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Illinois Emergency Medical Services for Children



Annual EMSC Report and Profile of Emergency Medical Services Regions

Region 4

December 2007

*Illinois Emergency Medical Services for Children
is a collaborative program between the
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- ❑ Mark Cichon, DO, Associate Professor and Director, Emergency Medical Services, Department of Surgery, Loyola University Medical Center
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- ❑ Dan Leonard, MS, EMSC Quality Information Manager, Loyola University Medical Center
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For further information regarding the contents of this report, please contact Dan Leonard, dleonar@lumc.edu, Loyola University Medical Center, 2160 South First Avenue, Building 110-Lower Level, Room 0246, Maywood, Illinois, 60153, (708) 327-3672.

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Illinois Emergency Medical Services for Children Annual Report

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Section I. Introduction

A. Purpose

The purpose of this report is to inform EMS regions about childhood illness and injury trends in their respective regions, particularly as these trends compare with statewide information. Also the report provides an overview of the effectiveness of emergency care for children that will assist the EMSC facility recognition program and other activities.

B. Description

A distinct report has been developed for each of the eleven EMS regions. In each report, we compare data for the region under study to statewide data for a number of measures. This approach results in relatively brief reports for each region. All of the eleven EMS regional reports are publicly available on the EMSC web site (<http://www.luhs.org/depts/emsc/data.htm>).

C. Databases

Four statewide databases were used in the development of this report. Descriptions and limitations of each of these data sources are outlined in this section.

1) Hospital Discharge Database, 1994-2006

Database Description

This database is collected by the Illinois Hospital Association (IHA). The hospital discharge data provide uniform information on virtually all hospitalizations within the state. It contains demographic characteristics of patients as well as principal conditions associated with hospitalization, major medical procedures, hospitalization outcomes and charges. IHA also obtains data for Illinois residents who have been hospitalized in the bordering states of Indiana, Iowa, and Missouri.

Database Limitations

The diagnosis information may be subject to variations in medical practice and diagnostic labeling. The database does not include Emergency Department (ED) or other outpatient information.

2) Trauma Registry, 1994-2004

Database Description

Currently, there are 63 hospitals within Illinois designated as either a Level I (18)¹ or Level II (45) trauma center. These hospitals must submit data to IDPH on patients who (a) sustain traumatic injuries that require treatment at a trauma center and are then admitted to a trauma center; (b) are transferred to a trauma center; or (c) are dead-on-arrival or die in the emergency department. One of the strengths of the Trauma Registry is that it captures information on the external causes of injury (E-codes).

The following are **not** included in the Trauma Registry:

- Patients admitted to a hospital that is not designated as a trauma center
- Those who die at the scene of a traumatic injury but are not transported to a trauma center
- Patients treated in the emergency department of a designated trauma center for less than twelve hours

¹ Note: Two of the Level I Trauma Centers are designated as both Adult and Pediatric Trauma Centers, and two others are designated as only a Pediatric Trauma Center.

Database Limitations

It is important to emphasize (as noted above) that the Trauma Registry does not contain all fatal and non-fatal injury occurrences within the state of Illinois. The database maintains information on those fatally injured cases brought to a trauma center or those whose injuries required inpatient admission to a trauma center.

It is also important to note that, although there are currently 63 trauma centers, this number as well as Level I and Level II designations have varied during the years covered by this report.

A Trauma Registry record is generated by trauma centers on patients who meet the defined criteria as described above. Therefore, duplicate records will exist for those patients transferred from one trauma center to another during the course of their injury management (approximately 8 percent to 10 percent of cases). For the purposes of this report, analysis was limited to records from receiving facilities only.

3) Mortality Data, 1999-2004

Database Description

Illinois state law mandates that all death certificates be filed with the Illinois Department of Public Health. Funeral home directors typically file these records with pertinent medical information completed by the attending physician. Death certificates are sent to the local registrar who then forwards them to the Illinois Department of Public Health, Division of Vital Records.

The death certificate data provide information on the frequency of deaths to Illinois residents, demographic characteristics of the deceased, and the conditions leading to mortality. These deaths may have occurred outside of the state of Illinois.

Illinois mortality data are provided to the Centers for Disease Control and Prevention (CDC). This report utilizes CDC aggregated data. The CDC places aggregate reports on-line for researchers at CDC Wonder (<http://wonder.cdc.gov/>). The total number of deaths recorded by CDC may vary slightly from IDPH reports, particularly relating to cut-off dates used for record inclusion and exchange agreements with other states and Canada.

Database Limitations

If the decedent is known to the certifying physician or if an autopsy was performed, further detail related to the cause of death will be present in the death certificate. Therefore, the cause of death information may be subject to some variations in medical practice and diagnostic labeling.

4) Traffic Crash Report Database, 2000-2005

Database Description

The Illinois Traffic Crash Report Form is used to report traffic crashes that occur within Illinois. The officer at the scene of the crash incident completes the report. The investigating police agency is then required to forward a copy of the completed report to the Illinois Department of Transportation if the crash involved death, injury and/or more than \$500 damage to any vehicle or property. The traffic crash database captures information on the frequency and severity of

crashes within the state, demographic characteristics of individuals involved in crashes, and scene characteristics such as weather and roadway conditions.

D. Measures Associated with Facility Recognition

1) The Illinois EMSC Facility Recognition Program

Since 1998, over 100 hospitals in Illinois have received recognition by the Illinois Department of Public Health and Illinois Emergency Medical Services for Children (EMSC) for having the essential resources and capabilities in place to meet the emergency needs of seriously ill and injured children. Illinois Administrative Code 77, Subpart J, Sections 515.4000 and 515.4010, define specifically the criteria associated with facility recognition.

Hospitals can apply for one of three levels of voluntary recognition. Hospitals with a dedicated pediatric intensive care unit and pediatric inpatient specialties and capabilities can apply for the Pediatric Critical Care Center (PCCC) level. Facilities that provide comprehensive emergency services can seek recognition as an Emergency Department Approved for Pediatrics (EDAP). The Standby Emergency Department for Pediatrics (SEDP) recognition is available for hospitals that provide stabilization measures and that have transfer guidelines in place when more definitive care is needed. Note that facilities applying for the PCCC level must also meet EDAP standards.

Hospitals seeking this voluntary designation receive a site visit by the EMSC program staff to verify that the emergency department is capable of meeting the following key pediatric emergency care standards:

- Professionals specially trained in pediatric emergency care;
- Adequate staffing and provisions for pediatric consultation and backup to support provision of pediatric emergency care services;
- Availability of essential pediatric equipment, supplies and medication;
- Implementation of protocols addressing treatment of the abused child, of critically ill and injured children and of those children requiring transfer to a specialized care center; and
- Inclusion of pediatrics into emergency services quality improvement activities.

