Hospital Report 2003: Emergency Department Care

System Integration and Change Technical Report

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Overview

Hospital Report 2003: Emergency Department Care includes System Integration and Change indicators in addition to the more traditional areas of performance measurement. These indicators assess investments in processes that serve to improve upon the quality of care provided to patients, integrate emergency department services with other partners within the continuum of care, use information and technology to support decision-making, and ensure that their staffs' ongoing professional development is supported. Where the need for brevity in the main body of the Report dictated that details of the indicator definitions and calculations be excluded, we have provided more detailed descriptions here in the Emergency Department (ED) Care Technical Report.

The three criteria used for identifying indicators in *Hospital Report 2003: Emergency Department Care* include: relevance, feasibility, and scientific soundness. These three criteria presented challenges in developing indicators of system integration and change. Unlike the other three quadrants in this Report, there are few accepted standard measures in these areas and there are no standard data sources available to derive indicators. While some hospitals collect measures of staff skills and training, there are few measures of human capital and organizational learning that are available in existing administrative databases. Consequently, the seven ED System Integration and Change indicators reported here are based on questionnaire data specifically collected for the Report. The first six of the indicators are based on a questionnaire developed for the System Integration and Change quadrant and the last indicator is based on patients' ratings of their care in preparing to return home as reported in the Standardized Hospital Patient Satisfaction Survey (SHoPSS). The technical information for the last indicator is presented in the Patient Satisfaction Technical Report on this website.

For each System Integration and Change indicator, this Technical Report provides a detailed description of the calculations used to arrive at indicator values and performance categories for participating hospitals. In addition, data on the distribution of scores for each indicator are provided for the province as a whole, as well as for teaching, community, and small hospital peer groups.

Methodology

The following sections describe the methodology used to identify indicators for *Hospital Report 2003: Emergency Department Care*, including modification of the survey, the data collection process, and a detailed description of how each indicator was constructed.

There are seven indicators of System Integration and Change presented in *Hospital Report 2003: Emergency Department Care*. One of the indicators (Preparation for Discharge) was taken from the Standardized Hospital Patient Satisfaction Survey (SHoPSS) that was conducted to obtain indicators for the Patient Satisfaction quadrant of the Hospital Report 2003: Emergency Department Care. The questions from the SHoPSS that were used to construct the Preparation for Discharge indicator are presented in the following sections. However, for a detailed description of sampling, risk-adjustment, and weighting techniques used in the construction of this patient satisfaction indicator, please refer to the Patient Satisfaction Technical Report.

The 2003 ED System Integration and Change Survey provided data for the remaining six indicators of System Integration and Change. The methodology underlying the survey and the definition of the six indicators created from the data are described in detail. In addition, the process used to determine the performance categories in *Hospital Report 2003: Emergency Department Care* is also described in detail.

Redevelopment of the ED System Integration and Change Questionnaire

The 2003 ED System Integration and Change questionnaire was based on the 2001 ED System Integration and Change questionnaire, developed from a comprehensive literature review and refined based on guidance from an Advisory Panel. Indicators designed to measure change and integration must themselves evolve with changing times and reflect emerging innovations and practices. As such, a challenge in developing and selecting indicators in 2003 was the need to balance consistency (so that performance can be measured over time) with a staged and necessary evolution process that ensures this quadrant remains meaningful over time.

For this year, current literature was again reviewed and consultations held with ED clinicians and managers to revise and update the 2001 indicators and identify potential new indicators. Current challenges and needs relevant to the System Integration and Change perspective were identified at a 2002 Fall meeting of an Advisory Panel of clinical and management experts drawn from different EDs and hospitals across Ontario. Individual consultations were also held with these experts. A list of Advisory Panel participants is provided in Appendix E of the *Hospital Report 2003: Emergency Department Care*. In addition, a review of System Integration and Change questionnaires for Hospital Report 1999, Hospital Report 2001, and *Hospital Report 2002: Acute Care* provided another source of possible indicators. These preceding sources guided modifications to the 2001 survey as well as the development and inclusion of new questions to reflect the theme areas that required further exploration, such as expanded external partnerships, internal coordination strategies, and the use of data collected for quality improvement purposes. Due to these modifications, results presented in this report are not directly comparable to those in *Hospital Report 2001: Emergency Department Care*.

A draft questionnaire, accompanied by a document summarizing the revisions made and areas needing further clarification, was then distributed to the Advisory Panel to elicit feedback on the clarity and face and content validity of the questions developed. A two-week turnaround time was allotted to obtain the Advisory Panel's feedback that was then incorporated into the final draft of the questionnaire. The full questionnaire is available on the Hospital Report website: www.hospitalreport.ca. The questionnaire was divided into two sections – one was used to

obtain responses to questions specific to ED programs and one was used to obtain hospital-wide information (such as many issues related to human resources practices) relevant to EDs. The first of these was directed to ED managers while the second was directed to senior managers of the hospital.

Describing the Emergency Department System Integration and Change Questionnaire

In total, the survey contained five sections and these were:

- Clinical Practice Guidelines and Medical Directives
- Community Relationships and Patient Flow
- Clinical Quality Improvement
- Staff Development and Turnover
- Management and Cross-Program Coordination

These five sections encompassed 23 questions in total, six of which were designed to collect information for research purposes and to provide additional context for the Clinical Utilization and Outcomes quadrant. The remaining 17 questions, designed specifically for the System Integration and Change quadrant, were either modified or new to the 2003 questionnaire, in comparison to the 2001 questionnaire.

