

National AE

**Supplementary material 1: Details regarding participating pediatric emergency departments**

<b>Name</b>	<b>Location</b>	<b>Emergency department (ED) census (patient visits/year)</b>	<b>Hospital admissions from the ED/year n (%)</b>
Janeway Children's Health and Rehabilitation Centre	St John's, Newfoundland and Labrador	34,307	1241 (3.6%)
Centre Hospitalier Universitaire Sainte-Justine	Montreal, Quebec	77,985	5737 (7.4%)
Children's Hospital of Eastern Ontario	Ottawa, Ontario	69,091	4327 (6.2%)
Hospital for Sick Children	Toronto, Ontario	65,210	7043 (10.8%)
Children's Hospital – London Health Science Centre	London, Ontario	33,460	2846 (8.5%)
The Children's Hospital of Winnipeg	Winnipeg, Manitoba	50,894	3652 (7.2%)
Alberta Children's Hospital	Calgary, Alberta	77355	4819 (6.2%)
Stollery Children's Hospital	Edmonton, Alberta	50,978	4904 (9.6%)
British Columbia Children's Hospital	Vancouver, British Columbia	46,706	3565 (7.6%)

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**Supplementary material 2: Telephone survey**

**ED Visits**

Since your child's Emergency Department visit on \_\_\_\_\_ (date), have you child returned to an Emergency Department?  Yes

No

OR Since our last phone call on \_\_\_\_\_ (date, have you/your child returned to an Emergency Department?)  NA

NA

Why NA?

How many visits to an emergency department have they had?  1  2  3

Visit 1: Which Emergency Department did you visit?

Visit 1: Please describe the reason for your visit:

Visit 1: Do you remember the date of this visit?

Yes  No

Visit 1: What was the date of the visit?

Visit 2: Which Emergency Department did you visit?

Visit 2: Please describe the reason for your visit:

Visit 2: Do you remember the date of this visit?

Yes  No

Visit 2: What was the date of the visit?

Visit 3: Which Emergency Department did you visit?

Visit 3: Please describe the reason for your visit:

Visit 3: Do you remember the date of this visit?

Yes  No

Visit 3: What was the date of the visit?

COMMENTS:

**Admitted to Hospital**

Since your child's Emergency Department visit on \_\_\_\_\_ (date), has your child been admitted to hospital?  Yes  No  NA

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OR

Since our last phone call on \_\_\_\_\_ (date), has your child been admitted to hospital?

Why NA?

How many times were they admitted to hospital?

 1 2 3

Admission 1: Which hospital were they admitted to?

Admission 1: Please describe the reason for the admission:

Admission 1: Do you remember the date of this admission?

 Yes  No

Admission 1: What was the date of admission?

Admission 2: Which hospital were they admitted to?

Admission 2: Please describe the reason for the admission:

Admission 2: Do you remember the date of this admission?

 Yes  No

Admission 2: What was the date of admission?

Admission 3: Which hospital were they admitted to?

Admission 3: Please describe the reason for the admission:

Admission 3: Do you remember the date of this admission?

 Yes  No

Admission 3: What was the date of admission?

**Health Professional**

Since your child's Emergency Department visit on \_\_\_\_\_ (date), has your child seen a health professional other than in the Emergency Department or in-hospital?  Yes  No  NA

OR

Since our last phone call on \_\_\_\_\_ (date) has your child seen a health care professional other than in the Emergency Department or in-hospital?

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Why NA?

How many visits with a health professional have you had?

 1  2  3

Visit 1: What type of health professional did you see?

 Family Doctor Specialist Nurse Practitioner Chiropractor Physiotherapist Other

Visit 1: If specialist, please specify:

Visit 1: If other, please specify:

Visit 1: Please describe the reason for your visit:

Visit 1: Do you remember the date of this visit?

 Yes  No

Visit 1: What was the date of this visit?

Visit 2: What type of health professional did you see?

 Family Doctor Specialist Nurse Practitioner Chiropractor Physiotherapist Other

Visit 2: If specialist, please specify:

Visit 2: If other, please specify:

Visit 2: Please describe the reason for your visit:

Visit 2: Do you remember the date of this visit?

 Yes  No

Visit 2: What was the date of this visit?

Visit 3: What type of health professional did you see?