2) Related Measures of Effectiveness

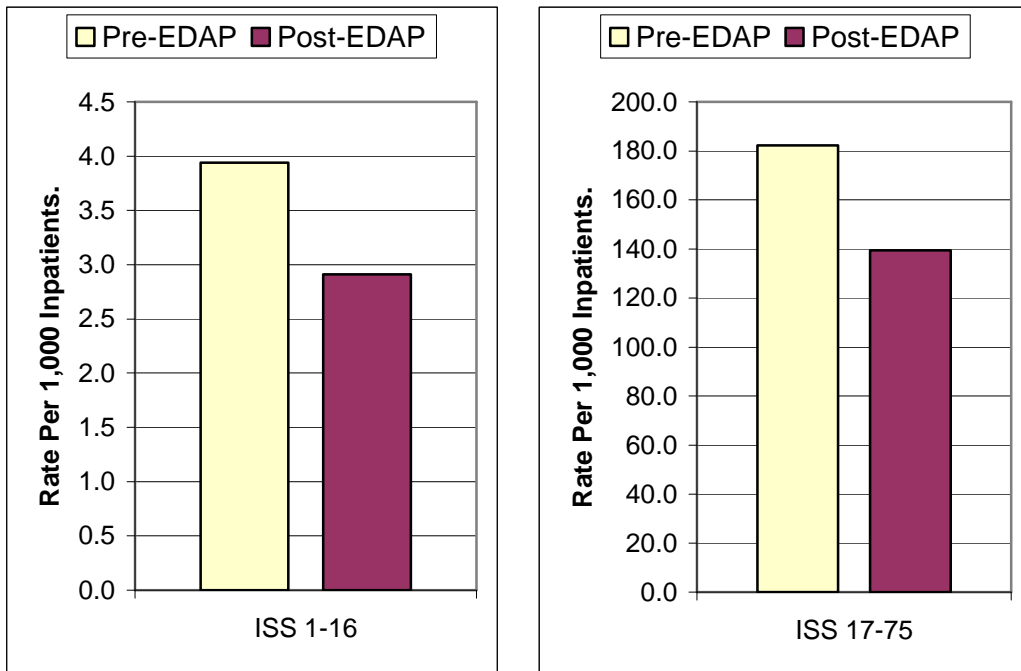
In an effort to evaluate effectiveness associated with the facility recognition program, mortality rates per 1,000 inpatients were calculated for 0-15 year olds who were admitted from the Emergency Department for injury. To conduct a pre- and post-EDAP comparison, records were restricted to facilities that obtained recognition as an EDAP facility between the years of 1994 and 2006. (This includes PCCC facilities because they meet EDAP standards.)

In addition, in order to control for severity, the software ICDMAP90[®] (The Johns Hopkins University and Tri-Analytics, Inc.) was used to calculate standardized injury severity scores (ISS) from diagnosis codes.

Using this approach, the injury mortality rates for hospitalized patients were compared for two groups, those with low to moderate severity (ISS 1-16) and those with high severity (ISS 17-75).

For both groups, post-EDAP mortality rates were lower (Figure 1). For the low to moderate severity group the rate declined from 3.9 deaths per 1,000 inpatients to 2.9 per 1,000 inpatients. For the high severity group the rate declined from 182.2 deaths per 1,000 inpatients to 139.4 deaths per 1,000 inpatients. Also, for the high severity group, the difference was statistically significant ($p < 0.01$, Pearson Chi-Square). Decreases in mortality can likely be attributed to multiple factors, one of which may be the increased awareness and attention to pediatric emergency care needs emphasized through the facility recognition process.

Figure 1. Mortality Rates per 1,000 Inpatient Injury-Related Admissions from the ED, 0-15 Year Olds, 1994-2006
 (Note: Records were restricted to facilities participating as EDAP)



Severity Group	Pre-EDAP			Post-EDAP		
	Patients	Deaths	Rate	Patients	Deaths	Rate
ISS 1-16	18,772	74	3.9	19,923	58	2.9
ISS 17-75	1,125	205	182.2	1,298	181	139.4

Data Source: Illinois Hospital Association

* Notes: Severity Groups were created using Injury Severity Scores (ISS) obtained using the software ICDMAP90. (Please see text for description.)

Records for all available years (1994-2006) were used, restricted to facilities participating in facility recognition at the EDAP level.

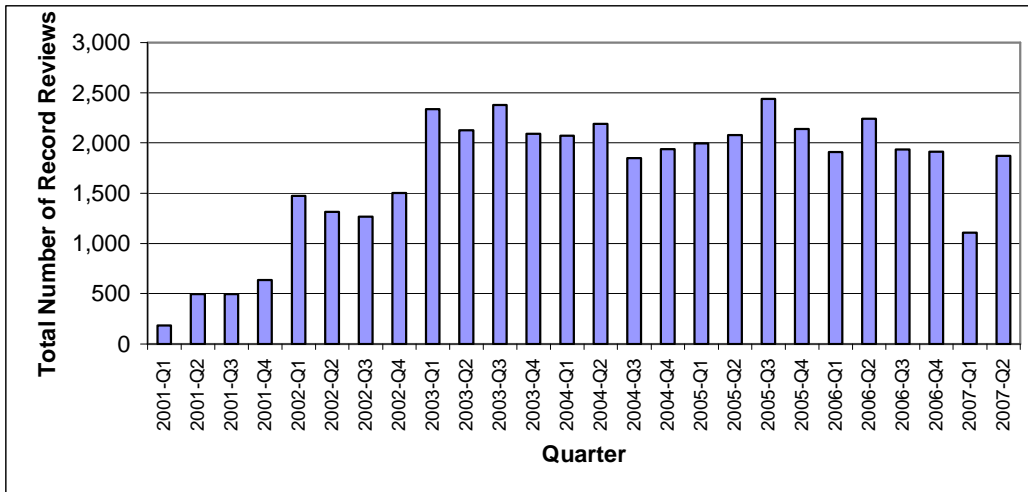
3) Regional Continuous Quality Improvement (CQI) Program

Each hospital participating in facility recognition is required to designate a Pediatric CQI Liaison. Liaisons meet quarterly in one of eleven EMS regional CQI committees. Facilities that have not received EDAP/SEDP recognition are welcome to send representatives to these meetings. The committees develop quality indicators of interest to their region. Each facility then conducts quarterly medical record reviews related to this indicator and submits data to either a committee data coordinator or to the EMSC central office for processing. Reports are

generated that allow each hospital to compare their facility's responses to the aggregate responses of the region. Confidentiality of the patient and facility are maintained throughout.

As of the second quarter of 2007, over 43,000 medical record reviews have been conducted through this process (Figure 2). Improvements were found by Regions 1, 2, 3, 4, 6, 7, 8, 9, 10 and 11 in pain management indicators; by Regions 2, 5 and 7 in an asthma/respiratory distress indicators; and by Region 9 in a seizure indicator. EMSC has distributed reports summarizing the activities associated with these improvements (see Appendix A for an example report).

Figure 2. Monitoring Activity for Illinois EMSC CQI Program by Topic and Quarter



Quarter	Pain Management Records	Transfers	Respiratory Distress/ Asthma	Head Injury	Specific Clinical Conditions	Quarterly Totals
2001-Q1		184				184
2001-Q2	322	174				496
2001-Q3	289	206				495
2001-Q4	350	285				635
2002-Q1	1,038	290	107		40	1,475
2002-Q2	807	293	164		51	1,315
2002-Q3	625	359	217		67	1,268
2002-Q4	841	333	232		98	1,504
2003-Q1	1,582	340	221		193	2,336
2003-Q2	1,444	330	155		197	2,126
2003-Q3	1,547	342	156		335	2,380
2003-Q4	1,203	323	249		315	2,090
2004-Q1	1,500	141	203		227	2,071
2004-Q2	1,418	170	324		278	2,190
2004-Q3	1,422	107	181		140	1,850
2004-Q4	1,343	108	372		115	1,938
2005-Q1	698	33	1,088		175	1,994
2005-Q2	961		948		169	2,078
2005-Q3	1,130		1,078		229	2,437
2005-Q4	897		1,063		179	2,139
2006-Q1	1,171		693	46	0	1,910
2006-Q2	1,079		604	307	253	2,243
2006-Q3	1,079		573	281	0	1,933
2006-Q4	1,015		384	220	296	1,915
2007-Q1	169		171	583	186	1,109
2007-Q2	120		34	951	766	1,871
Grand Totals	24,050	4,018	9,217	2,388	4,309	43,982