Describing the Survey Process

In early January 2003, the ED System Integration and Change questionnaire was mailed to 121 hospital corporations or partnerships in Ontario. The ED System Integration and Change questionnaire was accompanied by the System Integration and Change questionnaires for the Acute Care sector, the Mental Health sector (pilot questionnaire), and the corporate level. Although the survey was mailed in January 2003, managers were requested to reflect the 2001/02 fiscal year in their responses. This distribution process was centrally coordinated in collaboration with the University of Toronto research teams and the Canadian Institute for Health Information (CIHI). Such a centrally coordinated process was implemented in 2003 in efforts to streamline the survey process across the different sectors. Specifically with regards to the ED System Integration and Change questionnaire, the hospitals included those who were participating in the hospital-specific portion of *Hospital Report 2003: Emergency Department Care*, as well as those only participating in the province-wide analysis (called system-wide hospitals). System-wide hospitals were sent a survey so a picture of system integration and change activity for the province as a whole could be obtained. Multi-site hospitals were encouraged to submit one overall corporate response. Site-specific responses were aggregated to yield one corporate response based on ED patient volumes at each site. Only one hospital corporation/partnership responded by its sites.

The survey was sent to Hospital Report contacts designated by hospitals with instructions to forward discrete sections of the survey to the most appropriate person(s) in the hospital for completion. This helped to reduce the burden on any one individual and, more importantly, helped to ensure that each section was completed by the person in the hospital with the most knowledge of that area.

Hospitals were given approximately five weeks to complete the questionnaire. To maximize the survey response, reminder emails and telephone calls approximately three weeks after the initial distribution of questionnaires. Eighty-seven (87) of the eighty-nine hospitals who were participating in the hospital-specific portion of the *Hospital Report 2003: Emergency Department Care* returned a survey for a response rate of 98%. In addition, 18 of the 32 system-wide hospitals returned a survey for a system-wide response rate of 56%. The total number of questionnaires returned was 105.

Survey Response Rates By Peer Group, Region, and Participation Level

Hospital Peer Group	# Questionnaires Sent	# Questionnaires Returned	Response Rate
Small	39	26	66.7%
Community	69	68	98.6%
Teaching	13	11	84.6%
OHA Region			
1 (North)	35	25	71.4%
2 (East)	28	25	89.3%
3 (Greater Toronto Area)	18	18	100.0%
4 (South Central)	23	20	87.0%
5 (West)	17	17	100.0%
Participation Level			
Hospital-Specific	89	87	97.8%
System-Wide	32	18	56.3%
Total	121	105	86.8%

Data Quality

The indicators for this quadrant were based on hospital survey data that are inevitably subject to a "social desirability bias". That is, consciously or unconsciously, respondents may answer questions in ways that tend to favour the hospital. To counteract this bias, survey questions were constructed with a focus on specific behaviours rather than attitudes and beliefs. Nevertheless, opportunities remained for varying interpretations of questions, and some degree of interpretation may be reflected in answers to many of the questions.

In addition, questionnaires were examined on two separate occasions for missing information and for responses requiring further clarification within the question items. A standardized form outlining potential reasons for follow up was used in examination of each survey (example: a hospital checked more than one box in a question instructing to check only one box per row). When questions used to derive indicators were left blank, hospitals were prompted for answers. All questions with missing data or discrepancies were flagged for follow up. Phone calls to inquire about missing information on questions were made to the appropriate section's contact person. On occasion, sections of the survey were faxed to the contact person if a significant number of questions were left blank or had discrepancies. Deadlines, approximately one week in

length, were emphasized in order to receive the information within an appropriate timeframe. Cross-validation among comparable questions was also performed. Questions that had more than 10% of missing answers and/or elicited a number of queries from respondents about instructions for completion were not used in the construction of indicators as these were indicative of potential problems with interpretation. Only one question (related to staff turnover rates) was excluded completely due to data quality issues. Data entry was performed in collaboration with CIHI, which used a double data entry approach in a secure database that utilized a template identical to the survey. SAS statistical software was employed.

Indicator Development

Indicators were constructed by grouping together survey questions and question items. In some indicators (i.e. Indicators 2 and 4), the same survey questions were used in their composition but different items within the questions. Advisory Panel participants provided guidance to the researchers on indicator composition and the relative importance of the indicator components. Preliminary recommendations for including/excluding each question and question items in the proposed indicators were distributed to the Advisory Panel for feedback and discussion at a face-to-face meeting held in May 2003. These preliminary recommendations were based on the distributions and quality of responses and individual hospital feedback. Further, simple statistical analyses were performed to verify the alignment of internal correlations within response items in the same question with the intended theme of the question. At the Advisory Panel meeting in May, survey questions were discussed and group consensus sought regarding which questions and question items should be included in each indicator and how they would be scored.

In addition, the Advisory Panel provided advice on questionnaire item weights to be used in aggregating the items into indicators. To ensure consistency in the generation of weights, a set of general guiding principles for weighting the relative importance of each questionnaire item in an indicator was established. The principles and the corollary questions for consideration are outlined as follows:

- Balanced Content: There are a number of different priority areas that are part of each indicator. The overall weighting for one indicator should not be skewed towards one priority area. It is important to have balance among the priority areas in order to appropriately represent all areas. Does a bias exist towards a given priority area or indicator theme?
- Appropriateness for Different Hospital Types: Some priority areas may be more reflective of performance or practice at specific types of hospitals (teaching, community, small). The overall weighting of each indicator should not be biased to one hospital type over another. Is the indicator element representative of a theme that all Emergency Departments face, regardless of type?
- Data Quality: Higher weightings should be given to questions that were well understood by hospitals, where the majority of hospitals were able to provide data (i.e. few missing values), and where other attributes of data quality are strong. Would the highlighted data quality issues have significant impact on the interpretation of results?
- Degree of Evaluation/External Validity: It is important to put more weight on priority areas that have a high degree of robustness in measurement. Is the reported information

reflective of data that Emergency Departments have confidence in collecting and analyzing?

