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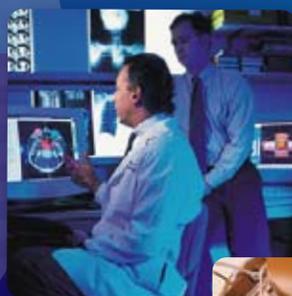


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Data Collection on Patients in
Emergency Departments
in Canada



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This report and the French version entitled *Collecter des données sur les urgences au Canada* are available on CADTH's web site.

This is the second in a series of four CADTH reports on emergency department (ED) overcrowding in Canada. The series looks at measures of ED overcrowding, and examines databases and information systems to monitor the issue. It also examines the frequency, determinants, and impacts of overcrowding. Finally, the series explores interventions used to reduce ED overcrowding and reviews which interventions are successful. An overview report on the series is available.

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Data Collection on Patients in Emergency Departments in Canada

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Brian H. Rowe helped refine the research questions, led the protocol development, supervised the data collection and analyses, wrote the manuscript, and revised the report for publication.

Kenneth Bond helped refine the research questions, assisted with protocol development, coordinated the surveys, and helped prepared the report for publication.

Maria B. Ospina helped refine the research questions, assisted with protocol development, and helped prepare the report for publication.

Sandra Blitz contributed to the data synthesis plan for the ED directors’ survey, performed quantitative data synthesis, and participated in drafting and revising the report.

Michael Schull, Douglas Sinclair, and Michael Bullard helped refine the research questions, assisted with protocol development, contributed to data collection, and revised the report for publication.

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Conflicts of Interest

Kenneth Bond, Maria B. Ospina, and Sandra Blitz disclosed no conflicts of interest. Brian H. Rowe and Michael Bullard are collaborating authors of the ED Atlas Reports in Alberta cited in this report. Michael Schull is one of the authors of the ED Atlas Reports in Ontario cited in this report. Douglas Sinclair is the Chair of the Canadian Association of Emergency Physicians (CAEP) Canadian Emergency Department Information Systems (CEDIS) Committee, and Brian Rowe and Michael Bullard are committee members. Brian Rowe and Michael Bullard have contributed to the development of eTRIAGE®.

Data Collection on Patients in Emergency Departments in Canada

Issue and Methods

Effectively monitoring emergency department (ED) overcrowding may help with intra- and inter-institutional benchmarking, as well as designing and implementing interventions to reduce overcrowding in Canadian EDs. There is a need to understand the ability of EDs and of governments to quantify ED activity and report on measures of ED overcrowding. A survey of 243 Canadian hospital ED directors was conducted (158 respondents, 65% response rate). A survey of vendors of ED information systems (EDIS); provincial and territorial governments; and the Canadian Institute for Health Information (CIHI) was also conducted.

Implications for Decision Making

- **Measures of ED overcrowding and their collection require consistency.** Inconsistent methods of acquiring, collecting, and defining data, as well as using different data elements and measures of overcrowding create a confusing picture of problems facing EDs. Measures thought to be important by those delivering ED services, such as the percentage of ED occupied by in-patients, are infrequently collected.
- **The electronic collection of relevant data to measure and address overcrowding should be considered.**

Only 39% of ED directors surveyed reported using EDIS, one way of gathering electronic ED data. As of 2005, nine (69%) provincial and territorial ministries reported collecting some form of ED data, but most (78%) obtained all or part from medical records. Alberta, Ontario, and Yukon reported having a comprehensive, jurisdictional ED database in 2005. Six jurisdictions, however, expected to change the way that they collect ED data within two years.

- **Contributions to the national data system would be valuable for policy makers.** As of 2005, Ontario and Yukon reported providing comprehensive ED data to CIHI's National Ambulatory Care Reporting System; several other provinces have individual institutions that contribute local data.
- **Electronic ED information systems are broadly available in Canada.** Seven of 11 EDIS vendors (64%) surveyed in 2005 reported that their software was in use by Canadian EDs. Most vendors provide a similar package of basic EDIS options (100% tracking and mapping functions, 91% electronic triage); however, more advanced informatics (e.g., electronic charts, discharge information, order entry) are less commonly available as part of the standard software package or are available only as add-on features.

This summary is based on a comprehensive health technology assessment available from CADTH's web site (www.cadth.ca): Rowe BH, Bond K, Ospina MB, Blitz S, Schull M, Sinclair D, Bullard M. *Data collection on patients in emergency departments in Canada.*

EXECUTIVE SUMMARY

The Issue

The lack of uniform reporting of data from hospital emergency departments (EDs) impairs the ability of institutions and governments to quantify overcrowding. The lack of standardized data collection is an under-recognized problem that has hindered attempts to study the causes, characteristics, and effects of ED overcrowding, and to develop effective solutions.

Identifying methods of valid data collection (electronic or otherwise) in EDs, pinpointing information gaps, determining the capabilities of provincial ED databases, and examining contributions to the National Ambulatory Care Reporting System (NACRS) are steps in understanding how ED activity is recorded in Canada. This knowledge may help in developing standardized approaches for measuring ED overcrowding that would allow comparisons between EDs of different sizes and capacities, and between provinces.

