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# How do emergency physicians make discharge decisions?

Lisa A Calder,<sup>1</sup> Trevor Arnason,<sup>2</sup> Christian Vaillancourt,<sup>1</sup> Jeffrey J Perry,<sup>1</sup> Ian G Stiell,<sup>1</sup> Alan J Forster<sup>3</sup>

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<sup>1</sup>Department of Emergency Medicine, University of Ottawa, Ottawa, Ontario, Canada

<sup>2</sup>Department of Epidemiology and Community Medicine, University of Ottawa, Ottawa, Ontario, Canada

<sup>3</sup>Department of Medicine, University of Ottawa, Ottawa, Ontario, Canada

## Correspondence to

Dr Lisa A Calder, The Ottawa Hospital, Civic Campus, 1053 Carling Ave., F658, Box 685, Ottawa, ON, Canada K1Y 4E9; [lcalders@ohri.ca](mailto:lcalders@ohri.ca)

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## ABSTRACT

**Background** One of the most important decisions that emergency department (ED) physicians make is patient disposition (admission vs discharge).

**Objectives** To determine how ED physicians perceive their discharge decisions for high-acuity patients and the impact on adverse events (adverse outcomes associated with healthcare management).

**Methods** We conducted a real-time survey of staff ED physicians discharging consecutive patients from high-acuity areas of a tertiary care ED. We asked open-ended questions about rationale for discharge decisions and use of clinical judgement versus evidence. We searched for 30-day flagged outcomes (deaths, unscheduled admissions, ED or clinic visits). Three trained blinded ED physicians independently reviewed these for adverse events and preventability. We resolved disagreements by consensus. We used descriptive statistics and 95% CIs.

**Results** We interviewed 88.9% (32/36) of possible ED physicians for 366 discharge decisions. Respondents were mostly male (71.9%) and experienced (53.1% >10 years). ED physicians stated they used clinical judgement in 87.6% of decisions and evidence in 12.4%. There were 69 flagged outcomes (18.8%) and 10 adverse events (2.7%, 95% CI 1.1 to 4.5%). All adverse events were preventable (1 death, 4 admissions, 5 return ED visits). No significant associations occurred between decision-making rationale and adverse events.

**Conclusions** Experienced ED physicians most often relied on clinical acumen rather than evidence-based guidelines when discharging patients from ED high-acuity areas. Neither approach was associated with adverse events. In order to improve the safety of discharge decisions, further research should focus on decision support solutions and feedback interventions.

## INTRODUCTION

The disposition decision to admit or discharge a patient is one of the most important decisions made during a patient's encounter with the emergency department (ED). Every year in Canada, there are an estimated 15.8 million visits to EDs.<sup>1</sup> Of these, 80% of patients are discharged home or to assisted living.<sup>1</sup> The discharge decision occurs in an environment of time pressure and ED crowding. If a discharge decision error is made, it could place patients at risk for adverse outcomes.

Our previous research has shown 8.5% of patients triaged to high-acuity areas of the ED suffer adverse events (adverse outcomes related to healthcare management).<sup>2</sup> Half these occurred among discharged patients and 70% were preventable. Furthermore, our previous work highlighted unsafe disposition decision making as a source of

error, particularly for high-acuity patients being discharged home.<sup>2,3</sup> ED physicians receive little training on how to make the disposition decision and there is sparse data about how these decisions are made. Applied research in this area has focused on the implementation of decision rules or algorithms for narrow, predefined patient groups, such as those presenting with chest pain, children with croup, or women with pyelonephritis.<sup>4-9</sup> The issue of disposition decision making has implications for the safety of all patients who present to EDs.

The purpose of this study is to identify the factors that contribute to physicians' decisions to discharge a prospective cohort of patients from geographic high-acuity areas of the ED, and whether decision-making rationale impacts on the occurrence of adverse events.

## METHODS

### Study design

We conducted real-time qualitative interviews of ED physicians at the time of the discharge decision at The Ottawa Hospital from June to August 2008. We then followed patients prospectively for adverse outcomes. The Ottawa Hospital Research Ethics Board approved this study.

### Study population and setting

We studied the staff ED physicians practicing in the geographic high-acuity areas (Resuscitation, Emergent, Observation) of the Civic Campus ED of The Ottawa Hospital, a tertiary care academic centre in Ottawa, Canada, with 68 000 patient visits per year. Patients placed in these areas are triaged under the Canadian Triage and Acuity Scale (CTAS) as Resuscitation (1), Emergent (2), or Urgent (3).<sup>10</sup> In Canada, there are no national performance benchmark requirements for disposition decisions.