- Degree of Implementation: In weighting an indicator, consideration may be given to the selection of attributes based on the distribution of hospital responses (i.e. it may be preferable to underweight or drop areas where almost all hospitals have widely adopted a practice or where almost no hospitals have adopted it). Do the results exhibit a good range of frequencies and distribution of results to allow for meaningful interpretation?

A visual analogue scale, using visual representation of the questions making up a given indicator, was employed to elicit a weight for each of the questions. For each indicator, Advisory Panel members were provided with the proposed scoring methodology and the associated general principles for each question making up the indicator. A separate form was provided that included a pre-measured line on which Advisory Panel members were asked to draw a vertical line to represent the importance of each question within the indicator relative to the other questions. In general, the more principles that an item satisfied in comparison to another item, the higher the weight assigned. A greater amount of space allotted to a question corresponded to a greater amount of importance or "weight" of that question to the indicator as a whole. The question number was placed in the appropriate space. The final weight assigned to each question making up an indicator was calculated using the mean of the weights suggested by each of the Advisory Panel members. As such, indicators were developed by calculating a raw score for each question and then based on the advice of the Advisory Panel, each of these questions were weighted to make up the final indicator score. SAS software was utilized for data management and analysis.

The content of the 2001 and 2002 SHoPSS were very similar. As such, the calculation of the Preparation for Discharge indicator developed in Hospital Report 2001: Emergency Department Care remains unchanged in the 2003 Report. Please refer to the Patient Satisfaction Technical Report for more information.

The six indicators generally reflect one of four major themes: protocol use, internal and external stakeholder coordination, information use, and health human resources. As the survey on which the data was derived was modified this year, a direct comparison between this year's data and data from the previous Hospital Report: Emergency Department Care is not possible.

All indicators are out of a denominator of 10. To calculate the indicator score, each question must first have its score converted out of a denominator of 10 and then multiplied by the specified weighting for the question.

Indicator Score =

$$\left\{\left[\frac{\text{Hospital Question Score}}{\text{Maximum Question Score}} \times \text{Question Weight}\right] + \left[\frac{\text{Hospital Question Score}}{\text{Maximum Question Score}} \times \text{Question Weight} + \ldots\ldots\right]\right\} \times 10$$

A detailed description of the ED System Integration and Change survey questions and associated point allocations used in indicator development are provided below.

Indicator 1: Use of Standardized Protocols

The Use of Standardized Protocols indicator was constructed to reflect the extent to which EDs are developing and using clinical practice guidelines and medical directives in a broad range of relatively common conditions.

Question 1: EDs were asked to indicate the extent to which clinical practice guidelines were developed and used in the ED between April 1, 2001 and March 31, 2002 for 21 items, out of which 12 items were selected based on the distributions of responses and Advisory Panel input. For instance, if over 70% of Ontario EDs were not using guidelines for a given condition, then this was excluded for the purpose of calculating the indicator. The 12 items included: asthma/COPD, pneumonia, stroke, chest pain, acute myocardial infarction, ankle trauma, emergency oral contraception, sexual assault, domestic violence, deep vein thrombosis, febrile infant, and croup. For each condition, EDs were asked to check one of seven response options:

Question 1 Response Options	Point Allocation	Maximum Points	Question 1 Weighting
Service not offered at our hospital	0	24	47.1%
Service offered but no guideline existed for this population by March 31, 2002	0		
Guidelines were in the early stages of development for this population by March 31, 2002	0		
Guidelines were developed but not yet implemented by March 31, 2002	1		
Guidelines were developed and few (<25%) patients were cared for using the guideline	2		
Guidelines were developed and some (25-74%) patients were cared for using the guideline	3		
Guidelines were developed and few (75+%) patients were cared for using the guideline	4		

To account for EDs that did not have a given service or have volumes to support a given guideline, we chose to calculate the score for Question 1 based on the top six guidelines EDs had points for; this represents 50% of the selected conditions. As such, the total point allocation for Question 1 was 24 points.

Question 2: EDs were asked to indicate the extent to which medical directives were developed and used in the ED between April 1, 2001 and March 31, 2002 for 17 items, out of which nine items were selected based on the distributions of responses and Advisory Panel input. For instance, if over 70% of Ontario EDs were not using medical directives for a given condition, then this was excluded for the purpose of calculating the indicator. The nine items included: asthma/COPD, pneumonia, fever, stroke, chest pain, acute myocardial infarction, anaphylactic shock reaction, abdominal pain, extremity injury. For each condition, EDs were asked to check one of five response options:

Question 2 Response Options	Point Allocation	Maximum Points	Question 2 Weighting
Service not offered at our hospital	0	10	52.9%
Service offered but no medical directive existed for this population by March 31, 2002	0		
In the early stages of medical directive development for this population by March 31, 2002	0		
Guidelines were developed but not yet implemented by March 31, 2002	1		
Guidelines were developed and implemented by March 31, 2002	2		

To account for EDs that did not have a given service or have volumes to support a given medical directive, we chose to calculate the score for Question 2 based on the top five medical directives EDs had points for; this represents just over 50% of the selected conditions. As such, the total point allocation for Question 2 was 10 points.

Provided is an example of how the overall Indicator 1 score was calculated for Hospital X.

Example Step 1:
For Question 1, when choosing the top six points assigned to the clinical conditions presented in the question, Hospital X received 18 points out of a possible total 24 points. To calculate the contribution of this question to the indicator score, divide the hospital's score (18) by the total possible points (24) and then multiply by the specified weighting (47.1%). The result is 0.353.

Example Step 2:
For Question 2, when choosing the top five points assigned to the clinical conditions presented in the question, Hospital X received five points out of a possible total 10 points. To calculate the contribution of this question to the indicator score, divide the hospital's score (5) by the total possible points (10) and then multiply by the specified weighting (52.9%). The result is 0.265.