Data Source: EMSC Regional CQI Committees

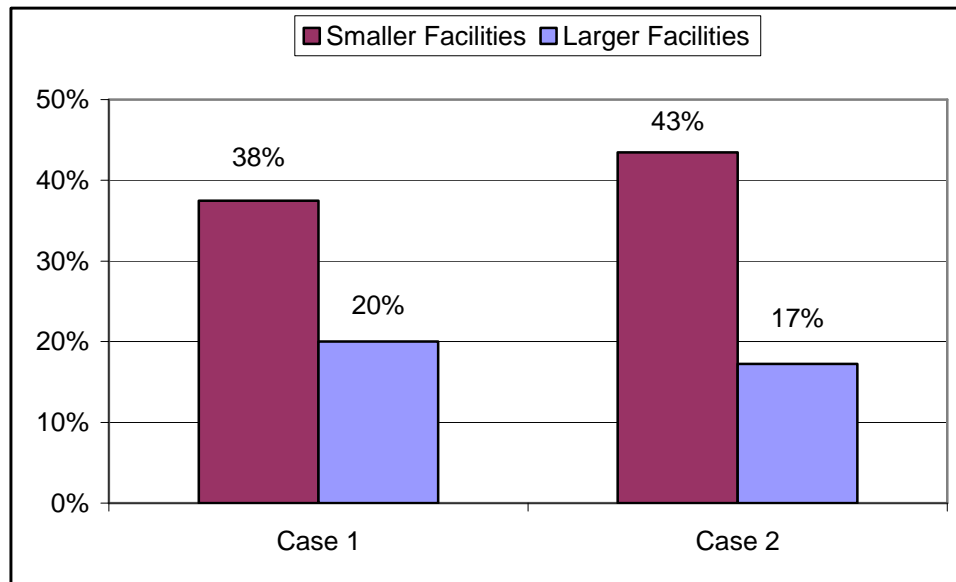
4) Pediatric Moderate Sedation in the Emergency Department, 2007

In May 2007, Illinois EMS for Children conducted a statewide survey regarding pediatric moderate sedation in the Emergency Department. Included in the survey were two case scenarios that described patients undergoing sedation and asked questions related to these cases (Case 1 involved a diagnostic procedure; Case 2 involved a therapeutic procedure).

Responses were obtained from 77 hospitals (64% response rate). Findings from the survey included the following:

- Meperidine (which is not recommended for use in pediatric patients due to heightened risk of seizure activity) continues to be a drug of choice in higher than expected numbers (Case 1 - 11%, Case 2 - 10%).
- A substantial number of respondents reported using Chloral Hydrate (Case 1 - 31%, Case 2 - 12%) even with the choice of preferable sedating medications with more rapid onset/offset times than Chloral Hydrate.
- The person responsible for monitoring the sedated patient was allowed to perform or assist in the procedure more often than expected (Case 1 - 28%, Case 2 - 29%). This was found particularly for smaller facilities (6,000 or less pediatric ED visits per year) when compared with larger facilities (more than 6,000 ED visits per year) as shown in Figure 3.

Figure 3. Person Responsible for Monitoring the Sedated Patient Is Allowed to Perform or Assist with the Procedure



Data Source: EMSC CQI Program

After data submission, participants were provided with Web-based reports that allowed comparison of their results to their region, to similar sized facilities, and to the rest of the state. Statewide results were also summarized in a report available online at <http://www.luh.org/depts/emsc/ModSedSummaryRpt.pdf>.

E. Statewide Findings from the Traffic Crash Database

Note: This section is divided into two sub-sections. The first presents data regarding passengers of motor vehicles involved in crashes. The second presents data regarding pedestrians and pedalcyclists.

1) Motor Vehicle Crash Passengers

Demographics. For 2004-2005, the Illinois Department of Transportation (IDOT) recorded 146,620 children between the ages of 0 and 15 as passengers in motor vehicle crashes. The age and gender distribution for these children was similar to the distributions from 2000 through 2003 (Tables 1, 2), with a slight increase in unknowns for gender related to an increase in the IDOT database entry of passenger records with limited information.

Table 1. Motor Vehicle Crash Passengers by Age for 0-15 Year Olds in Illinois, 2000-2005

Age	2000-2003		2004-2005	
	Count	Percent	Count	Percent
0-3 Years	63,652	23.1%	38,073	26.0%
4-5 Years	34,682	12.6%	17,733	12.1%
6-9 Years	62,114	22.6%	31,608	21.6%
10-14 Years	82,716	30.0%	43,458	29.6%
15 Years	32,099	11.7%	15,748	10.7%
Total	275,263	100.0%	146,620	100.0%

Data Source: IDOT Motor Vehicle Crash Database

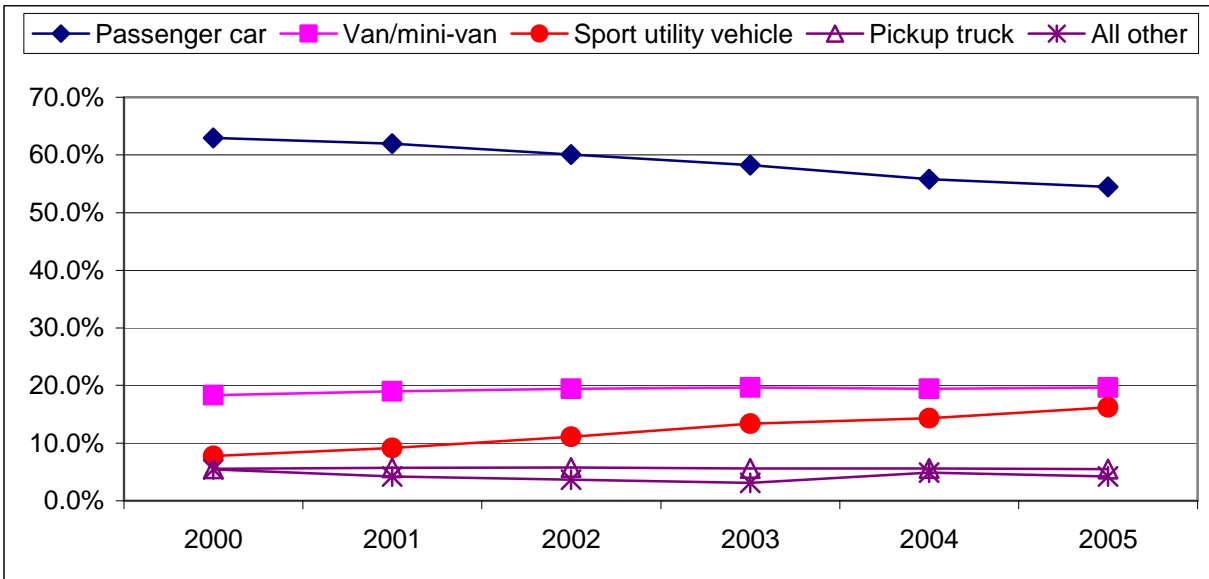
Table 2. Motor Vehicle Crash Passengers By Gender in Illinois, 2000-2005

Gender	2000-2003		2004-2005	
	Count	Percent	Count	Percent
F	139,578	50.7%	70,796	48.3%
M	135,266	49.1%	69,041	47.1%
N/A	419	0.2%	6,783	4.6%
Total	275,263	100.0%	146,620	100.0%

Data Source: IDOT Motor Vehicle Crash Database

Vehicle Types. The vehicle types associated with crashes for 0-15 year old passengers showed several consistent trends over the period of 2000-2005 (Figure 4). The percentage of sports utility vehicles increased from 7.8% in 2000 to 16.2% in 2005 and the percentage of vans/mini-vans increased from 18.3% in 2000 to 19.6% in 2005. At the same time, the percentage of passenger cars decreased from 63.0% in 2000 to 54.4% in 2005.

Figure 4. Vehicle Types Associated with 0-15 Year Old Passengers in Crashes, Illinois, 2000-2005



Vehicle Type	2000		2001		2002		2003		2004		2005	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Passenger car	42,380	63.0%	39,026	62.0%	42,956	60.1%	42,802	58.3%	43,838	55.8%	37,062	54.4%
Van/mini-van	12,318	18.3%	11,931	18.9%	13,873	19.4%	14,431	19.6%	15,248	19.4%	13,362	19.6%
Sport utility vehicle	5,223	7.8%	5,761	9.1%	7,929	11.1%	9,833	13.4%	11,254	14.3%	11,044	16.2%
Pickup truck	3,751	5.6%	3,595	5.7%	4,120	5.8%	4,117	5.6%	4,381	5.6%	3,755	5.5%
All other	3,644	5.4%	2,666	4.2%	2,611	3.7%	2,296	3.1%	3,824	4.9%	2,852	4.2%
Total	67,316	100.0%	62,979	100.0%	71,489	100.0%	73,479	100.0%	78,545	100.0%	68,075	100.0%

Data Source: IDOT Motor Vehicle Crash Database

Safety Equipment and Injuries. For 0-15 year old passengers, the use of safety equipment was associated with less overall injury and less severe injury throughout the period of 2000-2005 (Table 3).