### Selection of participants and patient population

We excluded resident physicians and medical students. We did not interview physicians for decisions made for admitted patients or paediatric patients. We also excluded decisions made for patients transferred from outside centres for investigations only and not physician assessment. We included decisions made for patients who had return visits to the ED during the study period.

### Data collection

Interview shifts were scheduled to include the three peak times in high-acuity area discharges: 08:00–11:00, 14:00–17:00 and 20:00–23:00. The research assistant obtained verbal consent at the beginning of each shift to conduct the interviews



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for each consecutive patient being discharged from a high-acuity area. The research assistant reviewed the chart and abstracted predefined variables such as: patient demographics, time of registration, length of ED stay, presenting complaint, vital signs, ED physician's interpretation of ECGs and radiological investigations.

### Measurement tool

We developed our survey tool in consultation with patient safety experts. We piloted the survey for 2 weeks among a convenience sample of ED physicians and modified the questions according to the feedback we received. We used Dillman's method for interviews when administering our real-time survey.<sup>11</sup>

At the time of discharge, the research assistant asked three open-ended questions: (1) What is the basis of this discharge decision? (2) Did you use any specific criteria in making the discharge decision? (3) What is the likelihood that this patient will return to the ED for the same problem within 1 month? If physicians asked for clarification on the meaning of the questions, they were given pre-determined prompts.<sup>11</sup> The prompts for questions 1–3 were as follows: (1) Why did you decide to discharge the patient? (2) Did you use any evidence-based guidelines, clinical prediction rules or decision aids? (3) What is the likelihood that the patient will return to the ED for the same problem in the next month (low, moderate or high)? The data from the chart review and interview were directly entered into a handheld device that was synchronised to a Microsoft Access database weekly.

### Outcome measures

The primary outcomes were the most common themes for the basis of the discharge decision (question 1). The secondary outcomes were the rationale for the discharge decision in terms of use of evidence or other criteria (question 2) and the occurrence of adverse events. The responses to the first two survey questions were coded by the principal investigator using a qualitative inductive approach after all data were collected. Categories were identified from the data in an iterative fashion and were grounded in the data. The codes were then reapplied separately by the research assistant. Discrepancies were identified and discussed until consensus was reached and all responses were fitted into categorical themes.

### Adverse event assessment

Adverse events were measured using a standardised, previously piloted method.<sup>2 12–16</sup> We searched the electronic health record database for flagged outcomes in order to identify adverse events. Flagged outcomes included any patients who died, had an unscheduled admission, ED or clinic visit within 30 days. Patients with flagged outcomes that were judged to be due to progression of disease were not classified as adverse events.

Three specialty-certified attending ED physicians were trained in adverse event assessment. Reviewers were blinded to patient name, gender and treating physician. Reviewers categorised adverse events according to type, severity and preventability (see online supplementary appendix A). They used a six-point Likert submitted scale to determine their confidence in healthcare management causation of the flagged outcome (1=no evidence for management causation, 6=certain evidence for management causation).<sup>15 17–23</sup> If two out of three reviewers had a level of certainty greater than 4/6 (ie, 5/6 or 6/6), we classified the flagged outcome as an adverse event. We defined a preventable adverse event as an adverse event caused by a healthcare

management problem, such as a diagnostic issue, management issue, unsafe disposition decision or suboptimal follow-up.

### Data analysis

We described the study population and adverse event proportions using descriptive statistics. We used  $\chi^2$  tests for associations between decision rationale and: (1) physician or patient characteristics and (2) adverse events. We calculated ORs for associations between physician characteristics and adverse events.