Example Step 3:
To calculate Hospital X's Indicator 1 score, add the results from the component questions and multiply by 10 {(0.353 +0.265) X 10}. The result is 6.18 out of a maximum indicator score of 10.

Indicator 2: Coordination of Patient Flow

The Coordination of Patient Flow indicator was constructed to reflect the degree to which EDs are engaged in different strategies that facilitate the management of patient flow.

Question 9: EDs were asked to indicate the extent to which they have developed or used strategies to address the patient flow issues between April 1, 2001 and March 31, 2002. Points were given for the following strategies: clinical decision units or observation medicine beds/units, rapid admission units/teams, urgent care clinics, medical outpatient follow-up clinics, early intervention clinics, bed allocation policies, and a designated ED patient flow coordinator. For each strategy, EDs were asked to check one of four response options:

Question 9 Response Options	Point Allocation	Maximum Points	Question 9 Weighting
This service/strategy was not available between April 1, 2001 and March 31, 2002	0	14	38.75%
This service/strategy was in the early stages of development between April 1, 2001 and March 31, 2002	1		
This service/strategy was being developed during April 1, 2001 and March 31, 2002	2		
This service/strategy was being used between April 1, 2001 and March 31, 2002	3		

The total point allocation for Question 9 was 14 points.

Question 22: EDs were asked a) to what extent a committee and/or mechanism existed that included a given activity as part of its mandate and b) if the committee existed, whether it included only ED staff membership or if it included staff membership from different program areas within the hospital. The time period was April 1, 2001 and March 31, 2002. For each strategy, EDs were asked to check one of three response options in Part A and one of two response options for Part B:

Question 22 Response Options	Point Allocation	Maximum Question Score	Question 22 Weighting
Part A: Activity		8	61.25%
We did not meet around this issue between April 1, 2001 and March 31, 2002	0		
We had ad hoc meetings to address specific issues/concerns between April 1, 2001 and March 31, 2002	1		
We had a formalized committee/mechanism with this mandate between April 1, 2001 and March 31, 2002	2		
Part B: Committee Membership			
The committee/mechanism involved ED staff membership only between April 1, 2001 and March 31, 2002	No points allocated		
The committee/mechanism also involved staff membership from different program areas within the hospital between April 1, 2001 and March 31, 2002	No points allocated		

Points were given for the following activities if they were part of the committee/mechanism's mandate: utilization review/management, development of clinical practice guidelines and/or medical directives, improving the transfer of patients and case information outside of the hospital and development of policies and procedures regarding coordination of patient flow across programs within the hospital *or* improving the transfer of patient flow within the hospital. The total point allocation for Question 22 in this indicator was 8 points. (Note that different response items within Question 22 were also used in the calculations for Indicator 4).

Indicator 3: Working with Other Health Care Partners

The Working with Other Health Care Partners indicator was constructed to reflect the extent to which EDs were directly engaged in initiatives with other health care partners and agencies in their communities.

Question 4: EDs were asked if they had been involved in the following collaborative activities with their community between April 1, 2001 and March 31, 2002:

Question 4 Response Items	Point Allocation if Checked Up to a Maximum of 2 Points	Maximum Points	Question 4 Weighting
Obtaining community input and feedback on ED issues through a corporate community advisory committee	0.5	2	25.8%
Obtaining community input and feedback through community participation on ED committees (e.g. ED community advisory committee; ED patient services committee; ED quality committee; ED accreditation committee, etc.)	0.5		
Obtaining community input and feedback for specific issues through mechanisms such as focus groups or interviews	0.5		
Working with community providers to recognize the importance of end-of life decisions/advanced directives	0.5		
Participating in community-based injury surveillance monitoring and prevention activities	0.5		
Participating in community-based advocacy for the prevention of domestic violence	0.5		
Participating in community education related to the "appropriate" use of EDs	0.5		

If an ED checked the response option that none of the above activities applied, the point allocation was 0 points. The total point allocation for Question 4 was 2 points.

Question 5: EDs were asked to indicate if they were engaged in collaborative activities with each of six selected specialty programs: Regional Geriatric Program; Regional Stroke Program, Regional Trauma Program, Community Mental Health Program, Child Health Program, Palliative Care Program. For each of the programs, EDs had to check one of three response options (point allocation provided in brackets): these programs were not available/accessible to out ED between April 1, 2001 and March 31, 2002 (0); we were not engaged in any activities with these programs between April 1, 2001 and March 31, 2002 (0); we were engaged in activities with these programs between April 1, 2001 and March 31, 2002 (0.5). To minimize penalizing EDs that may not have had these programs accessible or available to them, we chose to calculate the score for Question 5 based on the two programs EDs had the best points for; this represented just over 30% of the selected programs. As such, the maximum score for Question 5 was 1 point. Weighting of Question 5 was 15.0%.

Question 6: Points were assigned if EDs indicated that they were engaged in the following common collaborative practices with Community Care Access Centers (CCACs) between April 1, 2001 and March 31, 2002:

Question 4 Response Items	Point Allocation if Checked Up to a Maximum of 1 Point	Maximum Points	Question 4 Weighting
Worked with CCACs to understand why patients were "sent" to the ED as a back-up for in-home care (e.g. breakdown in in-home services, no access to community physicians, etc.)	0.5	1	22.5%
Worked with CCACs to develop strategies to prevent ED visits in the event of the breakdown of in-home services that lead to ED visits	0.5		
Worked with CCACs to ensure appropriate referrals were made to the CCAC intake-case managers	0.5		
Working with community providers to recognize the importance of end-of life decisions/advanced directives	0.5		
Involved CCAC staff in planning and/or evaluation of ED services as they relate to the community and the hospital	0.5		

If an ED checked that it was not engaged in any activities with CCAC staff, the point allocation was 0 points. The total point allocation for Question 4 was 1 point.