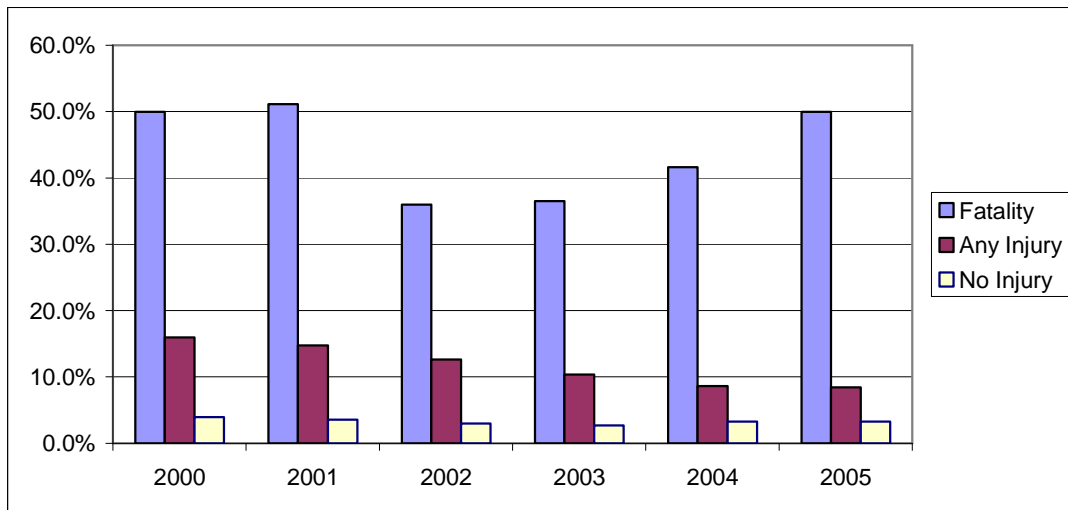
Table 3. Safety Equipment Use and Injury Severity for 0-15 Year Old Passengers, 2001-2005

Year	Usage	No Injury		Any Injury		Fatality		Total	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent
2000	Safety Equipment Used	49,675	86.5%	7,227	73.6%	15	27.8%	56,917	84.6%
	Safety Equipment Not Used	2,265	3.9%	1,567	16.0%	27	50.0%	3,859	5.7%
	Unknown	5,499	9.6%	1,029	10.5%	12	22.2%	6,540	9.7%
	Total	57,439	100.0%	9,823	100.0%	54	100.0%	67,316	100.0%
2001	Safety Equipment Used	46,961	86.7%	6,569	75.1%	14	31.1%	53,544	85.0%
	Safety Equipment Not Used	1,935	3.6%	1,295	14.8%	23	51.1%	3,253	5.2%
	Unknown	5,286	9.8%	888	10.1%	8	17.8%	6,182	9.8%
	Total	54,182	100.0%	8,752	100.0%	45	100.0%	62,979	100.0%
2002	Safety Equipment Used	54,004	87.2%	7,346	77.0%	25	50.0%	61,375	85.9%
	Safety Equipment Not Used	1,863	3.0%	1,206	12.6%	18	36.0%	3,087	4.3%
	Unknown	6,032	9.7%	988	10.4%	7	14.0%	7,027	9.8%
	Total	61,899	100.0%	9,540	100.0%	50	100.0%	71,489	100.0%
2003	Safety Equipment Used	56,007	87.9%	7,786	80.3%	24	46.2%	63,817	86.9%
	Safety Equipment Not Used	1,739	2.7%	1,004	10.4%	19	36.5%	2,762	3.8%
	Unknown	5,984	9.4%	907	9.4%	9	17.3%	6,900	9.4%
	Total	63,730	100.0%	9,697	100.0%	52	100.0%	73,479	100.0%
2004	Safety Equipment Used	57,074	82.0%	7,254	81.5%	22	45.8%	64,350	81.9%
	Safety Equipment Not Used	2,271	3.3%	766	8.6%	20	41.7%	3,057	3.9%
	Unknown	10,242	14.7%	885	9.9%	6	12.5%	11,133	14.2%
	Total	69,587	100.0%	8,905	100.0%	48	100.0%	78,540	100.0%
2005	Safety Equipment Used	51,365	84.2%	5,593	80.2%	20	47.6%	56,978	83.8%
	Safety Equipment Not Used	2,006	3.3%	589	8.4%	21	50.0%	2,616	3.8%
	Unknown	7,603	12.5%	796	11.4%	1	2.4%	8,400	12.4%
	Total	60,974	100.0%	6,978	100.0%	42	100.0%	67,994	100.0%

Data Source: IDOT Motor Vehicle Crash Database

This is particularly apparent when examining injuries when safety equipment was not used. Figure 5 shows the percentage of non-use for each level of injury severity (data for the figure appear in Table 3 above).

Figure 5. Percentage of Passengers Who Did Not Use Safety Equipment By Injury Severity, 0-15 Year Olds, 2000-2005

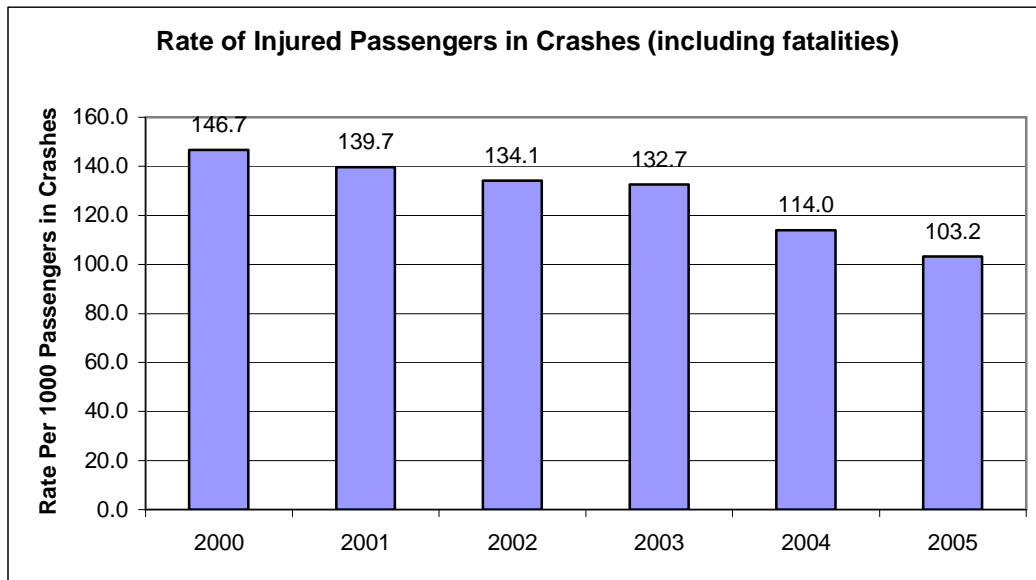


Notes regarding this analysis:

- *Safety Equipment Used* consisted of passengers with child restraint used or safety belt used.
- *Safety Equipment Not Used* consisted of passengers with no safety equipment present, safety belt not used, child restraint not used, or child restraint used improperly.
- Child restraint use was estimated by the police officer at the scene. This did not include an expert technical review of the usage.
- Passengers with unknown severity of injury were excluded from the analysis.

Finally, of particular interest is an evaluation for the effect of efforts to improve safety equipment use. Figure 6 shows that the rate of injury for passengers in crashes decreased over time for 0-15 year olds (data for the figure are derived from Table 3 above; also note that “injury” refers to any injury type including fatality).