This is the second in a series of four CADTH reports, which together provide a comprehensive assessment of ED overcrowding in Canada.

Objectives

The first objective was to survey ED directors, and identify the common ED information systems (EDIS) being used in Canada. The second objective was to survey EDIS vendors, and determine the options available to Canadian EDs, and the level of EDIS use. The third objective was to survey provincial ministries of health and national health organizations, and determine the accessibility of provincial data on ED visits. The final objective was to identify the data elements and methods of EDIS data collection at the national level.

Methods

The survey of ED directors was a national cross-sectional study of 243 ED directors of hospitals in Canadian municipalities with a population >10,000. A 54-question survey was developed in English and French, and piloted using standard techniques. A web-based survey was distributed via an automated e-mail system, and a paper form was distributed by Canada Post. The survey of software vendors was one page long, and was sent to 11 EDIS vendors known to the Technical Expert Panel (TEP). A third survey, also one page, was sent to the coordinator of the National Ambulatory Care Reporting System (NACRS), and to provincial and territorial representatives who are knowledgeable about ED data collection. Wherever possible, a clinician or researcher familiar with the data collection was contacted to verify the information provided by government representatives. Disagreements were resolved by consensus. Data were summarized as percentages for categorical variables. Continuous data are reported as means with standard deviations (SD), or medians with interquartile ranges (IQR), when appropriate.

Results

Survey of ED Directors: Of the 243 directors contacted, 158 completed the survey (65% response rate). Overall, 39% of all ED directors reported using an electronic EDIS; no vendor has a monopoly in Canada. Triage is performed in nearly all responding EDs; electronic triage is available in 19% of these.

Survey of EDIS Vendors: All 11 EDIS vendors completed the survey (100%). Most provide a similar package of basic EDIS options: 100%, tracking and mapping functions; 91%, electronic triage. More advanced informatics (e.g., electronic charts, discharge information, order entry) are less commonly available as part of the standard software package, or are available only as add-on features.

Survey of National, Provincial, Territorial ED Data: All 13 provincial, territorial, and federal government representatives completed the survey (100%). Nine provinces and territories (69%) collect ED data, but the source of the information varies. Ontario, Québec, and Nunavut produce an annual ED report. Five provinces and territories (38%) collect triage data. Alberta, Yukon Territory, and Ontario (23%) have a comprehensive, jurisdiction-wide, population-based ED database. Two jurisdictions (Ontario, and Yukon Territory) contribute these comprehensive data to a national database. Changes in ED data collection are expected in six provinces and territories (46%) within the next two years.

Conclusions

The collection of sensible, comprehensive, reliable, and valid data by local hospitals and provincial repositories is required to better understand the problem of ED use and overcrowding in Canada. A national repository of data, with contributions from each province and territory, would be of value to policy makers, administrators, staff, and patients. The use of uniform data definitions and collection methods may also help with intra- and inter-institutional comparisons, and with the design and implementation of interventions aimed at reducing overcrowding in EDs across Canada.

GLOSSARY

Access block: situation in which patients in the emergency department requiring in-patient care cannot gain access to appropriate hospital beds within a reasonable time frame

Administrative data: data that are collected for administrative purposes, and that can be used to describe a population or sample of the population

Ambulatory Care Classification System (ACCS): provincial data repository housed at Alberta Ministry of Health and Wellness; it has collected comprehensive emergency department data for all Alberta emergency departments since 1997

Boarding of patients: situation where patients in emergency department requiring in-patient care are held in emergency department because there are no appropriate hospital beds

Canadian Association of Emergency Physicians (CAEP): national organization of emergency physicians in Canada responsible for advocacy, education, and research issues relevant to emergency practice

Canadian Emergency Department Information System (CEDIS) Committee: committee [composed of representatives from CAEP and National Emergency Nurses Affiliation (NENA)] that developed and published relevant elements to collect in ED data set

Canadian Institute of Health Information (CIHI): federal agency responsible for collecting, storing, and analyzing data from clinical data repositories (e.g., emergency departments, long-term care facilities, hospitals)

Canadian Triage and Acuity Scale (CTAS): five-level grading system used to classify severity of patient's injury or illness, and to rapidly identify those patients with urgent, life-threatening conditions, and prioritize them by acuity; also used to determine most appropriate treatment area for patients presenting to ED; developed by CAEP, CTAS is national standard for triage in Canada

Emergency Department Information System (EDIS): information system for EDs, often accompanied by glossary of data elements; these systems may be paper-based or electronic

Interquartile range: measure of statistical spread that indicates range of middle 50% of observations (i.e., range between 25th and 75th percentiles)

National Ambulatory Care Reporting System (NACRS): database of information on emergency departments maintained by Canadian Institute of Health Information; contains data mainly from Ontario emergency departments

