0.79).

**Table 1. Predictors of walkout**

<table>
<thead>
<tr>
<th>Arrival time</th>
<th>Walkouts $^a$ (n = 169)</th>
<th>Patients who stayed for treatment $^a$ (n = 338)</th>
<th>Adjusted odds ratio $b$ (95% CI)</th>
<th>Adjusted odds ratio (95% CI), final model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day shift</td>
<td>50 (29.6)</td>
<td>153 (45.3)</td>
<td>Reference</td>
<td>Reference</td>
</tr>
<tr>
<td>Evening shift</td>
<td>88 (52.1)</td>
<td>133 (39.3)</td>
<td>1.97 (1.12, 3.46)</td>
<td>2.14 (1.23, 3.70)</td>
</tr>
<tr>
<td>Night shift</td>
<td>31 (18.3)</td>
<td>52 (15.4)</td>
<td>4.00 (1.76, 9.08)</td>
<td>4.40 (2.00, 9.67)</td>
</tr>
<tr>
<td>Age (mean, SD)</td>
<td>30.70 (18.5)</td>
<td>40.1 (22.8)</td>
<td>0.99 (0.98, 1.00)</td>
<td>-</td>
</tr>
<tr>
<td>Sex, male</td>
<td>93 (55.0)</td>
<td>165 (48.8)</td>
<td>1.10 (0.67, 1.80)</td>
<td>-</td>
</tr>
<tr>
<td>Arrival with ambulance</td>
<td>8 (4.7)</td>
<td>63 (18.6)</td>
<td>1.05 (0.31, 3.58)</td>
<td>-</td>
</tr>
<tr>
<td>Self-referred</td>
<td>151 (89.3)</td>
<td>200 (59.2)</td>
<td>2.58 (1.12, 5.95)</td>
<td>2.81 (1.46, 5.41)</td>
</tr>
<tr>
<td>Registered with a GP</td>
<td>139 (82.2)</td>
<td>301 (89.1)</td>
<td>1.67 (0.83, 3.38)</td>
<td>-</td>
</tr>
<tr>
<td>Uninsured</td>
<td>14 (8.3)</td>
<td>17 (5.0)</td>
<td>1.05 (0.38, 2.94)</td>
<td>-</td>
</tr>
<tr>
<td>ED visits in the previous year (mean, SD)</td>
<td>1.06 (2.0)</td>
<td>1.09 (2.2)</td>
<td>1.06 (0.93, 1.21)</td>
<td>-</td>
</tr>
<tr>
<td>Hospital admissions previous year (mean, SD)</td>
<td>0.24 (0.9)</td>
<td>0.59 (2.1)</td>
<td>0.92 (0.68, 1.24)</td>
<td>-</td>
</tr>
<tr>
<td>Crowding index $^c$ (mean, SD)</td>
<td>16 (7)</td>
<td>14 (7)</td>
<td>1.06 (1.01, 1.10)</td>
<td>1.06 (1.01, 1.10)</td>
</tr>
<tr>
<td>Triage level</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immediate and high urgent</td>
<td>4 (3.8)</td>
<td>57 (17.7)</td>
<td>Reference</td>
<td>Reference</td>
</tr>
<tr>
<td>Urgent</td>
<td>23 (21.9)</td>
<td>110 (34.2)</td>
<td>2.26 (0.70, 7.28)</td>
<td>2.34 (0.74, 7.37)</td>
</tr>
<tr>
<td>Standard and non-urgent</td>
<td>78 (74.3)</td>
<td>155 (48.1)</td>
<td>5.17 (1.65, 16.21)</td>
<td>5.53 (1.82, 16.79)</td>
</tr>
</tbody>
</table>

* Model based on 427 observations due to missing values on triage level

$^a$ Number of subjects (%) except otherwise indicated

$^b$ Adjusted for other variables by logistic regression, OR > 1 indicate an increased risk of walkout.

$^c$ The number of patients presenting within the same hour and in the hour before the ED visit of a subject
Reasons for leaving without treatment
Of the walkouts, 90 (53.3%) were contacted by telephone, consented to be interviewed and completed the survey. Seventy-nine (46.7%) patients were not contacted: 46 patients had an incorrect or no telephone number listed, 14 patients were not reached, four patients could not be interviewed because of language barriers, one patient was admitted to the hospital and 12 patients had already revisited the emergency department before they were reached by phone. Another two patients refused to participate. No notable differences in arrival time, age, sex, self-referral, crowding index and triage level were found between the patients who were interviewed and the patients who were not interviewed (data not presented).