**Figure 6. Rate of Injury per 1,000 Passengers in Motor Vehicle Crashes
0-15 Year Olds, 2000-2005**



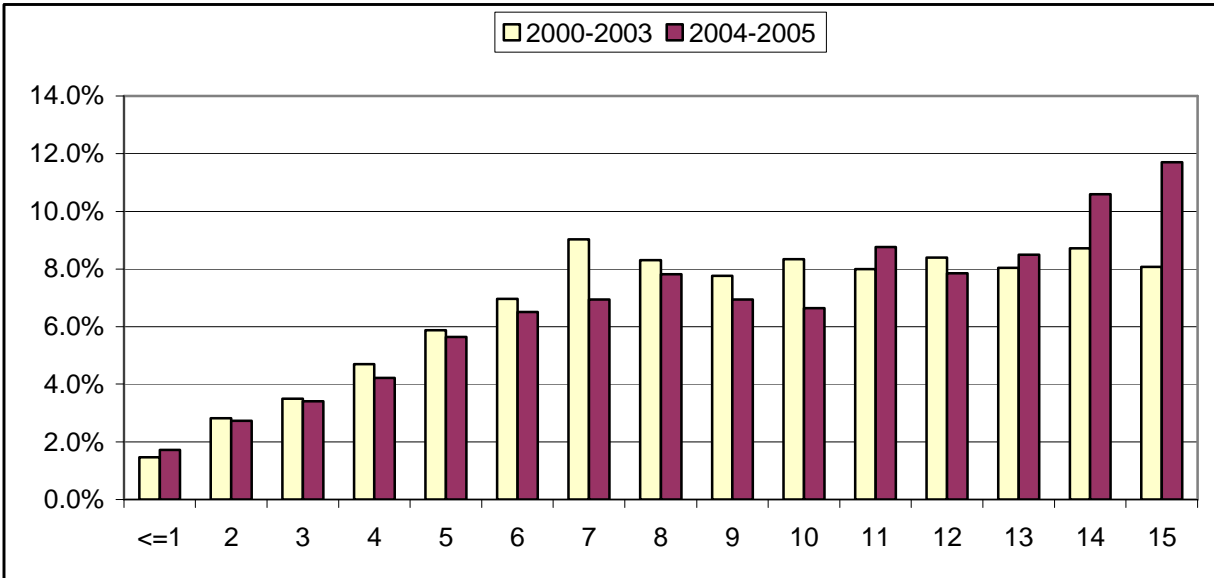
Using established epidemiological methods for estimating annual rate changes², the rate of injury for 0-15 year old passengers decreased 6.6% per year ($p < 0.01$, 95% confidence interval 3.7%, 9.4%) from 2000 through 2005.

² National Cancer Institute. “Annual Percent Change.” Available at http://seer.cancer.gov/seerstat/WebHelp/seerstat.htm#Trend_Algorithms.htm. Accessed June 28, 2007

2) Pedestrians and Pedalcyclists

Demographics. In the 0-15 year old age group, there were 2,965 pedestrians and 2,395 pedalcyclists involved in crash incidents in 2004-2005. For both of these groups, the percentage of older children was higher than in the period of 2000-2003 (Figures 7, 8).

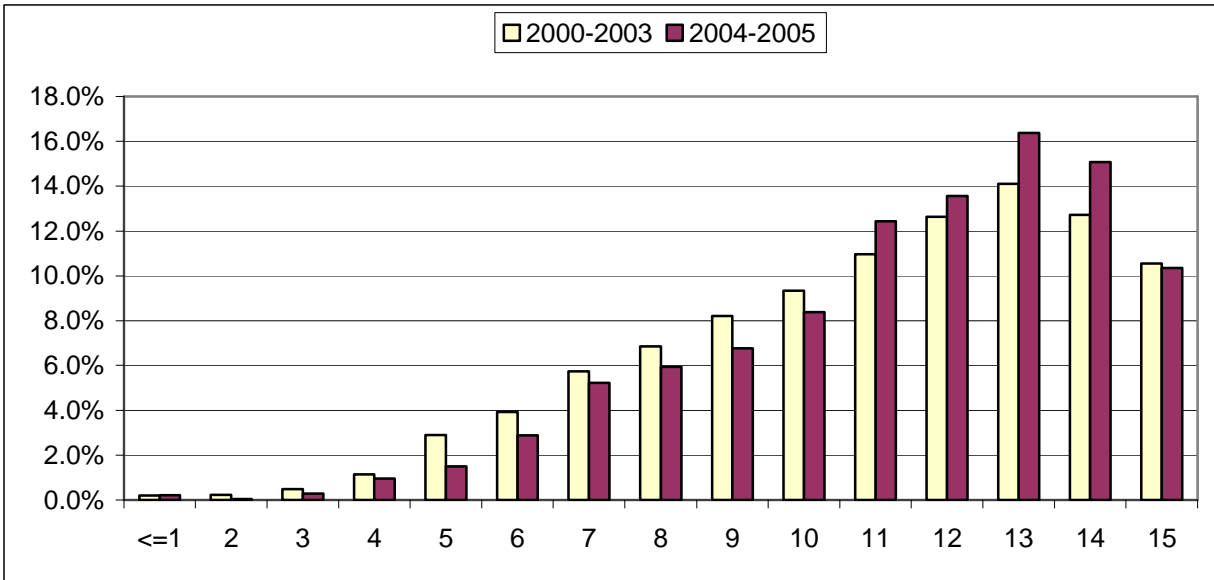
Figure 7. Pedestrian Victims by Age for 0-15 Year Olds in Illinois, 2000-2005



Age	2000-2003		2004-2005	
	Count	Percent	Count	Percent
<=1	113	1.5%	51	1.7%
2	217	2.8%	81	2.7%
3	269	3.5%	101	3.4%
4	361	4.7%	125	4.2%
5	451	5.9%	167	5.6%
6	536	7.0%	193	6.5%
7	694	9.0%	206	6.9%
8	639	8.3%	232	7.8%
9	597	7.8%	206	6.9%
10	641	8.3%	197	6.6%
11	615	8.0%	260	8.8%
12	646	8.4%	233	7.9%
13	618	8.0%	252	8.5%
14	670	8.7%	314	10.6%
15	621	8.1%	347	11.7%
Total	7,688	100.0%	2,965	100.0%

Data Source: IDOT Motor Vehicle Crash Database

Figure 8. Pedalcyclist Victims by Age for 0-15 Year Olds in Illinois, 2000-2005



Age	2000-2003		2004-2005	
	Count	Percent	Count	Percent
<=1	11	0.2%	5	0.2%
2	13	0.2%	1	0.0%
3	27	0.5%	7	0.3%
4	63	1.1%	23	1.0%
5	160	2.9%	36	1.5%
6	217	3.9%	69	2.9%
7	317	5.7%	125	5.2%
8	379	6.8%	142	5.9%
9	455	8.2%	162	6.8%
10	517	9.3%	201	8.4%
11	607	11.0%	298	12.4%
12	699	12.6%	325	13.6%
13	781	14.1%	392	16.4%
14	704	12.7%	361	15.1%
15	584	10.6%	248	10.4%
Total	5,534	100.0%	2,395	100.0%

Data Source: IDOT Motor Vehicle Crash Database

There was little change in the distribution of these cases by gender in 2004-2005 when compared with 2000-2003 (Table 4). Males predominated as both pedestrian (56.8%) and pedalcyclist (72.4%) victims.