Question 7: EDs were asked to indicate if they were engaged in the following collaborative activities in efforts to enhance access to patient care:

Question 7 Response Items	Point Allocation	Maximum Points	Question 7 Weighting
Worked with local family physicians to increase office hours and/or on call access	1 if either response item checked	2	15.8%
Worked with local family physicians to reduce the number of direct referrals for specialist consultation within the ED			
Worked with staff in long-term care facilities to expand their scope of practice, thereby preventing/reducing transfer to an ED	1		

If an ED checked that it was not engaged in any of the above activities, the point allocation was 0 points. The total point allocation for Question 7 was 2 points.

Question 8: EDs were asked to indicate if they were engaged in the following common collaborative practices with local ambulance providers/providers of emergency medical transport and services.

Question 8 Response Items	Point Allocation if Checked Up to a Maximum of 2 Points	Maximum Points	Weighting
Examination of ambulance diversion times	0.5	2	20.9%
Development of strategies for non-urgent patient transfers	0.5		
Examination of critical bypass policies	0.5		
Examination of trauma patient flow protocols	0.5		
Improvement of data collection and data sharing capabilities	0.5		
Standardization of the reporting process between ambulance attendants/paramedics and ED staff	0.5		
Standardization of communications technology to better track and communicate movement	0.5		
Development of strategies for the care of patients who cannot be immediately unloaded	0.5		
Education/in-service initiatives	0.5		

If an ED checked that it was not engaged in any of the above activities, the point allocation was 0 points. The total point allocation for Question 8 was 2 points.

Indicator 4: Health Human Resources

The Health Human Resources indicator was constructed to reflect the efforts made by EDs to support staff training and education, and the mechanisms that facilitate discussion of issues regarding quality of work life and recruitment and retention.

This indicator was scored based on responses to two questions in the 2003 Emergency Department System Integration and Change Survey. A third question, posed in the 2003 Corporate System Integration and Change Survey (aimed more at the senior management level with instructions to have the most appropriate person in the hospital respond), was originally supposed to be included in the indicator calculation. This question had asked EDs to indicate the extent to which EDs had access to permanent staff roles in the hospital between April 1, 2001 and March 31, 2002. Due to a data quality issues involving questionable interpretations of the response options as well as a number of missing responses, this question was dropped from the Health Human Resources indicator calculation.

Question 20: EDs were asked to indicate the extent to which they had invested in ED staff and physician attendance at selected continuing education activities between April 1, 2001 and March 31, 2002. Points were given to the following nine activities: team building, conflict management, ethical issues, quality improvement, domestic violence and/or abuse, availability of community services for patients, clinical management, leadership development, and communication skills. For each activity listed for ED physicians and ED nursing staff, EDs were asked to check one of the following four response options:

Question 20 Response Options	Point Allocation	Maximum Points	Question 20 Weighting
The activity of focus was not offered to this group	0	54	55.0%
This group participated in formal in-service programs, courses, and off-site conferences for few (<25%)	1		
This group participated in formal in-service programs, courses, and off-site conferences for some (25-74%)	2		
This group participated in formal in-service programs, courses, and off-site conferences for most (75+%)	3		

The total point allocation for Question 20 was 54 points.

Question 22: EDs were asked a) to what extent a committee and/or mechanism existed that included a given activity as part of its mandate and b) if the committee existed, whether it included only ED staff membership or if it included staff membership from different program areas within the hospital. The time period was April 1, 2001 and March 31, 2002. For each strategy, EDs were asked to check one of three response options in Part A and one of two response options for Part B:

Question 22 Response Options	Point Allocation	Maximum Points	Question 22 Weighting
Part A: Activity		4	45.0%
We did not meet around this issue between April 1, 2001 and March 31, 2002	0		
We had ad hoc meetings to address specific issues/concerns between April 1, 2001 and March 31, 2002	1		
We had a formalized committee/mechanism with this mandate between April 1, 2001 and March 31, 2002	2		
Part B: Committee Membership			
The committee/mechanism involved ED staff membership only between April 1, 2001 and March 31, 2002	No points allocated		
The committee/mechanism also involved staff membership from different program areas within the hospital between April 1, 2001 and March 31, 2002	No points allocated		

Points were given for the following activities if they were part of the committee/mechanism's mandate: quality of work life, including scheduling and workload issues and identifying and evaluating. The total point allocation for Question 22 in this indicator was 4 points. (Note that different response items within Question 22 were also used in the calculations for Indicator 2).

Indicator 5: Clinical Data Collection and Dissemination

The Clinical Data Collection and Dissemination indicator was constructed to reflect the extent to which EDs are collecting and disseminating clinical outcomes and appropriateness data.

Question 10: EDs were asked: a) to what extent they collected data to improve care delivery processes between April 1, 2001 and March 31, 2002; and b) if they did collect such data, if there was evidence that these data were being used to make improvements to care delivery processes between April 1, 2001 and March 31, 2002. Points were given for the following data topics:

Data on Timing Issues
Time from triage to full nursing assessment
Time from triage to ED Physician/Nurse Practitioner initial assessment
Medical consultant telephone response time
Medical consultant in-person response time
Time from decision to admit to availability to inpatient bed/service
Time from decision to admit to transfer to inpatient bed
Fractile response (i.e. the proportion of patient visits for a given triage level where the patients were seen within the CTAS time frame defined for that level)
Data on Patient Care Management Issues
Inpatient days in the ED
Number of patients who are registered and leave without being seen by a physicians
Unscheduled return visits within 72 hours for the same/related condition
Unscheduled return visits within 72 hours that result in hospitalization
Patient/family complaints/compliments
Data on Adverse Events
Adverse events (including medication errors, drug reactions)

For each of the above data topics, EDs were asked to check one of the following response options:

Question 10 Response Items	Point Allocation	Maximum Points	Question 10 Weighting
These data were not collected between April 1, 2001 and March 31, 2002	0	32.5	52.5%
These data were collected on an ad hoc basis only to improve care delivery processes between April 1, 2001 and March 31, 2002	1		
These data were routinely collected to improve care delivery processes between April 1, 2001 and March 31, 2002	2		
If EDs indicated that they did collect the data, then they were asked to respond in one additional column that asked if there is evidence that these data were being used to make improvements to care delivery processes between April 1, 2001 and March 31, 2002	0.5		

The total point allocation for Question 10 was 32.5 points.