 Family Doctor Specialist

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- Nurse Practitioner
- Chiropractor
- Physiotherapist
- Other

Visit 3: If specialist, please specify:

Visit 3: If other, please specify:

Visit 3: Please describe the reason for your visit:

Visit 3: Do you remember the date of this visit?

- Yes  No

Visit 3: What was the date of this visit?

**Problem Resolved**

Did the problem your child had on your Emergency Department visit resolve?

- Yes  No  NA

Why NA?

Can you tell me what happened?

What did you do?

**New Health Problems**

Since your Emergency Department visit, has your child had any new health problems develop?

- Yes  No  NA

OR

Since our last phone call on (date), has your child had any new health problems develop??

Why NA?

Please describe the problem(s) (i.e. when did it start? what are the symptoms?)

What do you think is/are the cause(s) of this problem(s)?

What did you do?

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For the new health problem: On a scale of 0-5 (0 = not serious at all, 5 = very serious), how seriously is this problem affecting your child's quality of life?

- 
- 
- 0
- 
- 
- 1
- 
- 
- 2
- 
- 
- 3
- 
- 
- 4
- 
- 
- 5

**Worsening Pre-existing Health Problems**

Since your/your child's Emergency Department visit, has your child had any worsening of pre-existing health problems?

- 
- Yes
- 
- No
- 
- NA

OR

Since our last phone call on (date), has your child had any worsening of pre-existing health problems?

Why NA?

Please describe the problem(s) (i.e. when did it start? what are the symptoms?)

What do you think is/are the cause(s) of this problem(s)?

What did you do?

For the worst pre-existing health problem: On a scale of 0-5 (0 = not serious at all, 5 = very serious), how seriously is this problem affecting your child's quality of life?

- 
- 
- 0
- 
- 
- 1
- 
- 
- 2
- 
- 
- 3
- 
- 
- 4
- 
- 
- 5

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*National AE***Mental Health Questions – ONLY IF PATIENT PRESENTED WITH A MENTAL HEALTH ISSUE (includes family conflict, behavioural changes, alcohol, intoxication, ingestion, anxiety, depression, etc.)**

**\*\* FOR RA ONLY\*\*** Was the child's visit due to a mental health issue?  Yes  No

Since your child's visit on \_\_\_\_\_(date) did they attempt any self-harm?

Yes  No

OR

Since our last phone call on (date) did your child attempt any self-harm?

What happened? (i.e. when, the event, injuries)

Since your child's visit on \_\_\_\_\_(date) did they attempt to harm anyone else?

Yes  No

OR

Since our last phone call on (date), did your child attempt to harm anyone else?

What happened? (i.e. when, the event, injuries)

Since our last phone call on \_\_\_\_\_(date) did anyone harm or attempt to harm your child?

Yes  No

What happened? (i.e. when, the event, injuries)

Did the child or family need to contact the police since their visit to the ED?

Yes  No

OR

Did the child or family need to contact the police since our last phone call?

What happened? (i.e. when, the event, etc.)

Did the child or family contact a mental health crisis line since their visit to the ED?

Yes  No

OR

Did the child or family contact a mental health crisis line since the last phone call?

Please elaborate:

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**\*\*Possible Adverse Events Identified by Family – Please read the following script:\*\* “For the next section, I am going to describe a possible medical scenario and ask whether or not you believe your child experienced this during their ED visit”**

**A medication problem occurs** when a medication is not given exactly as it was meant to be given. For example, a medication may be given in the incorrect amount or the patient had an allergic reaction to the medication.

Do you think a medication problem occurred or was stopped before occurring?  Yes  No  NA

Why NA?

Please describe the medication problem:

**A complication of care occurs** when there is unwanted result of treatment. For example, unexpected bleeding occurred; the patient was transferred to the intensive care unit because of a complication.

Do you think a complication of care occurred or was stopped before occurring?  Yes  No  NA

Why NA?

Please describe the complication of care:

**An equipment problem** occurs when equipment fails or is not used correctly. For example, equipment not available when needed; an intravenous line leaked or became blocked.

Do you think an equipment problem occurred or was stopped before occurring?  Yes  No  NA

Why NA?

Please describe the equipment error:

**A miscommunication between staff occurs** when members of the staff give or receive information from other staff about diagnosis, treatment, or care that is inadequate (not enough information), conflicting (information that is different from what someone else gave) or incorrect. For example a test was repeated because the original result was lost or destroyed; a test was cancelled by mistake.