### RESULTS

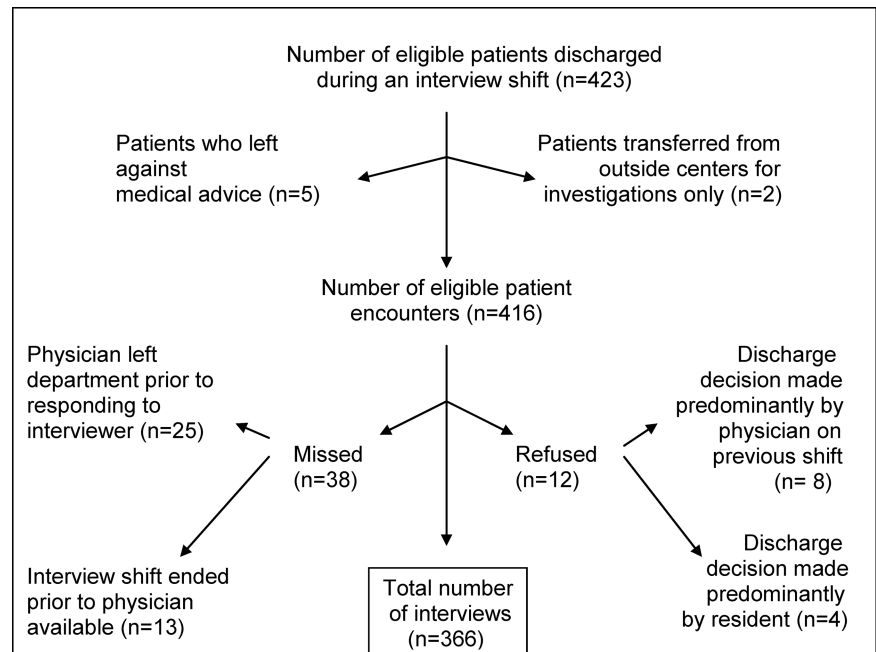
We interviewed 32/36 (88.9% response rate) ED physicians regarding 366 patient encounters. See figure 1 for reasons for exclusion. In terms of physician characteristics, the mean age was 41.4 (SD 7.0) and the majority were male (71.9%). The majority (62.5%) of ED physicians' training was the 3-year family medicine-based emergency training Canadian College of Family Physicians, Emergency Medicine Fellowship (CCFP-EM), and the remainder had 5-year emergency specialty training Fellow of the Royal College of Physicians and Surgeons of Canada (FRCPC). There was a mean of 34.3 (SD 7.9) discharges per ED physician over the course of the study. We interviewed the physicians for a mean of 10 discharges each, representing approximately 25% of the discharge decisions that each ED physician performed during that time period. Over half (53.1%) the surveyed physicians had more than 10 years of clinical experience.

Table 1 describes the patient characteristics for the 366 encounters. The mean age was 60.1, and half (54.1%) were women. The majority (94.6%) was high-acuity with Canadian Triage Acuity Scores of 1–3. The most common presenting complaints were chest pain, weakness or dizziness and abdominal pain.

For our primary outcome, the most common themes of the basis of discharge decision making were resolution or control of patient symptoms, normal results of investigations and clinical criteria such as physical examination and vital signs (see table 2).

Table 3 shows an analysis of associations between physician and patient characteristics and decision rationale. Decision rationale was grouped into two mutually exclusive categories: clinical judgment (including specific clinical criteria) and evidence-based (including specific guidelines or consulting the literature) (see online supplementary appendix B). Family physician-based ED training (CCFP-EM) was the only physician characteristic shown to be significantly associated with the use of evidence-based practices in making discharge decisions. In order to adjust for a potential clustering effect by individual physicians, we also determined the mean proportion of each decision rationale for each physician and still demonstrated a statistically significant difference. The only patient characteristic associated with use of evidence-based medicine was location in the ED. The highest-acuity areas, Resuscitation and Emergent, had the highest rates of consultation of evidence in the making of the discharge decision. Examples of evidence-based decision-making rationale included clinical decision rules such as the Canadian CT Head Rule and the Pneumonia Patient Outcomes Research Team (PORT) pneumonia score.<sup>24 25</sup> In the majority of cases, physicians stated that their decisions were made based upon clinical judgment (69.3%) and specific clinical criteria (18.3%) such as tolerating a walk test.

In terms of ED physicians' ability to predict the likelihood of a return ED visit for the same complaint, these data are presented in figure 2. The sensitivity of ED physicians for predicting adverse events was 40.0% (95% CI 12.4 to 73.0%) and the

**Figure 1** Study flow.

specificity was 63.5% (95% CI 58.2 to 68.5%). We also examined the ED physicians' ability to predict the occurrence of a flagged outcome and in this case the sensitivity was 8.9% (95% CI 3.0 to 19.6%) and the specificity was 91.5% (95% CI 87.8% to 94.4%).

The adverse event analysis is shown in table 4. Overall, there were 69 flagged outcomes out of the 366 discharge decisions (18.8%), and 10 were deemed adverse events (2.7%, 95% CI 1.1 to 4.5%). All were judged to be preventable, and the

predominant adverse event types were diagnostic and management issues. There was no statistically significant association between decision-making rationale (clinical judgment or evidence based) and the occurrence of adverse events ( $p=0.37$ ) or flagged outcomes ( $p=0.82$ ). There were also no associations between physician characteristics and the occurrence of adverse events. Please see online supplementary appendix C for descriptions of the adverse events.