ABBREVIATIONS

CAEP	Canadian Association of Emergency Physicians
CEDIS	Canadian Emergency Department Information System
CIHI	Canadian Institute of Health Information
CTAS	Canadian Triage and Acuity Scale
ED	emergency department
EDIS	Emergency Department Information System
EIP	emergency in-patient
EP	emergency physician
eTriage	electronic triage system
eTRIAGE®	electronic triage system developed at University of Alberta, Edmonton AB
IQR	interquartile range
LWBS	left without being seen
NACRS	National Ambulatory Care Reporting System
NENA	National Emergency Nurses Affiliation
SD	standard deviation
TEP	technical expert panel

TABLE OF CONTENTS

EXECUTIVE SUMMARY	iv
GLOSSARY.....	vi
ABBREVIATIONS	vii
1 INTRODUCTION	1
1.1 Background	1
2 THE ISSUE	2
3 OBJECTIVES	3
4 METHODS.....	3
4.1 Survey Designs	3
4.1.1 Survey of ED directors	3
4.1.2 Survey of EDIS vendors.....	3
4.1.3 Survey of national, provincial, territorial ED record collection	3
4.2 Sampling Frame and Study Participants.....	4
4.2.1 Survey of ED directors	4
4.2.2 Survey of EDIS vendors.....	4
4.2.3 Survey of national, provincial, territorial ED data	4
4.3 Survey Instruments	5
4.3.1 Survey of ED directors	5
4.3.2 Survey of EDIS vendors.....	5
4.3.3 Survey of national, provincial, territorial ED data	5
4.4 Study Protocol.....	6
4.4.1 Survey of ED directors	6
4.4.2 Survey of EDIS vendors.....	6
4.4.3 Survey of national, provincial, territorial ED data	6
4.5 Data Analysis	6
4.6 Ethics.....	6
5 RESULTS.....	7
5.1 Survey of ED Directors.....	7
5.2 Survey of EDIS Vendors	7
5.3 Survey of National, Provincial, Territorial ED Data.....	7
6 DISCUSSION.....	8
6.1 Summary of Results	8
6.1.1 Survey of ED directors	8
6.1.2 Survey of EDIS vendors.....	8
6.1.3 Survey of national, provincial, territorial ED data	8
6.1.4 Data collection variability.....	9
6.2 Study Limitations	9
6.2.1 ED director survey.....	9
6.2.2 EDIS vendor survey	9
6.2.3 National, provincial, territorial survey	10

6.3	Generalizability of Findings	10
6.4	Health Services Impact	10
6.5	Knowledge Gaps	10
7	CONCLUSIONS	11
8	REFERENCES	12

APPENDICES – available from CADTH’s web site www.cadth.ca

- APPENDIX 1: ED Directors' Responses to Survey of Emergency Department Information Systems
- APPENDIX 2: EDIS Vendor Responses to Survey
- APPENDIX 3: Responses of Provincial Ministries of Health to Administrative Databases Survey
- APPENDIX 4: Data Available to Determine Extent of ED Overcrowding in
Provinces in Canada
- APPENDIX 5: EDIS Survey
- APPENDIX 6: National, Provincial, Territorial ED Record Collection Survey