Do you think a miscommunication between staff occurred or was stopped before occurring?

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*National AE* Yes  No  NA

Why NA?

Please describe the miscommunication:

**Miscommunications between staff and your family occur** when you or your family gives or receives information from staff about diagnosis, treatment or care that is inadequate (not enough information), conflicting (information that is different from what someone else gave) or incorrect. Examples: Medication instructions were not explained to you or your family.

Do you think a miscommunication between your family and staff occurred or was stopped before occurring?

 Yes  No  NA

Why NA?

Please describe the miscommunication:

**Was there any other action that** may have caused health care problems for your child? For example, the child fell off a stretcher?

 Yes  No  NA

Why NA?

Please describe the other action:

COMMENTS:

**End of Interview**

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### Supplementary material 3: Types of adverse events, clinical severity, and system response required

#### Types of adverse events

*Diagnostic issue:* documented signs, symptoms, laboratory tests or imaging not acted on or an indicated diagnostic test not ordered.

*Management issue:* suboptimal management plans despite accurate diagnosis or based on an inaccurate diagnosis.

*Unsafe disposition decision:* patient placed at unnecessary risk of experiencing death or major disability by being discharged from the ED or hospital.

*Suboptimal follow-up:* problems with follow-up arrangements lead to the development of new symptoms, unnecessary prolongation of symptoms, an unscheduled return visit to the ED or a subsequent unscheduled hospital admission (this could be due to inadequate availability of follow-up or due to inappropriate follow-up arrangements).

*Medication adverse effect:* patient experiences a symptom related to a medication regardless of whether the medication was appropriately prescribed or taken.

*Procedural complication:* patient experiences adverse consequences of a procedure.

*Nosocomial infection:* infection acquired in ED or in hospital.

#### Clinical severity of adverse events

- a) an abnormality on laboratory testing
- b)  $\leq 1$  day of symptoms
- c)  $> 1$  day of symptoms
- d) nonpermanent disability – defined as temporary impairment of function lasting less than 3 months
- e) permanent disability – defined as permanent impairment of function
- f) death

#### System response for adverse events

- a) no treatment (symptoms only)
- b) visit to lab facility or other health care facility
- c) visit to MD
- d) visit to ED
- e) medical intervention  
surgical intervention
- f) admission to hospital
- g) transfer to critical care

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**Supplementary material 4: Outcome and preventability scales**

Outcome assessment: confidence that outcome is related to health care received

1. No evidence for causation
2. Slight evidence for causation
3. Management causation <50-50 but close call
4. Management causation >50-50 but close call
5. Strong evidence for management causation
6. Certain evidence for management causation

Preventability scale: Confidence that outcome was preventable

1. Definitely not preventable
2. Probably not preventable
3. Probably preventable
4. Definitely preventable

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**Supplementary material 5: Patient characteristics and systems factors to be examined for association with the occurrence of adverse events**

<b>Patient Characteristics</b>	<b>Further Description/Categories</b>
Age	Age, in years
Sex	male/female
English or French not spoken in the home by either parent	Neither parent reports using English or French to communicate within the home
Immigration	Both parents immigrated to Canada in last five years
Pediatric Canadian Triage Acuity Scale (PedsCTAS)	Five categories: 1=resuscitation; 2=emergent; 3=urgent; 4 semi-urgent; 5=nonurgent Variable be grouped into 3 categories for analysis: (1) high acuity (resuscitation and emergent); (2) mid acuity (urgent); and (3) low-acuity (semi-urgent and nonurgent)
Disposition	Admitted or discharged
Mental health presentation	For example, depression, anxiety, substance abuse
Chronic condition	Defined as a condition needing on-going, regular follow-up or regular medication use (e.g asthma, cancer, kidney disease, congenital heart disease, diabetes)
<b>System factors</b>	<b>Further Description/Categories</b>
Length of time to see physician	Time between triage and first physician assessment
Number of ED staff physicians involved in that patient's care	Number of staff physicians that assume responsibility for care (reflects number of end-of-physician-shift hand overs for each patient); Variable divided into two categories: 1 and $\geq 2$
Location within the ED	Participating ED is divided into two areas: 'ambulatory' and 'acute' zones
Need for a consultation	Consultation by ED consultant physician of another sub-speciality (e.g.; pediatric general surgery, orthopedics, cardiology, etc.)
Level of physician initially managing patient (ED staff versus medical trainee)	Participating centre is a teaching facility and patients may be seen first by ED staff or by medical trainees (i.e.; medical students, residents, fellows); variable grouped into primary assessor 'consultant' vs 'trainee'
"After-hours" presentation	'regular hours' (8:00 to 15:49) / 'after hours' (15:49 to 7:59)
Weekday/weekend presentation of patient to the ED	'weekday' (Monday to Friday) / 'weekend' (Saturday and Sunday)

