LOYOLA MEDICINE
Loyola University Health System

Illinois
Emergency Medical Services
for Children

Illinois Department of PUBLIC HEALTH

Illinois EMS for Children

Pediatric Mild Traumatic Head Injury in the Emergency Department Record Review Summary Report, 3rd-4th Quarters of 2008

Updated March 2009

Abstract

From July 2008 through January 2009, Illinois EMS for Children (EMSC) conducted a statewide quality improvement monitor regarding the assessment, management, and disposition of pediatric mild traumatic head injury in the Emergency Department. Retrospectively, participating hospitals throughout the state reviewed medical records regarding 0-15 year old patients admitted to the ED during the third and fourth quarters of 2008 (July 1 – December 31) for head injury.

A total of 3,206 record reviews were obtained from 113 Illinois area hospitals. Findings of note included the following:

- For 0-23 month old patients who received a CT scan, 68% of records documented the presence of at least one of the following *prior to CT*: emesis, loss of consciousness (LOC), focal neurological findings, evidence of skull fracture, or evidence of scalp abnormality. Smaller facilities (with 6,000 or less pediatric ED visits per year) that are located in the Chicago area (EMS Regions 7-11) had a higher percentage (75%) of such documentation when compared with other facilities.
- For the same 0-23 month old patients who received a CT scan, 19% of records with CT documented a positive finding of head trauma (e.g., signs of fracture, bleed, etc.). Larger facilities (more than 6,000 pediatric ED visits per year) located outside of the Chicago area (EMS Regions 1-6) recorded a higher percentage (25%) of positive findings when compared with other facilities.
- For 2-15 year old patients who received a CT scan, 49% of records documented the presence of at least one of the following *prior to CT*: emesis, LOC, focal neurological findings, or evidence of skull fracture. Larger facilities located outside of the Chicago area had a higher percentage (55%) of such documentation.
- For 2-15 year old patients who received a CT scan, 9% of records documented a positive finding. Larger facilities located outside of the Chicago area recorded a higher percentage (18%).
- Child abuse screening was documented in 54% of records. In addition, 17% of records documented that no child abuse screening was performed, 15% were "not documented", and 13% were considered "not applicable" by the data abstractor.

I. Results Summary

In 2008, 121 emergency departments (EDs) actively participated in the Illinois EMSC regional CQI program. Of these, 109 were recognized as PCCC, EDAP or SEDP facilities. The 121 EDs were charged with reviewing a maximum of 20 medical records in each of the 3rd and 4th quarters of 2008 regarding their management of mild pediatric head trauma (up to 10 records of patients who received a CT scan, and up to 10 more records for any head injured patient regardless of diagnostic testing).

Of the 121 facilities, 113 (93%) participated in the record review process resulting in a total of 3,206 records. After data submission, participants were provided with Web-based reports that allow comparison of their results to their region, to similar sized facilities, and to the rest of the state.

For this summary, responses were aggregated by location *and* size of facility.

Location:

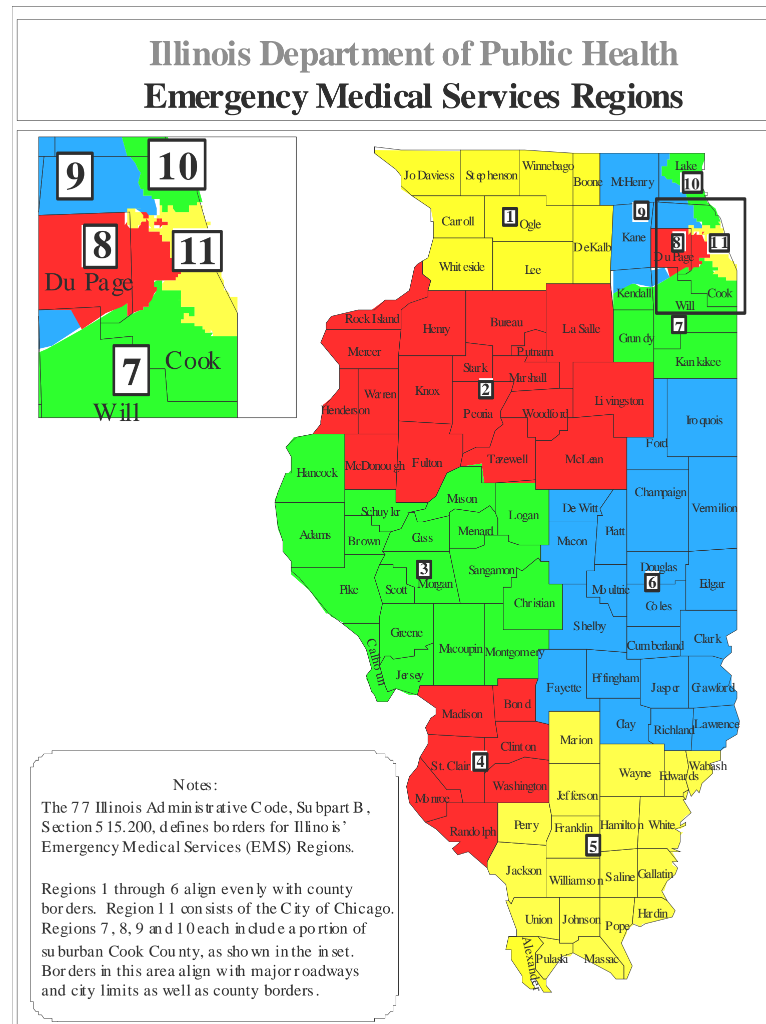
- Facilities within the Chicago and suburban areas (**54** hospitals located in Regions 7 through 11 – please see map at right) were compared with areas outside of the Chicago area (**59** hospitals located in Regions 1 through 6).

Size:

- "Larger" facilities (**59** hospitals with greater than 6,000 pediatric ED visits per year) were compared with "smaller" facilities (**54** hospitals with 6,000 or less visits).

Significant differences found in these comparisons either by location or size of facility are noted throughout this summary.

Map of EMS Regions in Illinois



Patient History

- The mode of arrival to the ED for these patients consisted of 83% walk-in, 15% pre-hospital transport, and 1% transfer.
- The time of injury was documented as occurring within the previous 24 hours in 90% of the records.
- Mechanism of injury (MOI) differed by patient age, as shown in the following table:

Table 1. Mechanism of Injury by Age Group

Mechanism of Injury	0-23 Month Olds	2-15 Year Olds
Motor Vehicle Crash	1%	6%
Bicycle Incident	0%	7%
Hit by Object	7%	20%
Sports Related	0%	13%
Fall	86%	49%
Other	5%	5%

- (Not shown in table) In addition, for 2-15 years olds, larger facilities had a higher percentage of sports injuries (15%) than smaller facilities (9%).
- For injuries in which safety equipment was applicable, 36% of records recorded safety equipment used, 40% recorded no safety equipment used, and 24% recorded that this information was not documented.

Assessment

- Patients had the following distribution by age group:
  - 0-23 months: 20%
  - 2-5 years: 29%
  - 6-15 years: 50%
  - not recorded or other: 1%
- 90% of records documented vital signs.
- 85% of records documented pain level.
- Regarding child abuse screening:
  - 54% of records documented screening was performed
  - 17% documented that no screening was performed
  - 15% were "not documented"
  - 13% were "not applicable"
  - 2% of records did not provide a response to this question
- Overall, 60% of patient records submitted for this project were for patients who received CT scans (1,932 out of 3,206 records). This percentage differed by facility size. For larger facilities, 65% of patients received CT scan. For smaller facilities, 51% of patients received CT scans.
- When CT was not ordered, the reason in 97% of records was deemed physician decision and 3% noted the reason as "other."
- A neurosurgical consultation was ordered in 6% of all cases. This percentage differed by facility size. For larger facilities, neurosurgical consultation was ordered in 8% of records. For smaller facilities, neurosurgical consultation was ordered in 3% of records.

- For records without neurosurgical consultation, the reasons given were physician decision (88%), not documented (8%), no pediatrics neurosurgical service available (2%), patient was being transferred (1%), and other (1%).

Reassessment and Discharge

- Neurological reassessment was documented in 70% of all records. This percentage differed by facility size. For larger facilities, neurological reassessment was documented in 74% of records. For smaller facilities, reassessment was documented in 62% of records.
- Discharge disposition for all patients consisted of 89% home, 6% admitted, 4% transferred, and 1% observation. This percentage differed by facility size. For larger facilities, 87% of patients went home, 9% were admitted, 3% were transferred, and 1% went to observation. For smaller facilities, 92% of patients went home, 2% were admitted, 5% were transferred, and less than 1% went to observation.
- Restricting data to the 120 patients who were transferred, the reasons given for transfer were: 53% for a higher level of care, 41% for neurosurgical consultation, 2% for a lateral transfer for CT scan, 1% for a higher level of care specifically for neuro-imaging, and 3% other.
- Discharge instructions were documented in 88% of records.