## DISCUSSION

This is the first study to evaluate, in 'real time', how ED physicians make discharge decisions. An important finding of this study is that physicians perceived that the majority of their discharge decisions were made using primarily clinical judgment, and that explicit consideration of published evidence when making these decisions was rare. Furthermore, this study suggests that physician training and patient location in the ED can influence whether or not an evidence-based approach is used in discharge decision making. Physicians were poor at predicting the likelihood of returning to the ED and having an adverse event, although the numbers were small. Finally, while we detected a low proportion of adverse events there was a high degree of preventability, particularly highlighting management,

**Table 1** Characteristics of the 366 discharged patients

Patient characteristic	n=366 (%)
Mean age (SD: 20.0)	60.1
Female	198 (54.1)
Canadian triage acuity scale score	
Resuscitation (1)	1 (0.3)
Emergent (2)	184 (50.3)
Urgent (3)	161 (44.0)
Less urgent (4)	18 (4.9)
Non-urgent	2 (0.6)
Location in emergency department	
Resuscitation (monitored)	45 (12.3)
Emergent (monitored)	115 (31.4)
Observation (unmonitored stretcher)	206 (56.3)
Presenting complaints	
Chest pain	70 (19.1)
Abdominal pain	37 (10.1)
Weakness/dizziness	36 (9.8)
Shortness of breath	29 (7.9)
Trauma	27 (7.4)
Discharge diagnostic categories	
Cardiac	100 (27.3)
Gastrointestinal	49 (13.4)
Genitourinary	32 (8.7)
Trauma	31 (8.4)
Neurological	29 (7.9)

**Table 2** Most common themes of basis of discharge decision for 366 discharged patients\*

Theme†	n (%) n=366
Resolution/control of symptoms	114 (31.6)
Normal investigations	105 (29.1)
Clinical criteria	55 (15.3)
Diagnosis established	53 (14.7)
No indication for admission/suitable for outpatient treatment	53 (14.7)
Good follow-up in place	40 (11.1)
Presenting signs/symptoms not worrisome	39 (10.8)

\*Question 1: What is the basis of this discharge decision?

†Some decisions had more than one theme.

**Table 3** Association between physician and patient characteristics and rationale for 366 discharge decisions\*

Physician characteristics†	Clinical judgment	Evidence-based	p Value
Age			
>40‡	129	17	0.96
<40	179	24	
Sex			
Female	82	14	0.46
Male	234	31	
Experience			
>10 years	133	25	0.09
<10 years	183	20	
Training			
CCFP-EM	200	116	0.0007§
FRCPC	40	5	
Training clustered by physician (mean proportion)			
CCFP-EM	80.4%	22.3%	0.005
FRCPC	97.2%	7.5%	
Patient characteristics†			
Age			
>40	257	40	0.21
<40	59	5	
Sex			
Female	175	23	0.59
Male	141	22	
ED location			
Observation	189	14	0.0007§
Emergent	93	20	
Resuscitation	34	11	

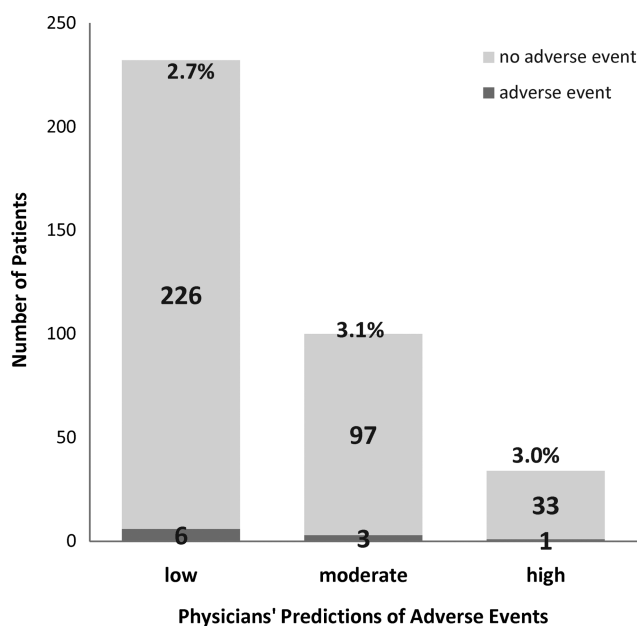
\*Question 2: Did you use any specific criteria in making the discharge decision?

†Missing values for five encounters.

‡Missing values for 17 encounters.

§Statistically significant values.