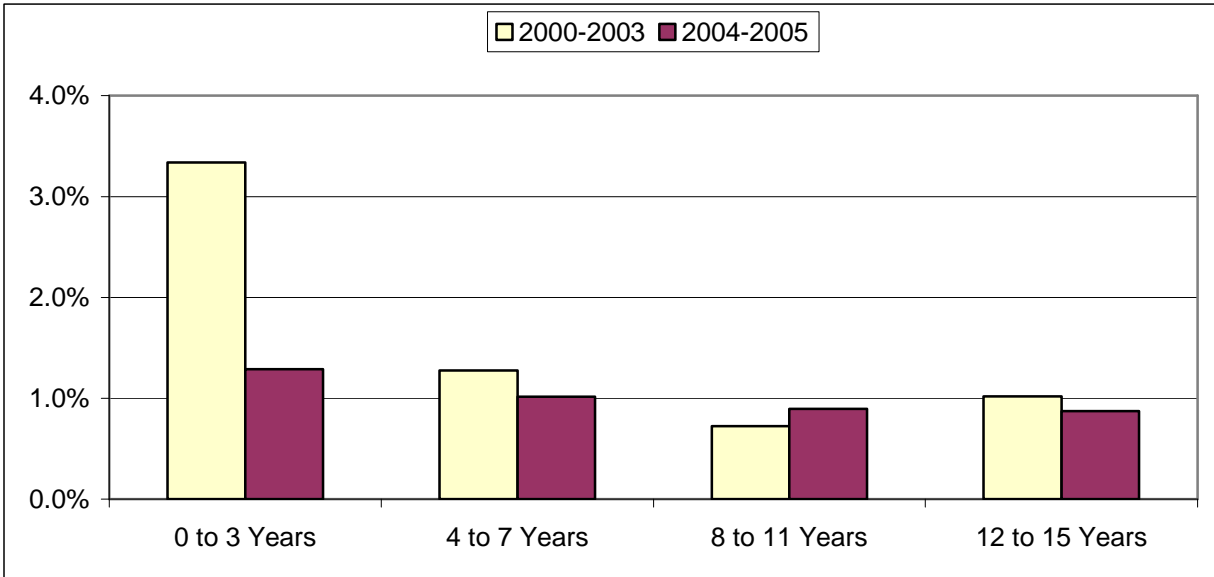
Table 4. Pedestrian and Pedalcyclist Victims by Sex for 0-15 Year Olds in Illinois, 2000-2005

Gender	Pedestrian				Pedalcyclist			
	2000-2003		2004-2005		2000-2003		2004-2005	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
F	2,886	37.5%	1,185	40.0%	1,280	23.1%	592	24.7%
M	4,788	62.3%	1,685	56.8%	4,247	76.7%	1,733	72.4%
N/A	14	0.2%	95	3.2%	7	0.1%	70	2.9%
Total	7,688	100.0%	2,965	100.0%	5,534	100.0%	2,395	100.0%

Data Source: IDOT Motor Vehicle Crash Database

Pedestrian Fatalities by Age Group. Although not as strongly apparent as in previous years, a higher percentage of fatalities occurred for younger pedestrian victims in 2004-2005 (Figure 9).

Figure 9. Percentage of Fatalities for Pedestrian Victims by Age for 0-15 Year Olds in Illinois, 2000-2005



Age	2000-2003			2004-2005		
	Victims	Fatalities	% Fatal	Victims	Fatalities	% Fatal
0 to 3 Years	599	20	3.3%	233	3	1.3%
4 to 7 Years	2,042	26	1.3%	691	7	1.0%
8 to 11 Years	2,492	18	0.7%	895	8	0.9%
12 to 15 Years	2,555	26	1.0%	1,146	10	0.9%

Data Source: IDOT Motor Vehicle Crash Database

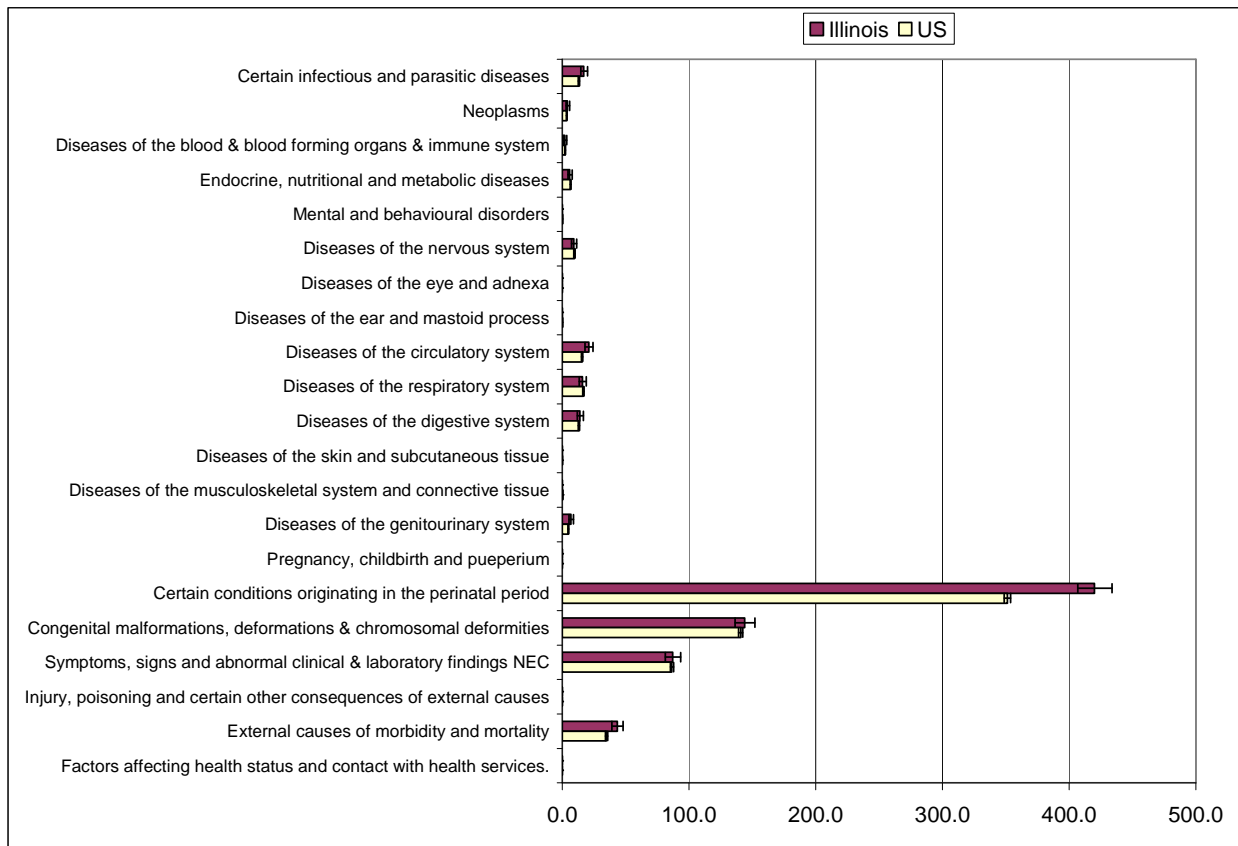
F. Statewide Findings from the Mortality Database³

In 2000-2004, Illinois childhood mortality rates per 100,000 residents were similar to U.S. rates with the following exceptions (Figures 10-13):

- A higher mortality rate in Illinois for less-than-1 year olds from conditions originating in the perinatal period (420.2 per 100,000 residents, CI 406.9, 433.8) compared to the U.S. (351.3 per 100,000 residents, CI 348.7, 353.9)
- An overall higher mortality rate in Illinois for all less-than-1 year olds (791.5 per 100,000 residents, CI 773.3, 810.1) compared to the U.S. (699.6 per 100,000 residents, CI 696.0, 703.3)
- A lower mortality rate in Illinois from external causes of morbidity and mortality for three age groups:
 - 1-4 year olds (11.4 per 100,000 residents, CI 10.4, 12.6) compared to the US (13.9 per 100,000 residents, CI 13.6, 14.1)
 - 5-9 year olds (5.2 per 100,000 residents, CI 4.6, 5.9) compared to the US (6.9 per 100,000 residents, CI 6.7, 7.1)
 - 10-14 year olds (8.5 per 100,000 residents, CI 7.7, 9.4) compared to the US (9.9 per 100,000 residents, CI 9.7, 10.1)
- A higher mortality rate in Illinois for 10-14 year olds from diseases of the respiratory system (1.5 per 100,000 residents, CI 1.2, 2.0) compared to the U.S. (0.9 per 100,000 residents, CI 0.8, 0.9)

³ In working with these and other data in the following sections of this report, confidence intervals (CI) were used. These are displayed as error bars in the charts. For a discussion of confidence intervals, please see Appendix B, Section 5.