Assessments Related to CT Scan

Several data elements were captured that were relevant to CT scanned patients (i.e., elements that were considered "red flags" when assessing for potentially serious head injuries). The following results apply to the **1,932 CT records** that were submitted.

- 11% of CT records documented a "severe" mechanism of injury (defined as Motor vehicle crash - ejection, rollover, death in same passenger compartment; Fall > 5 feet; Pedestrian or unhelmeted bicyclist struck by motorized vehicle; Struck by high impact object/projectile). This percentage differed by location of facility. For facilities in the Chicago area (Regions 7-11), the value was 7%. For regions outside of the Chicago area (Regions 1-6), the value was 15%.
- 2% of CT records documented the injury as recurrent, e.g., had a similar injury within the last 12 weeks (Note: for this data element, 31% of records were submitted as "not documented").
- 31% of CT records documented abnormal behavior per a reliable parent/caregiver (e.g., mood swings, excessive sleepiness, etc.)
- 23% of CT records documented emesis within the last 24 hours.
- 22% of CT records documented loss of consciousness (LOC).
- 7% of CT records documented focal neurologic findings/deficits present (e.g., paralysis, weakness, sensory level deficit, cranial nerve deficit, etc.).
- 3% of CT records documented physical/palpable evidence of any kind of skull fracture present *prior to CT imaging* (e.g., Battle's sign, raccoon eyes, hemotympanum, CSF rhinorrhea, etc.)

- 43% of CT records documented scalp abnormality present *prior to CT imaging* (e.g., hematoma, laceration, etc.). This percentage differed by age group. For 0-23 month olds, 49% of CT records documented scalp abnormality compared to 41% for 2-15 year olds.
- 18% of CT records documented other body systems involved (e.g., bruises, suspected fractures, suspected abdominal trauma, etc.).

Aggregated Assessment Information Related to CT Scan

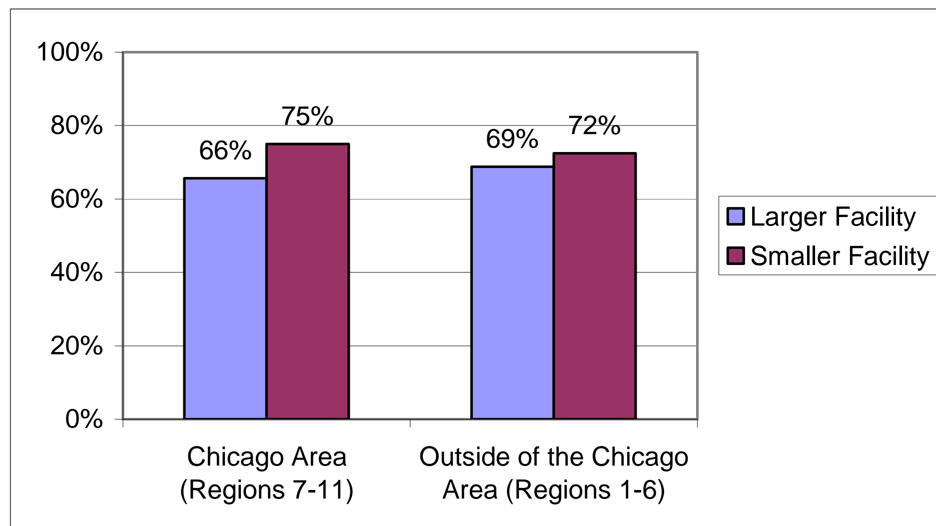
To further analyze CT scan use, some of the assessments listed above were aggregated. The aggregation was done differently for 2 distinct patient age groups, as follows:

0-23 month old patients. For 0-23 month old patients, 336 CT records were evaluated for presence of ***any of the following prior to the CT scan*****:**

- Emesis
- LOC
- Focal neurological findings
- Evidence of skull fracture
- Scalp abnormality.