CCFP-EM, Canadian College of Family Physicians, Emergency Medicine Fellowship (3-years emergency training); ED, emergency department; FRCPC, Fellow of the Royal College of Physicians and Surgeons of Canada (5-year emergency training).

**Figure 2** Predicted likelihood of return to ED and occurrence of adverse events for 356 discharged patients\*. \*No predicted likelihoods for 10 patients. % Above each column is the proportion of adverse events for each category of prediction.**Table 4** Adverse events among 366 discharged emergency department (ED) patients

	n (%) n=366
Flagged outcomes	69 (18.8)
Adverse events	10 (2.7)
Adverse event type*	
Management issue	9
Diagnostic issue	9
Unsafe disposition decision	7
Suboptimal follow-up	3
Medication adverse effect	2
Fall	0
Procedural complication	0
Infection	0
Adverse event severity	
Death	1
Unscheduled admission to hospital	4
Unscheduled return ED visit	5
Unscheduled hospital clinic visit	0
Preventable adverse events	10/10 (100)

\*Some adverse events had more than one type; all are counted and reported here.

diagnostic and unsafe disposition issues. These findings shed light on how discharge decisions are made and identify a need for enhanced decision support.

There are several possible explanations for why ED physicians stated that their decisions were mostly based on clinical judgment. First, there is little evidence available to guide clinical decision making.<sup>26</sup> Even when evidence is available, knowledge translation is lacking in emergency medicine.<sup>27–29</sup> One barrier to effective knowledge translation that has been cited in the literature is a cultural resistance of physicians towards algorithms and perceived ‘cookbook medicine’.<sup>30–31</sup> Physicians also may disagree with the recommendations of specific guidelines, or question whether certain rules have been rigorously tested.<sup>26</sup> For those decisions for which there is evidence available, it could be that physicians are either unaware of the evidence or that they may have incorporated it into their practice but are not consciously aware that they are using it.<sup>32</sup>

We found some physician and environmental characteristics were associated with evidence-based approaches to decision making. When discharging patients from the highest-acuity areas of the ED, physicians were more likely to state that they were taking evidence into account. This could reflect the complexity and severity of medical illnesses which may have magnified the risks of making an inappropriate discharge decision. It has been shown that clinical decision rules are more likely to be adopted if they help simplify complex decisions, which may explain why evidence is used more frequently in the highest-acuity areas.<sup>29</sup> ED physicians trained via the family medicine 3-year programme (CCFP-EM) were also more likely to state they were using an evidence-based approach. We hypothesise that this is a reflection of their shorter duration of training in emergency medicine, 1 year of specialised emergency medicine training (2 years of family medicine training) in comparison with 5 years for Royal College of Physicians and Surgeons of Canada (RCPSC) trained physicians. This may offer less time for the formation of heuristics or cognitive shortcuts that are the basis of rapid clinical judgment and may lead to a more systematic approach to decision making. We did not,



however, see a decrease in perceived use of evidence-based decision making in physicians who had been working for greater than 10 years as might be expected if experience in the ED fosters greater use of clinical judgment over evidence-based medicine.<sup>33</sup>

### Limitations

There are several limitations to this study. First, emergency physicians may not have been able to describe their own decision-making processes. It has been postulated that people often cannot properly articulate exactly how they made a decision, and are unaware of the biases in their reasoning process.<sup>32</sup> It is also possible that some physicians were subconsciously integrating evidence that they had read or learned in their training and did not identify it to the interviewer. Physicians were also on shift during their interview and may have felt pressured to answer the questions quickly due to time constraints. There may have been social desirability bias such that physicians felt they needed to cite a source of evidence for their decisions. The number of adverse events is small which limits the analysis of physicians' ability to predict these events. Since our adverse event analysis was retrospective, it is subject to hindsight bias and outcome bias. And while we endeavoured to collect data on consecutively discharged patients, there is risk of selection bias if those excluded were systematically different from those we analysed.

### Clinical and research implications

Our data demonstrate that safe disposition decisions were made most of the time. The adverse events that we did detect, however, were deemed 100% preventable. This suggests that there is a need for decision support (such as clinical decision rules, clinical pathways, electronic decision support systems) to help prevent these outcomes. Furthermore, the observation that ED physicians performed suboptimally in predicting adverse events led us to consider that a feedback intervention may help enhance this capability.

### CONCLUSIONS

We found that ED physicians perceive the discharge decision for high-acuity patients most frequently as one based upon clinical judgement rather than evidence-based medicine. We also identified that although adverse events are infrequent, preventable issues are readily recognised. In order to improve the safety of discharge decisions, further research should focus on decision support solutions and feedback interventions.

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