Question 11: EDs were asked to indicate the extent to which data collected and/or used for clinical quality improvement were shared with the various selected stakeholders between April 1, 2001 and March 31, 2002. Points were given to the following stakeholders: the Board or Board committee, senior management team, ED medical leadership, medical leadership from programs

other than ED, ED front-line staff, and committee looking at quality and/or utilization. EDs were asked to check the following responses:

Response Item	Point Allocation	Maximum Points	Weighting
Results were not shared with this group between April 1, 2001 and March 31, 2002	0	18	47.5%
Written reports were circulated but not presented to this group between April 1, 2001 and March 31, 2002	1		
Results were presented and discussed with this group (with the written report made available) between April 1, 2001 and March 31, 2002	3 if either option was checked		
Specific and relevant results were reviewed beyond the initial presentation between April 1, 2001 and March 31, 2002			

The total point allocation for Question 11 was 18 points.

Indicator 6: Clinical Information Technology

The Clinical Information Technology indicator was developed to reflect the degree to which clinical information is available electronically to care providers internal to the ED.

Question 13: EDs were asked to what extent they had the following types of electronic data available between April 1, 2001 and March 31, 2002: patient registration and ADT system, diagnostic images, diagnostic laboratory results, online transcribed reports, pharmacy/drug profiles, and clinical practice guidelines/medical directives. If checked, 1 point was assigned for each of the data types listed. The total point allocation for Question 13 was 6 points and 100% weighting was applied for this question within the indicator.

Indicator 7: Preparation for Discharge

The Preparation for Discharge indicator reflects patients' perceptions of their care in preparation for discharge. The indicator, derived from the SHoPSS, was based on patients' answers to six questions combined to create a score out of 100. The questions used to create this scale include:

1. If you had tests (blood, urine, X-ray), did someone clearly explain the results to you?
2. Do you feel the condition for which you were treated has improved at least as much as you expected?
3. Were you satisfied with how well your pain was managed?
4. When you left the Emergency Department, did you have a better understanding of your condition than when you came?
5. Before you were discharged, did the staff prepare you (or your caregiver) to manage your care at home?
6. Did the staff inform you of any needed follow up care?

Please refer to the Patient Satisfaction Technical Report for a more detailed description of the methodology used to develop this indicator.

Verification

In early July 2003, hospitals were sent the values for the ED System Integration and Change indicators to: 1) present this year's indicators and the indicator components; and 2) provide a preliminary snapshot of how they scored on the indicators. Hospitals were given two weeks to review the values and identify areas with potential concerns.

Methods Used to Determine Relative Performance in Hospital Report 2003: Emergency Department Care

Ranges

This year, a numeric range that includes a hospital's numeric score was presented in the Hospital-Specific Insert that accompanies the *Hospital Report 2003: Emergency Department Care.* The ranges were based on quintiles, that is, five groups with approximately the same number of hospitals in each group. Each of the five groups or numeric ranges for each indicator was then based on the score of the lowest scoring and highest scoring hospital in each group or quintile. The numeric ranges were simply a method for describing hospital scores for a given indicator. The method used to develop the numeric ranges was to take the distribution of scores across all hospitals participating in the hospital-specific portion of the Report.

Performance Allocations

In previous reports, hospitals were designated a performance allocation of "above average", "somewhat above average", "provincial average", "somewhat below average", or "below average" for the SIC indicators using a star system. This year, a three-point scale was used to designate performance allocations as "above average", "average" or "below average". The performance allocation for an indicator is based on the actual score for a hospital and the statistical significance of that score. It is not based on the numeric range. The performance allocation indicates whether the hospital's score is statistically different than the mean or average score. The performance of the 87 hospitals, participating in the hospital-specific report, that completed a System Integration and Change survey was considered in determining performance levels. This section describes the method for determining relative performance between organizations.

Determining relative performance among hospitals for the seven indicators derived from the 2003 ED System Integration and Change Survey and SHoPSS were based on two peer groups: teaching/community hospitals (N=73) and small hospitals (N=14). Peer group reporting was adopted because small hospitals face different challenges in carrying out many of the activities reported in the system integration and change areas. In addition, not all of these indicators apply equally to small hospitals and teaching/community hospitals. Small hospitals were defined as those hospitals funded using the JPPC Small Hospital Funding Formula. Please refer to www.jppc.org for more information.