- Overall, 68% of records documented at least one associated assessment finding. Slight differences were noted by both location and size of facility as shown in Figure 1. The highest percentage occurred in smaller facilities (6,000 or less pediatric ED visits per year) located in the Chicago area (Regions 7-11).

Figure 1. Percentage of CT scan records for 0-23 month olds with at least one associated assessment finding.

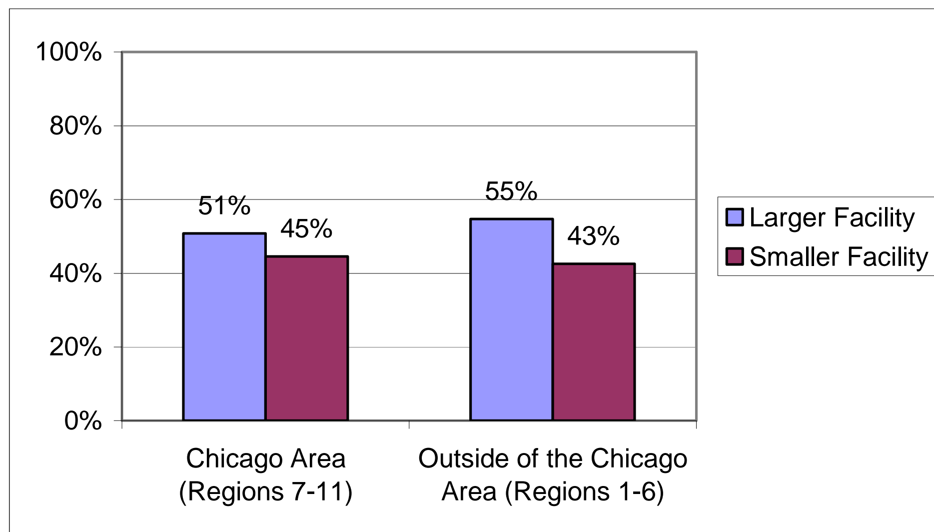


2-15 year old patients. For 2-15 year old patients, 1,583 CT records were evaluated for presence of ***any of the following prior to the CT scan*****:**

- Emesis
- LOC
- Focal neurological findings
- Evidence of skull fracture

- Overall, 49% of records documented at least one associated assessment finding. Slight differences were noted by both location and size of facility as shown in Figure 2. The highest percentage occurred in larger facilities (more than 6,000 pediatric ED visits per year) located outside of the Chicago area (Regions 1-6).

Figure 2. Percentage of CT scan records for 2-15 year olds with at least one associated assessment finding.



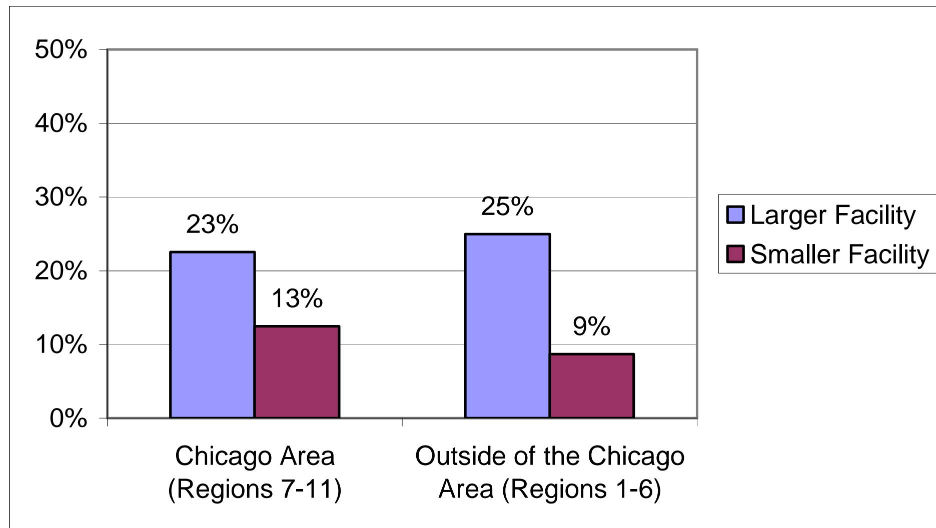
Positive CT Scan Findings

The percentage of CT records with initially "positive" CT findings/results in the ED (e.g., signs of fracture, bleed, etc.) differed by location and size of facility. For consistency, the results are shown by the same age groups used in the previous section.