Figure 10. Mortality Per 100,000 Residents for <1 Year Olds by ICD10 Category, 2000-2004

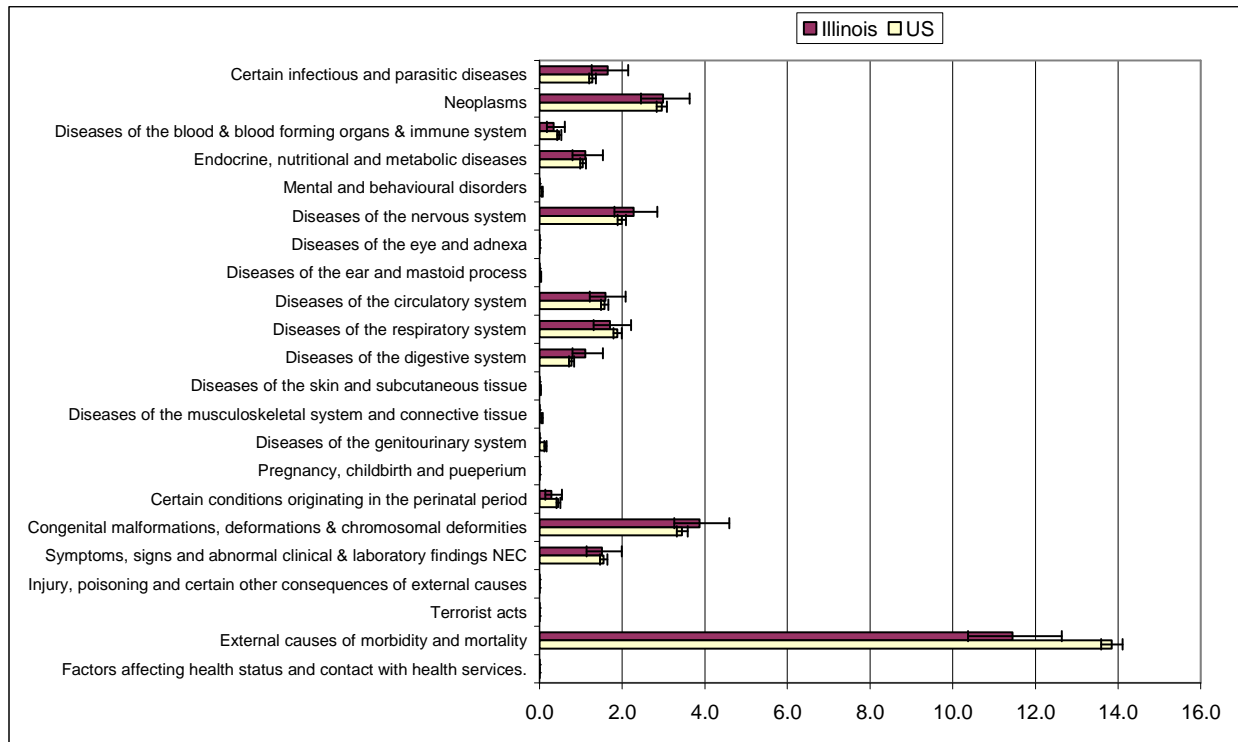


ICD10 Categories	Illinois				US			
	Count	Rate	95% CI		Count	Rate	95% CI	
Certain infectious and parasitic diseases	152	17.0	14.4	20.0	2,629	13.2	12.7	13.7
Neoplasms	37	4.1	3.0	5.8	694	3.5	3.2	3.7
Diseases of the blood & blood forming organs & immune system	19	2.1	1.3	3.4	457	2.3	2.1	2.5
Endocrine, nutritional and metabolic diseases	53	5.9	4.5	7.8	1,299	6.5	6.2	6.9
Mental and behavioural disorders	2				30	0.2	0.1	0.2
Diseases of the nervous system	81	9.1	7.2	11.3	1,908	9.6	9.1	10.0
Diseases of the eye and adnexa	3				7			
Diseases of the ear and mastoid process	1				27	0.1	0.1	0.2
Diseases of the circulatory system	187	20.9	18.1	24.2	3,136	15.7	15.2	16.3
Diseases of the respiratory system	143	16.0	13.5	18.9	3,328	16.7	16.1	17.3
Diseases of the digestive system	126	14.1	11.8	16.8	2,617	13.1	12.6	13.6
Diseases of the skin and subcutaneous tissue	0				13	0.1	0.0	0.1
Diseases of the musculoskeletal system and connective tissue	0				65	0.3	0.3	0.4
Diseases of the genitourinary system	61	6.8	5.3	8.8	941	4.7	4.4	5.0
Pregnancy, childbirth and puerperium	0				0			
Certain conditions originating in the perinatal period	3,759	420.2	406.9	433.8	70,091	351.3	348.7	353.9
Congenital malformations, deformations & chromosomal deformities	1,288	144.0	136.3	152.1	28,122	140.9	139.3	142.6
Symptoms, signs and abnormal clinical & laboratory findings NEC	780	87.2	81.2	93.6	17,265	86.5	85.2	87.8
Injury, poisoning and certain other consequences of external causes	0				0			
External causes of morbidity and mortality	389	43.5	39.3	48.1	6,969	34.9	34.1	35.8
Total	7,081	791.5	773.3	810.1	139,598	699.6	696.0	703.3

Note: Rates for counts of less than 10 are considered unreliable. For these values, rates were neither calculated nor displayed graphically.

Data Source: CDC Wonder (<http://wonder.cdc.gov>)

Figure 11. Mortality Per 100,000 Residents for 1-4 Year Olds by ICD10 Category, 2000-2004