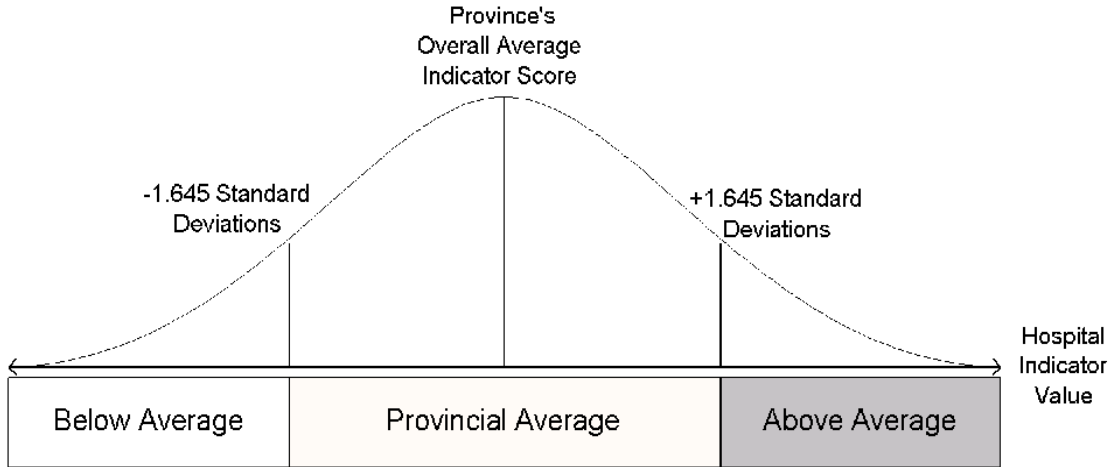
Scores for each indicator were stratified into peer groups and these distributions were tested for normality using the Shapiro-Wilk test, Kolmogorov-Smirnov test, and Lang-Secic test. These

statistical strategies provide tests for the null hypothesis that the input data values are a random sample from a normal distribution. In other words, they assess the discrepancy between the empirical distribution of observed values and the estimated hypothesized normal distribution estimated by the sample mean and standard deviation. Where applicable, the Shapiro-Wilk test was applied as it is a compromise between the more stringent Kolomogorov-Smirnov test and the more liberal Lang-Secic test.

If the indicator did not follow a normal distribution, the indicator was transformed using the power and logarithmic functions. The same normality test was performed on these transformed distributions. When more than one of the transformations resulted in a normal distribution (tested using Lang and Secic), the transformation used to allocate performance ratings was the transformation that produced the lowest value of skewness (i.e. level of asymmetry about the mean) and kurtosis (i.e. degree of peakedness in a curve).

Hospitals were allocated into three categories: "below average", “average”, and "above average", determined by the position of the hospital’s indicator value relative to the mean indicator value of its peer group. These values were reviewed to ensure meaningful differences among hospitals in the three categories. The following figure describes the method of assigning performance allocations for all hospitals relative to the distribution.

How Performance was Allocated



The criteria used to determine relative performance in each peer group is described below.

Teaching/Community Hospitals

For four of the seven Hospital Report Emergency Department Care indicators, the indicator distributions were considered normal by the Shapiro-Wilk test, while in the most extreme case (Lang-Secic) all indicators were considered to be normal. Performance levels were identified based on the three category distributions. One indicator, Clinical Data Use and Dissemination, was transformed using a power function ($x^{**2.5}$). Three other indicators, Use of Standardized Protocols, Working with Other Health Care Partners, and Clinical Information Technology, were not transformable using any form of simple mathematical equation. Consequently, we elected not

to perform any transformation on these indicators, which might otherwise render the results more difficult to interpret. Performance levels were identified based on the transformations for the respective indicators.

Small Hospitals

For small hospitals, all seven indicators were considered normal by the Shapiro-Wilk test. Performance levels were identified based on the three category distributions.

The following table shows the actual scores that correspond to 1.645 standard deviations from the mean scores that approximate these specifications when using different transformations. Hospitals with scores above or below these cut points were respectively identified as hospitals with above or below average levels of performance. For the purpose of assigning performance classifications, teaching and community hospitals were included in the same peer group and therefore the related data were presented for these two hospital groups together. Data were presented this way because: (1) there are only 11 hospitals in the teaching group and; (2) from an improvement standpoint, both types of hospitals can learn from one another.

The following tables show the cut points for the teaching/community and small hospital peer groups reported in *Hospital Report 2003: Emergency Department Care.*

Indicator Values Differentiating the Three Performance Categories for Peer Groups

Indicator	Below Average Performance Cut Off	Above Average Performance Cut Off	Peer Group Mean	Total Possible Score
Teaching & Community Peer Group				
Use of Standardized Protocols	3.50	10.00 *	7.40	10.00
Coordination of Patient Flow	4.03	9.50	6.77	10.00
Working with Other Health Care Partners Intensity of Information Use	4.97	10.00*	8.03	10.00
Health Human Resources	2.32	8.90	5.61	10.00
Clinical Data Collection and Dissemination	5.24	9.52	7.65	10.00
Clinical Information Technology	1.25	9.47	5.36	10.00
Preparation for Discharge	66.20	78.28	72.24	100.00
Small Hospital Peer Group				
Use of Standardized Protocols	0.10	10.00*	5.67	10.00
Coordination of Patient Flow	2.32	6.56	4.44	10.00
Working with Other Health Care Partners Intensity of Information Use	2.05	8.57	5.31	10.00
Health Human Resources	0.73	6.29	3.51	10.00
Clinical Data Collection and Dissemination	2.28	9.38	5.83	10.00
Clinical Information	0.325	6.58	3.45	10.00

Indicator	Below Average Performance Cut Off	Above Average Performance Cut Off	Peer Group Mean	Total Possible Score
Technology				
Preparation for Discharge	71.72	84.55	78.13	100.00

*Due to the large size of the standard deviation and the large number of maximum scores of 10, the above average performance cut-off is achieved at a score of 10.

System-Level Findings

This section provides provincial findings for the seven indicators of System Integration and Change. In addition, the data are presented for teaching, community, and small hospital EDs separately. Although only results for those hospitals participating at the hospital-specific level were presented in *the Performance Allocations section,* indicator values for all hospital-specific and system-wide hospitals that returned a survey were included in the calculation of the statistics displayed in the following summary tables. Given that the response rate for the System Integration and Change survey was 87% overall, the system-level analysis described in *Hospital Report 2003: Emergency Department Care* and here in the *Technical Summary* represents a nearly complete report on the performance of Ontario's Emergency Departments on these seven indicators of System Integration and Change.