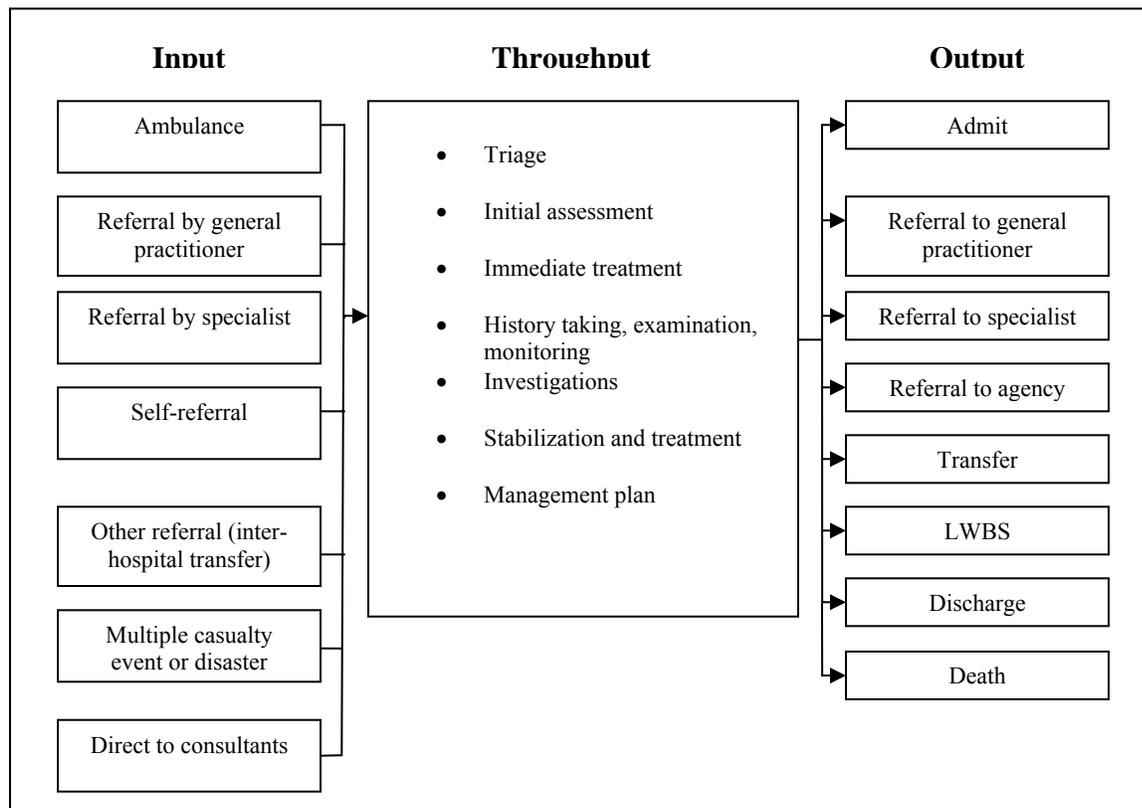
1 INTRODUCTION

1.1 Background

Every year, approximately 14 million Canadians and 110 million Americans go to emergency departments (EDs) for care. For many, the ED is the main entry into the health care system, regardless of whether they have a primary care physician. Because the ED must be available to all, and is often used to reduce pressures elsewhere in a hospital, it is most sensitive to deficiencies in the health care system. Hospital restructuring, decreased in-patient capacity, and a growing number of elderly patients and patients with complex health issues are pushing ED capacities beyond their limits, leading to overcrowding. This occurs when the demand for service exceeds the ability to provide care within a reasonable time, hindering physicians and nurses from providing optimal care.¹ Long waits for patients before evaluation,² prolonged boarding of admitted patients because of lack of in-patient beds, patients leaving without being seen (LWBS),³ diversion and gridlock of ambulances,⁴ and increased ED staff turnover are manifestations of ED overcrowding.

ED overcrowding is a growing concern in many health care systems, and a topic of frequent investigation in the biomedical literature. Overcrowding has been conceptualized in terms of patient flow into the ED, through the ED, and out of the ED (Figure 1).

Figure 1: Input-throughput-output conceptual model of ED overcrowding



(Adapted from Asplin *et al*¹ and Fatovich⁵)

The meaning of ED overcrowding varies from one organization to another, depending on the local context and the information available. The ability of local, provincial, territorial, and national organizations to quantify ED activity, and report on measures of ED overcrowding depends on good quality, easily accessible information. Little is known about the patients presenting to the ED. The importance of this information is not limited to issues of overcrowding. ED data may be used for:

- examining general epidemiological patterns regarding ED use across the population, and by groups (e.g., children, the elderly, marginalized populations)
- examining epidemiological trends regarding ED use based on presenting complaint (e.g., injury, shortness of breath, chest pain) or diagnostic grouping (e.g., heart failure, renal colic, myocardial infarction, asthma, chronic obstructive pulmonary disease)
- monitoring health problems (e.g., injury, infectious diseases, bio-terrorism).

Data sources are available to estimate census and activity in Canadian EDs. Information about ED patients in the US is sketchy, and this report reflects only the Canadian situation. ED data can be obtained from various sources.

- Mortality data are available through vital statistics, but because few patients die in the emergency setting, these data provide little insight into volume issues.
- Hospitalization data are available from the Canadian Institute for Health Information (CIHI). They are well coded, complete, and provide a snapshot of ED use across Canada. Because a small percentage of patients presenting to the ED are admitted to hospitals, and because this percentage varies according to the location and type of hospital, these data only provide information regarding the tip of the ambulatory care data pyramid.⁶
- Physician billing data can be used to determine which patients present to the ED, but coding and access restrictions limit their utility. For example, a variety of payment programs, such as salaries and contract work, and variations in physician coding, limit the usefulness of these data.
- ED data from patient charts that have been coded by nosologists, and entered into a hospital database are available.
- Population-based surveys have been done to provide estimations of ED use at a regional level. For example, the Canadian Community Health Survey (a national population survey of 39,000 people aged ≥ 12 years in Ontario, representing 9.7 million individuals, was administered between 2000 and 2001) provided data on health status, injury, risk factors, and health care use. Self-reporting biases, a lack of details about individual visits, an under-representation of children and other groups, and a lack of information on multiple visits limit the use of survey data to macroscopic analyses.
- ED patient data entered into electronic information systems by physicians and nurses are available from some hospitals, and provide the best information for understanding ED census and issues related to overcrowding.

2 THE ISSUE

The lack of consistent reporting of ED data at institutional, provincial, and national levels impairs the ability of governments to quantify ED use and overcrowding. This lack of standardized data collection has hindered attempts to study the causes, characteristics, and effects of ED overcrowding, and to develop effective solutions. It has also frustrated research efforts into ED use and quality of care, and efforts to link acute care to past and future health care in an attempt to better understand the role of EDs in delivering health services to Canadians.