0-23 month old patients. For 0-23 month old patients overall, 19% of 336 CT records had positive findings.

- The percentage differed by location and size of facility as shown in Figure 3, with the highest percentage occurring in larger facilities (more than 6,000 pediatric ED visits per year) located outside of the Chicago area (Regions 1-6).

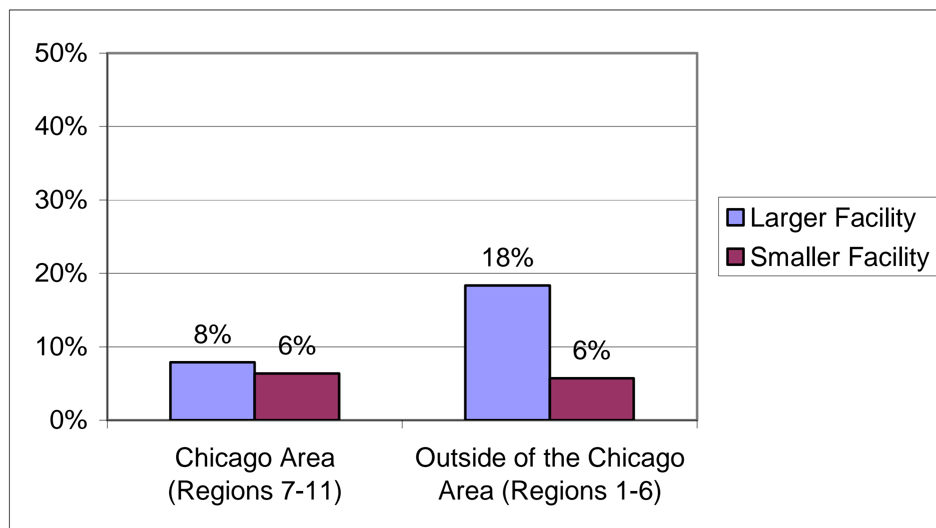
Figure 3. Percentage of positive CT scan findings for 0-23 month olds.



2-15 year old patients. For 2-15 year old patients overall, 9% of 1,583 CT records had positive findings.

- The percentage differed by location and size of facility as shown in Figure 4, with the highest percentage occurring in larger facilities (more than 6,000 pediatric ED visits per year) located outside of the Chicago area (Regions 1-6).

Figure 4. Percentage of positive CT scan findings for 2-15 year olds.



Positive CT Scan Findings Compared with Child Abuse Screening Process

Records with positive CT scan findings were further evaluated to determine if the child was screened for potential child abuse.

- For all records with positive CT scan findings, 55% noted that child abuse screening was documented.
- These percentages differed by age group: 45% for 2-15 year olds and 77% for 0-23 month olds.
- The percentage was even higher for infants 0-3 months old at 83%.

Relationship between Child Abuse Screening and Quality Improvement Monitors

Record review data were compared with the earlier statewide survey of practices regarding the management of mild pediatric head injury (110 surveys received in the 3rd quarter of 2008). Of particular interest was a comparison between (a) the percentage of child abuse screens documented in record reviews and (b) the survey question for whether facilities used a quality improvement (QI) monitor that specifically checked for such screening.

- For facilities that on survey reported that they checked for screening in their QI monitor, 62% of patient records documented that those patients were screened for potential child abuse.
- For facilities that on survey reported that they did *not* check for screening in their QI monitor or did not have a QI monitor for pediatric traumatic head injury, only 53% of records documented those patients were screened for potential child abuse.

II. Conclusions

The 3rd-4th quarter record review constitutes the second component of Illinois EMSC's quality improvement effort to address the care of pediatric patients with mild traumatic head injury in the ED. Prior to the record review, in the third quarter of 2008, a statewide survey of practices was conducted. In addition, both the survey and record review will be duplicated in the summer/fall period of 2009 in order to assess for improvements in care of this pediatric population.

As a result, this summary provides a baseline of information regarding ED management of pediatric mild traumatic head injured patients. Of particular interest were the findings regarding documented "red flag" assessments associated with CT scans and the percentage of scans with positive findings. These data indicated that larger facilities located outside of the Chicago area had higher percentages for documentation of critical assessments and the resulting positive findings.

Separately, the record reviews indicated an opportunity to improve documentation of screening for child abuse cases. Combining record reviews with earlier survey data suggest that QI programs may facilitate screening for child abuse.