Figure 1 shows the reported reasons for leaving without treatment. The most-cited reason for leaving (61.1%) was waiting time, followed by dissatisfaction because of lack of information about the waiting time (8.9%) and mistaking triage for treatment (8.9%). Two patients left because they were brought to the emergency department by ambulance against their will, both after an epileptic seizure.

Of the 90 walkouts interviewed, 73 answered the question about their waiting times before leaving; the remaining 17 were unsure. The median actual waiting time for walkouts was 88 minutes (range 1-332 minutes). The median perceived waiting time was 60 minutes (range 1-420 minutes).
Table 2 shows that most patients simply wanted to be helped sooner (46.6%) to prevent them from leaving. Sixteen patients mentioned more than one intervention: quicker help, more information about the reason of waiting and whether it was actually necessary to wait for a doctor. Although it is ED policy to keep patients fasted until their diagnosis is certain in case they need surgery, four patients claimed that having food and drinks available would have increased the amount of time they would have been willing to wait.

Table 2. Factors patients reported that might have prevented them from leaving without treatment (n=90)

<table>
<thead>
<tr>
<th>Factor</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Getting help quicker by ‘adding more doctors’</td>
<td>42 (46.7)</td>
</tr>
<tr>
<td>More than one intervention needed (such as quicker help, or more information about the waiting time and about the reason for waiting)</td>
<td>16 (17.8)</td>
</tr>
<tr>
<td>Information about the waiting time</td>
<td>11 (12.2)</td>
</tr>
<tr>
<td>Comfort measures (analgesics, a better chair, a separate room)</td>
<td>10 (11.1)</td>
</tr>
<tr>
<td>Catering service in the waiting room</td>
<td>4 (4.4)</td>
</tr>
<tr>
<td>Improved communication during triage for patients with language barriers</td>
<td>4 (4.4)</td>
</tr>
<tr>
<td>Arranging parental consent for minors by telephone</td>
<td>2 (2.2)</td>
</tr>
<tr>
<td>Prescription of medication during triage</td>
<td>1 (1.1)</td>
</tr>
</tbody>
</table>

Walkouts’ medical care needs

Twelve (7.1%) walkouts returned to the emergency department on their own initiative within 3 days for the same complaint or its direct consequences; one patient was subsequently hospitalised for deep vein thrombosis of the left leg and a pulmonary embolus.

Table 3 summarises the medical care needs, if any, after leaving. Forty-seven (52.2%) out of the 90 walkouts who had a follow-up interview sought medical care within 3 days after leaving the emergency department. Eighteen patients went to their GP, 14 patients went to another hospital and nine patients sought specialist care within the hospital. The six patients in the ‘Other’ category were patients seeking help from a dentist, pharmacy, or a midwife.

Table 3. Medical care needs of walkouts (n=90)

<table>
<thead>
<tr>
<th>Walkouts that did seek medical care</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GP</td>
<td>18 (20.0)</td>
</tr>
<tr>
<td>Emergency department of another hospital</td>
<td>14 (15.6)</td>
</tr>
<tr>
<td>Outpatient clinic within the same hospital</td>
<td>9 (10.0)</td>
</tr>
<tr>
<td>Other (dentist, pharmacy, midwife)</td>
<td>6 (6.7)</td>
</tr>
<tr>
<td>Walkouts that did not seek medical care</td>
<td>43 (47.8)</td>
</tr>
<tr>
<td>Medical problems had spontaneously resolved</td>
<td>19 (21.1)</td>
</tr>
<tr>
<td>Advised by ED social worker to go to the GP</td>
<td>16 (17.8)</td>
</tr>
<tr>
<td>Invited back to the emergency department by ED social worker</td>
<td>4 (4.4)</td>
</tr>
<tr>
<td>Advised by ED social worker to go to the pharmacy</td>
<td>4 (4.4)</td>
</tr>
</tbody>
</table>
Of the remaining 43 patients who did not seek medical care within 3 days, 19 had medical problems that resolved spontaneously and the remaining 24 patients indicated having persisting medical problems needing care. The ED social worker advised 16 of them to go to their GP, four patients were invited to return to the emergency department and four patients were advised to go to a pharmacy for prescription-free drugs (Table 3).