Identifying methods of valid data collection (electronic or otherwise) in EDs, pinpointing information gaps, determining capabilities of provincial ED databases, and examining contributions to the National Ambulatory Care Reporting System (NACRS) are steps in understanding how ED activity is recorded in Canada. This knowledge may help in developing standardized approaches for measuring ED overcrowding that would allow comparisons between EDs of different sizes and capacities, and between provinces. A better understanding of ED use and the degree of ED overcrowding could improve communication among those who use this information for decision making.

3 OBJECTIVES

The first objective was to survey ED directors to identify the common ED information systems (EDIS) being used in Canada. The second objective was to survey EDIS vendors to determine the options available to Canadian EDs, and the level of EDIS use. The third objective was to survey provincial ministries of health and national health organizations to determine the accessibility of provincial data on ED visits. The final objective was to identify the data elements and methods of EDIS data collection at the national level.

4 METHODS

4.1 Survey Designs

4.1.1 Survey of ED directors

For the national cross-sectional study, the target population consisted of ED directors working in hospitals in Canadian municipalities with a population of >10,000 inhabitants. Institutions without a designated ED (e.g., psychiatric and rehabilitation hospitals) were excluded. A description of the methods appears in “Frequency, determinants, and impact of emergency department overcrowding in Canada.”⁷

4.1.2 Survey of EDIS vendors

For this cross-sectional study, the target population consisted of representatives of EDIS vendors who are active in Canada and EDIS vendors who are known to the Technical Expert Panel (TEP). Participants were individuals considered to be expert users of a particular software. For the study, an expert was any company employee with knowledge about the ED component of the information system software. Vendors of software without ED modules were excluded.

4.1.3 Survey of national, provincial, territorial ED record collection

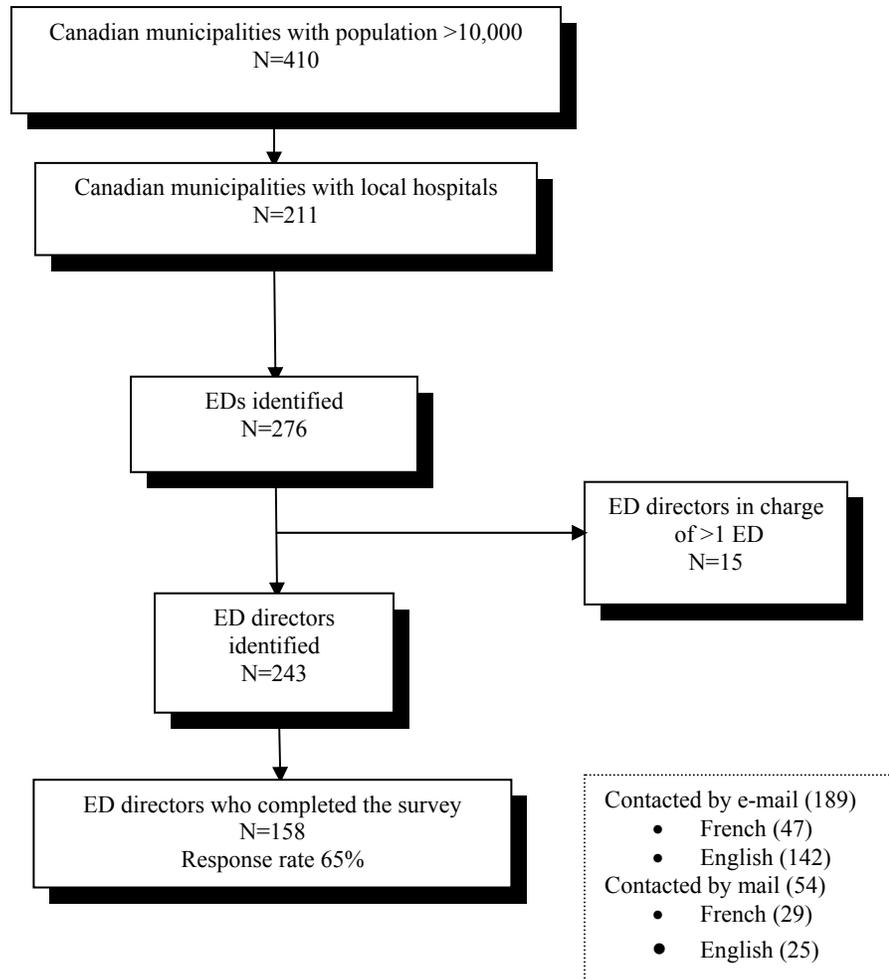
For this cross-sectional study, the target population consisted of representatives of ministries of health in each province and territory in Canada. Representatives were identified through TEP contacts, and from the NACRS housed at the CIHI. A representative of the CIHI completed a survey for the NACRS.

4.2 Sampling Frame and Study Participants

4.2.1 Survey of ED directors

The sampling frame for the study contained 243 ED directors, 15 of whom were identified as administrators of >1 ED, from 276 identified EDs across Canada (Figure 2).

Figure 2: Sampling frame development for survey of ED directors



4.2.2 Survey of EDIS vendors

Eleven EDIS vendor representatives from software companies in Canada and the US were contacted.