Some Statistics Provided for Hospital Comparisons with Provincial Results

For each of the seven System Integration and Change indicators, several statistics are displayed: the valid N (number of hospitals that received a score for this indicator), the mean, and the standard deviation. In addition, the minimum score and maximum score received for each indicator are displayed along with three percentile rankings: the 25th, 50th (median), and 75th. Just as the median is the value above and below which 50% of cases fall, percentiles provide the same information for different percentages of cases. For example, the value in the 25th percentile is the value that 25% of hospitals scored at or below (and the value above which 75% of hospitals scored).

The statistics in each indicator table are displayed for all 105 hospital EDs that returned a survey, and they are also displayed for teaching, community, and small hospital groups. Combined, these statistics provide important measures of central tendency as well as detailed information about the dispersion of scores for each indicator.

Peer Group Differences

In *Hospital Report 2003: Emergency Department Care*, we have separated out teaching, community, and small hospitals in order to provide hospitals with more detailed data at the hospital group level. In reporting data at this level, it is important to clarify that data are provided for these different groups so that hospitals can situate themselves relative to their peers, not to facilitate comparisons between these two different groups.

Table 1: Use of Standardized Protocols

	All Hospitals	Small	Community	Teaching
Valid N	105	26	68	11
Mean	6.74	5.27	7.48	5.63
Std Deviation	2.80	3.24	2.29	3.12
Minimum	0	0	0	1.06
25th Percentile	5.06	2.12	5.71	3.41
Median	7.36	5.33	7.89	4.55
75th Percentile	8.94	8.43	9.41	8.94
Maximum	10	9.80	10.00	10.00

Table 2: Coordination of Patient Flow

	All Hospitals	Small	Community	Teaching
Valid N	105	26	68	11
Mean	5.98	3.86	6.56	7.42
Std Deviation	2.11	1.79	1.75	1.20
Minimum	0	0	2.30	5.70
25th Percentile	4.51	2.36	4.97	6.74
Median	6.00	3.72	6.64	7.36
75th Percentile	7.57	4.59	8.06	8.68
Maximum	9.72	7.57	9.72	9.45

Table 3: Working with Other Health Care Partners

	All Hospitals	Small	Community	Teaching
Valid N	105	26	68	11
Mean	7.21	5.07	7.85	8.35
Std Deviation	2.47	2.54	2.11	1.09
Minimum	0.65	0.65	0.75	6.17
25th Percentile	6.13	3.06	6.96	7.30
Median	8.09	4.80	8.42	8.57
75th Percentile	9.21	7.52	9.21	9.21
Maximum	10	9.48	10.00	10.00

Table 4: Health Human Resources

	All Hospitals	Small	Community	Teaching
Valid N	105	26	68	11
Mean	5.05	3.70	5.34	6.41
Std Deviation	2.14	1.86	2.10	1.46
Minimum	0.11	0.10	0.10	3.88
25th Percentile	3.78	2.35	3.88	5.11
Median	5.10	4.13	5.16	6.94

75th Percentile	6.74	5.41	6.94	7.35
Maximum	9.80	7.25	9.80	8.57

Table 5: Clinical Data Collection and Dissemination

	All Hospitals	Small	Community	Teaching
Valid N	105	26	68	11
Mean	7.13	5.96	7.49	7.72
Std Deviation	1.79	1.93	1.62	1.23
Minimum	0.81	1.70	0.81	5.04
25th Percentile	6.12	4.58	6.62	7.19
Median	7.74	6.20	7.86	8.02
75th Percentile	8.38	7.74	8.67	8.22
Maximum	9.84	8.47	9.84	9.35

Table 6: Clinical Information Technology

	All Hospitals	Small	Community	Teaching
Valid N	105	26	68	11
Mean	4.66	3.08	5.16	5.30
Std Deviation	2.57	1.93	2.56	2.67
Minimum	0	0	0	0
25th Percentile	3.33	1.67	3.33	3.33
Median	5.00	3.33	5.00	5.00
75th Percentile	6.67	3.33	6.67	8.33
Maximum	10	6.67	10.00	8.33

Table 7: Preparation for Discharge – With UHN

	All Hospitals	Small	Community	Teaching
Valid N	90	15	63	12
Mean	73.25	77.89	72.43	71.76
Std Deviation	4.24	3.86	3.80	3.02
Minimum	62.85	69.10	62.85	68.58
25th Percentile	69.93	74.64	69.61	69.38
Median	72.97	79.44	72.79	70.80
75th Percentile	75.99	80.62	74.59	73.89
Maximum	82.87	82.87	81.02	77.72

Summary and Next Steps

The changing hospital environment has created numerous challenges for Ontario EDs. Simultaneously, new technologies and growing demands for service continue to strain existing resources. The seven indicators of System Integration and Change provide a performance profile

reflecting efforts by Ontario EDs to meet these challenges. These indicators capture four broad but key areas:

- Use of information to improve services
- Internal coordination of care to improve outcomes
- Levels of ED integration with community services to enable patients to receive coordinated care before and following their hospital experiences
- Employee practices and professional development for a more productive health care team in a changing environment

The seven indicators are only a small set from a wide range of indicators necessary to fully describe efforts to improve in processes of care, information use and technology, health human resources, and coordination of care. When used in combination with the indicators from the other quadrants, these measures will assist Ontario hospitals and other stakeholders in understanding the extent to which Ontario's EDs are implementing innovative strategies in these areas. Findings in the text of *Hospital Report 2003: Emergency Department Care* suggest areas for further quality improvement initiatives that span the boundaries of an individual hospital unit to the broader system itself.