DISCUSSION

We observed a walkout rate of about 1-2 patients every day over 4 months. Target times to treatment had elapsed for more than half of the triaged walkouts at the moment of leaving. Independent predictors of leaving without treatment included arriving during the evening or night or during crowded conditions, being self-referred and lower urgency triage allocation. Waiting time was the main reason for leaving. Strategies addressing long waiting times are required, especially targeting the high risk groups such as the urgent or high urgent walkouts (over one-quarter of the triaged walkouts). A substantial part of the interviewed walkouts who perceived a need for medical care, were helped by our social worker in finding appropriate care, indicating that it is useful to follow-up on walkouts.

Published percentages of walkouts vary from 0.06% to 20% [3-5,15] depending on the definition for example, with or without including patients leaving the examination room [4,21]. Our walkout rate (0.7%) was relatively low compared with international data, probably because ED crowding is milder in the Netherlands compared with many other countries [10]. However, target times to treatment elapsed for 54% of the walkouts and 38% of the walkouts left before triage, suggesting that crowding issues did occur during our study. Our triage system, which includes blood draw requests, radiographs and nurse-driven pain medication prescription, may prevent some patients from leaving prematurely [4,19]. The opposite may also occur: eight patients did not wait for treatment because they thought that the triage was the treatment. The latter implies the necessity of better communication during triage.

In line with other studies, our walkouts on average had lower urgency triage levels [4,8]. In some studies, walkouts were younger [3,22] and more likely to be male [13,15,22,23], but we found no effect of age and sex.

Walkout patients may be at risk for poor health outcomes. About 7% of the walkouts revisited the emergency department within 3 days for the same complaint. Although others report hospitalization rates of walkouts of ±4-11% [17,23], in our study only one (0.6%) walkout patient needed hospital admission. Whether this admission could have been prevented if the patient would have stayed during the first ED presentation is unclear.
Follow-up interview with the walkouts

In line with other reports, the main reason for patients to walkout in our study was waiting time [15,19]. Displaying the approximate waiting time for various triage categories in the waiting area may be helpful to prevent patients from leaving [13], although the opposite might also occur: patients leaving when they see the displayed long waiting time. Eleven patients mentioned that information about waiting time would have prevented them from leaving and another 16 mentioned waiting time among other interventions. Initiatives to address elapsed target times to treatment, such as expanding nursing staff and double triage covering, are the key in preventing patients from leaving before treatment.

Limitations

First, we were unable to contact about half of the walkouts, despite five attempts. A sizable number did not have any details or incorrect details and thus could not be contacted, which calls for improvements in the registration process. No notable differences were found in patient characteristics between participants and nonparticipants, making it less likely that the findings were subject to no response bias. However, it is possible that patients with psychosocial distress were over-represented in the group of non-responders.

We may also have missed admissions or ED revisits to one of the other hospitals in the non-responders. Many responders had ongoing symptoms and either sought care or were helped with finding the appropriate care. However, the absence of a control group from patients who did wait to be seen and experience ongoing symptoms limits the value of this finding.

Second, there is no criterion measure for crowding [24]. The method used, counting the number of patients registered during the hour of registration and the hour before, represents only one aspect of ED crowding. It does not account for the intensity of care needed for the patients at the emergency department, for example, patients waiting to be admitted. Future studies should determine to what extent crowding affects the frequency of patients leaving without treatment using validated crowding measurements [25].

Third, leaving time of the walkouts was set at the time that the patient was called by the triage nurse and not being present in the waiting room. This measure results in an overestimation of the actual waiting times of the walkouts.

The fourth limitation is related to data that were not captured in this study, such as ethnicity and socioeconomic status, both known to have an impact on LWBS [5,26]. Unfortunately, this information is not routinely entered in the hospital information system.
Finally, data were collected at only two emergency departments; thus, findings may not be generalizable to other emergency departments because of social and cultural differences. However, for the two emergency departments in our study, the inclusion of emergency department (level 1 vs. level 3) in the modelling was not associated independently with the walkout rate and did not alter the associations presented (results not shown).

**CONCLUSION**

Independent predictors of leaving without treatment included arriving during the evening or night or during crowded conditions, being self-referred and lower urgency triage allocation. Most walkouts leave because of the perceived waiting time. A small but significant proportion of ED patients lack required timely medical treatment. As a matter of risk management, it might be useful to follow-up on the walkouts to be able to refer them to appropriate care.
REFERENCES