4.2.3 Survey of national, provincial, territorial ED data

Fourteen individual representatives were contacted: one national, 10 provincial, and three territorial.

4.3 Survey Instruments

4.3.1 Survey of ED directors

A survey questionnaire was developed in English and French, based on previous surveys, and with input from researchers and experts on ED overcrowding.⁸⁻¹² The questions were refined in consultation with the TEP, which included 12 nationally recognized experts in emergency medicine. A pilot survey of 10% of ED directors, who were chosen at random, was done to assess the feasibility, response time, and face validity of the questionnaire. No changes in content or structure were made as a result of the pre-test. After another round of discussions with the TEP, the final English version of the questionnaire was generated (Appendix 1 of another report in this series).⁷

The questionnaire consisted of 54 questions designed to collect data in eight areas of ED activity. This report discusses those results that are relevant to electronic data collection, EDIS systems, and triage. Two methods were used to deliver the questionnaires: one was a web-based survey incorporating an automated e-mail system [VS Survey (VSS), developed by VS Communications, Inc.], and the other was a paper survey sent by post. The two instruments requested identical information, with the only differences being changes of wording to allow for the differences in delivery.

4.3.2 Survey of EDIS vendors

The TEP members and the research team generated an initial list of potential questions. A pilot survey was sent to a sample of all TEP members to test the completion time and comprehensiveness of the questionnaire. Pilot respondents were asked to include any questions that they considered to be important but that had been excluded. Several changes were made at this stage before the final questionnaire was approved.

A one-page survey was sent via e-mail or fax to each EDIS vendor, and when available, a clinician who was familiar with the product. A cover letter (Appendix 5) described the background of the ED overcrowding study, and the rationale for the EDIS vendor survey. The survey requested information on the use of EDIS products in Canada, the availability of standard EDIS tools (e.g., maps, triage function), and added features (e.g., patient order entry, electronic charting).

4.3.3 Survey of national, provincial, territorial ED data

The TEP members and the research team generated an initial list of potential questions. A pilot survey was sent to a sample of all TEP members to determine the time required to complete, and determine its comprehensiveness. Pilot respondents were asked to include any questions that they considered to be important but that had been excluded. Several changes were made at this stage.

A one-page survey was sent via e-mail to each national, provincial, and territorial representative. It was also sent to an emergency clinician or researcher familiar with the database, when available. A cover letter described the background of the ED overcrowding study and the rationale for the survey. The survey (Appendix 6) requested information on the methods of ED data collection, annual reporting, triage recording, and contribution to NACRS. It also asked whether changes to information collection systems were expected in the near future. Provincial representatives were asked for information regarding data elements (Appendix 4).

4.4 Study Protocol

4.4.1 Survey of ED directors

The survey was conducted between February and June 2005. The web-based questionnaire was sent to 142 English and 47 French ED directors. Using an automated system, participants were e-mailed a link to the web survey with an introductory letter from the president of the CAEP encouraging physicians to participate. Respondents were prevented from completing the survey more than once. A paper survey was mailed to 25 English and 29 French ED directors for whom no e-mail addresses were obtained. Mailed surveys included the introductory letter with a pre-paid addressed return envelope. Three e-mail reminders and two paper reminders were sent to non-respondents during the survey period.

4.4.2 Survey of EDIS vendors

This survey was conducted between May and September 2005. The search process identified 11 potential participants from the private sector with EDIS products of interest to the Canadian marketplace. Each EDIS vendor representative was contacted by e-mail or telephone, and agreed to participate. Up to three reminders were sent.

4.4.3 Survey of national, provincial, territorial ED data

This survey was conducted between May and September 2005. The process identified 10 potential provincial representatives, three potential territorial representatives, and one national representative from the public sector with knowledge about provincial and territorial ED capabilities. Each provincial, territorial, or national representative was contacted, and agreed to participate. Up to three reminders were sent.

4.5 Data Analysis

The ED directors' survey database was imported to SAS[®] for Windows (version 8.2; SAS Institute, Cary NC) for statistical analysis; data for all other surveys were entered into Excel[®] 2003 (Microsoft Corporation, Redmond WA). All available data were summarized, regardless of the completeness of an individual survey. Data are reported as percentages for categorical variables. Continuous data are reported as means with standard deviations (SD), or as medians with interquartile ranges (IQR), if appropriate.

4.6 Ethics

This study complied with the regulations of the Health Research Ethics Board of the University of Alberta regarding investigations involving human participants. Consent to participate was assumed if the questionnaire was completed and returned. Data from participants were coded, and the anonymity of the participants was ensured when reporting group results.

5 RESULTS

5.1 Survey of ED Directors

At the close of data collection, 158 responses were obtained from ED directors who had completed the survey (65% response rate). Overall, 57 (39%) directors reported using an electronic EDIS (Appendix 1). A small number of EDIS vendors provide products to these Canadian EDs. iSOFT (21%), SIURGE (19%), Cerner (16%), and MEDITECH (18%) were the most commonly reported products used. Triage was conducted in 146 (99%) EDs; the Canadian Triage and Acuity Scale (CTAS) is the most common triage scale in use [138 (95%)]. Electronic triage was available in 28 (19%) EDs.