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**Supplementary material 6: Baseline characteristics for eligible, non-enrolled patients (N=1673) and comparison to enrolled patients (N=6376)**

Characteristics	Enrolled n=6376	Non-enrolled n=1673	P values
Age (years); median (IQR)	2.0 (2.0, 2.0)	2.0 (2.0, 2.0)	0.57
Sex (Female); n (%)	2906 (45.6)	755 (45.3)	0.83
Disposition; n (%)			<0.001
Admitted	413 (6.5)	122 (7.3)	
Discharged	5807 (91.1)	1365 (81.6)	
Left without being seen/against medical advice	156 (2.4)	186 (11.1)	
CTAS; n (%)			<0.001
1 - Resuscitation	36 (0.6)	14 (0.8)	
2 - Emergent	828 (13.0)	284 (17.1)	
3 - Urgent	2636 (41.4)	639 (38.5)	
4 - Semi Urgent	2660 (41.7)	652 (39.3)	
5 - Non Urgent	213 (3.3)	69 (4.2)	
Presenting complaint; n (%)			0.001
Cough/Congestion	881 (13.8)	186 (11.2)	
Fever	817 (12.8)	190 (11.4)	
Upper extremity injury	436 (6.8)	98 (5.9)	
Vomiting and/or nausea	408 (6.4)	98 (5.9)	

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**Supplementary material 7: Description of 146 triggers among 88 patients\***

Triggers	n (%)
<b>Total number of triggers</b>	146
<b>Number of each type of trigger</b>	
Catheter Infiltration/Burn	25 (17.12)
Transfusion of blood products	14 (9.59)
Abnormal levels of potassium	12 (8.22)
Transfer to higher level of care	10 (6.85)
Hypoxia	9 (6.16)
Organ removal or repair	8 (5.48)
Mental health related triggers	8 (5.48)
Any infection acquired in the hospital	7 (4.79)
Dissatisfaction with care	7 (4.79)
Drop of platelets	7 (4.79)
Unplanned surgery	7 (4.79)
Drop in hemoglobin	4 (2.74)
Intubation	3 (2.05)
ICU procedure	3 (2.05)
Positive blood culture	3 (2.05)
Heparin give	3 (2.05)
Code or arrest	2 (1.37)
Abnormal sodium level	2 (1.37)
Abnormal urea and creatinine	2 (1.37)
ICU readmission	2 (1.37)
Use of gentamicin	2 (1.37)
Cranial imaging	1 (0.68)
Extreme temperature	1 (0.68)
Failed ETT	1 (0.68)
D_dimer positive	1 (0.68)
Drop in PTT or increase in INR	1 (0.68)
Vitamin K use	1 (0.68)

\*Number of patients who had at least one trigger on medical record review.

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**Supplementary material 8: Description of 3098 flags among 1581 patients\***

Flags	n (%)
<b>Total number of flags</b>	3098
<b>Types of flags</b>	
Emergency department visit	816 (26.34)
Unresolved symptoms	620 (20.01)
Unplanned Visit to a health care professional	550 (17.75)
New health problem/symptoms	359 (11.59)
Admitted to hospital	170 (5.49)
Other	165 (5.33)
Miscommunication between family and staff	128 (4.13)
Miscommunication between staff	54 (1.74)
Mental health problems related flags	139 (4.49)
Medication problem occurred	38 (1.23)
Complication of care	28 (0.9)
Equipment problem	22 (0.71)
Medication stop problem	4 (0.13)
Equipment stop problem/ complication of care stopped	4 (0.13)

\*Number of patients who had at least one flagged outcome reported on telephone follow-up.

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