5.2 Survey of EDIS Vendors

All 11 EDIS vendors completed the survey (100%); seven (64%) reported that their software was in use in Canadian EDs (Appendix 2). Most vendors provide a similar package of basic EDIS options: 100% tracking and mapping functions, and 91% electronic triage. While options for triage varied, eight (73%) provided a CTAS option. More advanced informatics (e.g., electronic charts, discharge information, order entry) were less commonly available, or were available only as add-on features. Seven (64%) EDIS vendors described options available in addition to the core EDIS functions.

5.3 Survey of National, Provincial, Territorial ED Data

All 14 representatives who were contacted completed the survey (100%). Nine (69%) provinces and territories reported collecting specific ED information (Appendix 3). The source of these data varies: seven (54%) obtained all or part of their data from medical records at each site. Three (23%) produce an annual ED report (Ontario, Québec, Nunavut), and three (23%) have a comprehensive, jurisdiction-wide ED database (Alberta, Yukon Territory, Ontario).

A variety of data are collected and reported by provinces and territories (Appendix 4). All jurisdictions report the ability to determine total ED volumes, although the methods and the ease of use may vary. Outcomes are variably linked to the ED registration data; nine (69%) jurisdictions can access admission status, and eight (62%) can access death records. Five (38%) jurisdictions reported collecting triage data, three (23%) collected presenting complaint data, and two (15%) collected reason for visit data. Eight (62%) jurisdictions could provide length of ED stay for admitted patients, six (46%) could provide percentages of ED patients leaving without being seen (LWBS), six (46%) could provide length-of-stay data for discharged patients, and five (38%) could provide percentages of patients who left against medical advice (LAMA). Fewer jurisdictions reported the ability to provide any data on episodes of ambulance diversion [4, (31%)] or waiting times in the ED [3, (23%)].

Two jurisdictions (Ontario and Yukon Territory) provide comprehensive ED data to a national database (Appendix 3). At least one other jurisdiction collects these data without providing them to the CIHI. Changes are expected in ED data collection by six (46%) jurisdictions. NACRS is the sole national repository for ED information, although a low rate of contributions from the provinces (one fully; two partially, seven not at all) and territories (one fully; two not at all) limits its utility as a national database.

6 DISCUSSION

6.1 Summary of Results

The objectives of this study were to evaluate the capabilities of a representative sample of EDs in Canada for collecting data, to identify the information system options available to Canadian EDs, to examine the capabilities of provincial and territorial data collection, and to examine the provincial and territorial contributions to a national ED information repository. This study has identified deficiencies in the way that EDs collect, store, and report information at local, provincial, territorial, and national levels. There is an urgent need to place the collection of ED information on the provincial and national agenda, and to make collecting this information consistent, comprehensive, and mandatory.

6.1.1 Survey of ED directors

Among ED directors, <40% reported using an electronic EDIS. Presumably, other EDs use methods to collect information that include paper records, log books, and other methods of transferring data from charts to record formats. While 11 vendors selling EDIS tools were identified, no vendor has a monopoly in Canada. In contrast, iSOFT (HASS) is used in >70% of Australian EDs. This may be an advantage and a problem: the consistency of one EDIS may make provincial and national data collection more efficient, but a lack of competition may inhibit companies from modifying their products to keep pace with changes in EDs. This report does not support a particular EDIS vendor or system; rather, it proposes the use of standardized data collection (e.g., CEDIS and NACRS).

Triage scores, which are a measure of acuity, have been found to accurately reflect resource use, the need for consultations, the need for admission, and overall costs.^{13,14} While triage is performed in most EDs, and CTAS is the most common rating system in Canada, few ED directors (19%) report using electronic triage.

6.1.2 Survey of EDIS vendors

Most EDIS vendors provide a similar package of basic options such as tracking, mapping, and triage capabilities; more advanced informatics (e.g., electronic charts, discharge information, order entry) are less commonly available, and often only as add-on features. Even with the availability of these add-on options, few EDs reported using them. Consequently, EDs without an electronic EDIS would find it difficult to provide comprehensive data on delays in care, times in the ED, and patient care data—all data required to understand ED overcrowding and to accurately evaluate interventions to reduce it.

6.1.3 Survey of national, provincial, territorial ED data

The response from provincial and territorial representatives was complete. Nine (69%) provinces and territories reported collecting ED data, but the source of these data varies. Seven (78%) obtained all or part of their data from medical records at each site. Three (33%) produce an annual ED report. Five (38%) collect triage data; and three (Alberta, Yukon Territory, Ontario) have a comprehensive provincial or territorial ED database. Two provinces and territories (Ontario, Yukon Territory) provide comprehensive ED data to the national database. Many jurisdictions expect to change the way that they collect ED data in the near future.

6.1.4 Data collection variability

There is variability in the quality and comprehensiveness of ED data being collected among provinces and territories. Data elements, such as presenting complaint, reason for visit, and triage, are rarely recorded at the provincial level. Measures of overcrowding, as identified by research, are infrequently collected. For example, results from another report in this series showed that the most important measure of overcrowding was the percentage of the ED occupied by in-patients.¹⁵ This has been referred to as “access block” or “emergency in-patients” and is an area of emerging research activity since its description by Richardson.¹⁶ It applies to a situation where patients requiring hospitalization stay in the ED for a long time before accessing an in-patient bed. None of the provincial or territorial representatives reported that their jurisdictions collect, or are capable of reporting, this information. Other research has shown that few hospitals can provide this information easily.¹⁵

Other measures of ED overcrowding that are often reported in the literature include times waiting to be seen, total times in the ED for admitted and discharged patients, numbers of patients who LWBS or LAMA, and number of episodes of ambulance diversion. These data elements are collected by less than half of provinces and territories.

Despite the variability in the recording of ED information, well defined data elements exist in provincial databases in Alberta and Ontario, and the national database, NACRS. The CAEP has established a Canadian Emergency Department Information System (CEDIS) committee that has made recommendations regarding the appropriate data elements to be included in future electronic EDIS.^{17,18} The committee also developed a chief complaint list,¹⁹ and recommended a list of data elements to collect in the future. If the NACRS data elements are viewed as an adequate version of EDIS, the goal of efforts should be to move as quickly as possible towards their adoption.

6.2 Study Limitations

Each aspect of this report has limitations

6.2.1 ED director survey

This survey had a response rate of 65%, so there is a likelihood of a non-response bias affecting the results. An attempt was made to sample all EDs in large urban areas, but the sample may be biased because a few lesser known hospitals could have been missed.

6.2.2 EDIS vendor survey

The survey of EDIS vendors may suffer from bias, because the outcomes are self-reported, and were unverified by system testing or widespread survey confirmation. An attempt was made to verify information by comparing vendors’ responses with those of ED clinicians who had reported expertise with the EDIS software. In cases where there was a discrepancy between the two, the clinician noted that the full capabilities of the software were not being used, and the vendor’s response was accepted as accurate. While all the EDIS vendors that were identified responded, other vendors may sell products that are appropriate for the Canadian market.

6.2.3 National, provincial, territorial survey

This survey may also suffer from self-reporting biases. Because there is little to gain from this, it is unlikely that these biases occurred.

Notwithstanding these limitations, the high response rate, the comprehensive data collection, and the verification systems used to ensure valid and reliable data have produced results that accurately reflect the state of ED data collection in Canada in 2005.

6.3 Generalizability of Findings

These results appear generalizable to all parts of Canada. Responses from the vendor and government surveys may have been influenced by variations in time. For example, recent changes may be recorded incorrectly, and the dynamic nature of data collection may limit the generalizability of these findings in the future.

It can be argued that the TEP participants were mostly health care providers and researchers in urban academic hospitals. The heterogeneity of the panel members, however, added to the richness of the discussion, and may have increased the generalizability of the final EDIS and database results.

6.4 Health Services Impact

Most EDs and jurisdictions in Canada do not routinely and systematically collect enough data to monitor ED use, to report on overcrowding, and to increase understanding of how health services are used. Inconsistent methods of acquiring, collecting, and defining data, and using different data elements and different measures of overcrowding are creating a contradictory picture of the problems facing EDs. One issue surrounding information gathered from EDIS applications is the accuracy and validity of the data. The use of biometrics and sensing equipment to capture physician and nurse activity and patient contact in real time, rather than relying on staff to sign in, is one example of the way in which more accurate time measures might be collected. Addressing these concerns is part of the development of any future system. Furthermore, the development of sensible, comprehensive, reliable, and valid ED databases would guide clinicians, administrators, researchers, and policy makers in finding the causes of and solutions to ED overcrowding in Canada.

6.5 Knowledge Gaps

Findings in this report point to gaps in the collection of ED information, and suggest future directions for policy action. Electronic data collection is not being widely used in EDs in Canada. An understanding of the causes, consequences, and potential solutions to ED overcrowding can be gained only through the efficient collection of sensible, comprehensive, reliable, and valid data from local and provincial repositories. A logical next step is for each province and territory in Canada to adopt the NACRS reporting standard as a minimum, and make mandatory their contributions to a national ED database. Refining the NACRS data elements in consideration of the CAEP EDIS data elements would be another improvement. Such work would increase understanding of ED use and overcrowding, and would improve the services provided in EDs.

7 CONCLUSIONS

The collection of sensible, comprehensive, reliable, and valid data by local hospitals and provincial repositories is required to better understand the problem of ED use and overcrowding across Canada. A national repository of data, with contributions from each province and territory, would be of value to policy makers, ED administrators, staff, and patients. Using uniform data definitions and collection methods may also help with intra- and inter-institutional comparisons, and with the design and implementation of interventions aimed at reducing overcrowding in EDs across Canada.

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APPENDICES

**Available from CADTH's web site
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