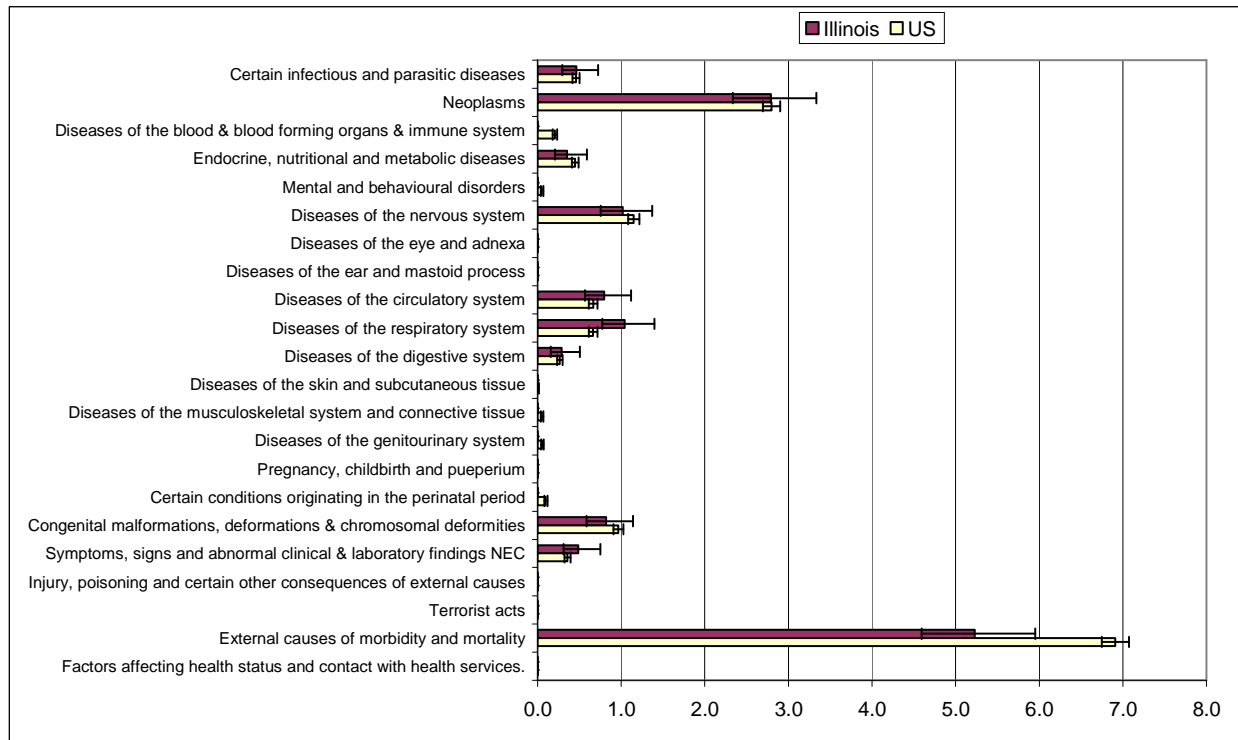


ICD10 Categories	Illinois				US			
	Count	Rate	Lower	Upper	Count	Rate	Lower	Upper
Certain infectious and parasitic diseases	58	1.7	1.3	2.2	1,001	1.3	1.2	1.4
Neoplasms	105	3.0	2.5	3.6	2,308	3.0	2.8	3.1
Diseases of the blood & blood forming organs & immune system	12	0.3	0.2	0.6	373	0.5	0.4	0.5
Endocrine, nutritional and metabolic diseases	39	1.1	0.8	1.5	822	1.1	1.0	1.1
Mental and behavioural disorders	2				50	0.1	0.0	0.1
Diseases of the nervous system	80	2.3	1.8	2.9	1,555	2.0	1.9	2.1
Diseases of the eye and adnexa	0				5			
Diseases of the ear and mastoid process	0				21	0.0	0.0	0.0
Diseases of the circulatory system	56	1.6	1.2	2.1	1,229	1.6	1.5	1.7
Diseases of the respiratory system	60	1.7	1.3	2.2	1,473	1.9	1.8	2.0
Diseases of the digestive system	39	1.1	0.8	1.5	605	0.8	0.7	0.8
Diseases of the skin and subcutaneous tissue	0				19	0.0	0.0	0.0
Diseases of the musculoskeletal system and connective tissue	3				47	0.1	0.0	0.1
Diseases of the genitourinary system	4				113	0.1	0.1	0.2
Pregnancy, childbirth and puerperium	0				0			
Certain conditions originating in the perinatal period	10	0.3	0.1	0.5	356	0.5	0.4	0.5
Congenital malformations, deformations & chromosomal deformities	136	3.9	3.3	4.6	2,692	3.4	3.3	3.6
Symptoms, signs and abnormal clinical & laboratory findings NEC	53	1.5	1.1	2.0	1,213	1.6	1.5	1.6
Injury, poisoning and certain other consequences of external causes	0				0			
Terrorist acts	0				3			
External causes of morbidity and mortality	402	11.4	10.4	12.6	10,809	13.9	13.6	14.1
Total	1,059	30.2	28.4	32.0	24,694	31.6	31.2	32.0

Note: Rates for counts of less than 10 are considered unreliable. For these values, rates were neither calculated nor displayed graphically.

Data Source: CDC Wonder (<http://wonder.cdc.gov>)

Figure 12. Mortality Per 100,000 Residents for 5-9 Year Olds by ICD10 Category, 2000-2004

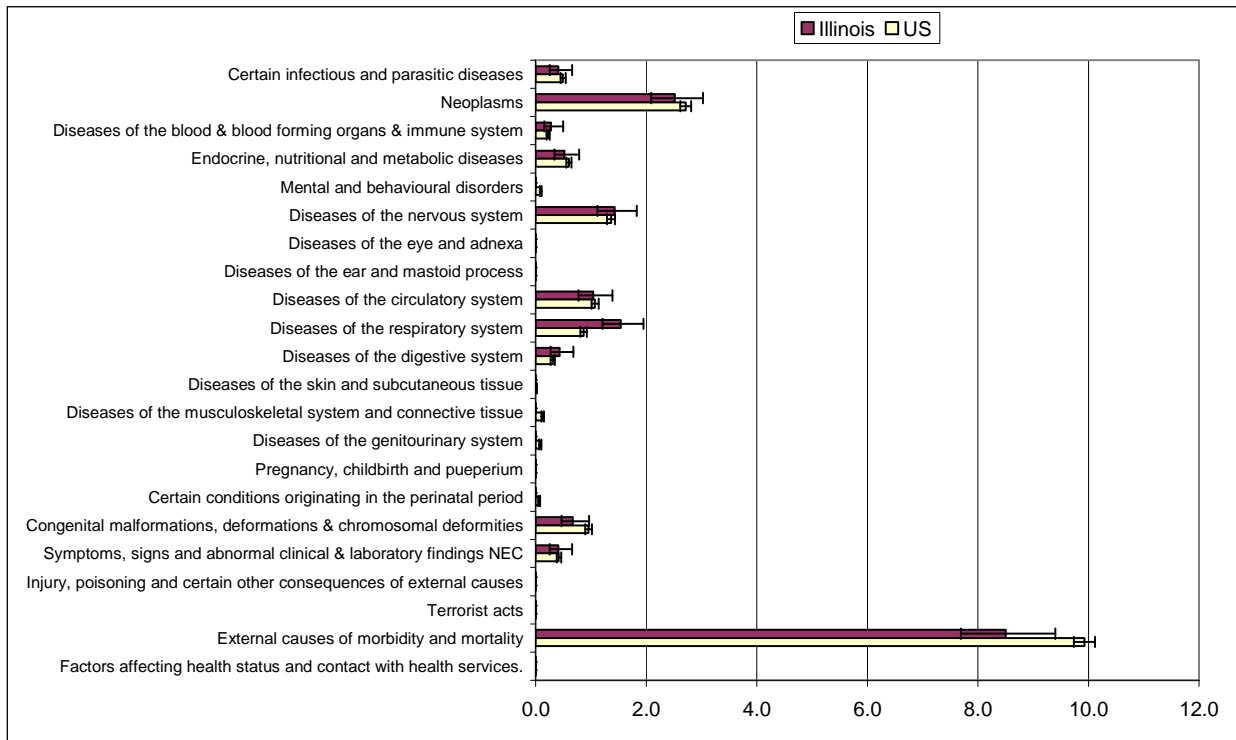


ICD10 Categories	Illinois				US			
	Count	Rate	95% CI		Count	Rate	95% CI	
Certain infectious and parasitic diseases	21	0.5	0.3	0.7	458	0.5	0.4	0.5
Neoplasms	126	2.8	2.3	3.3	2,798	2.8	2.7	2.9
Diseases of the blood & blood forming organs & immune system	9	0.2			206	0.2	0.2	0.2
Endocrine, nutritional and metabolic diseases	16	0.4	0.2	0.6	448	0.4	0.4	0.5
Mental and behavioural disorders	3	0.0			50	0.0	0.0	0.1
Diseases of the nervous system	46	1.0	0.8	1.4	1,150	1.1	1.1	1.2
Diseases of the eye and adnexa	0	0.0			4	0.0		
Diseases of the ear and mastoid process	0	0.0			2	0.0		
Diseases of the circulatory system	36	0.8	0.6	1.1	664	0.7	0.6	0.7
Diseases of the respiratory system	47	1.0	0.8	1.4	661	0.7	0.6	0.7
Diseases of the digestive system	13	0.3	0.2	0.5	265	0.3	0.2	0.3
Diseases of the skin and subcutaneous tissue	0	0.0			10	0.0	0.0	0.0
Diseases of the musculoskeletal system and connective tissue	1	0.0			51	0.1	0.0	0.1
Diseases of the genitourinary system	3	0.0			56	0.1	0.0	0.1
Pregnancy, childbirth and puerperium	0	0.0			0	0.0		
Certain conditions originating in the perinatal period	1	0.0			97	0.1	0.1	0.1
Congenital malformations, deformations & chromosomal deformities	37	0.8	0.6	1.1	964	1.0	0.9	1.0
Symptoms, signs and abnormal clinical & laboratory findings NEC	22	0.5	0.3	0.8	355	0.4	0.3	0.4
Injury, poisoning and certain other consequences of external causes	0	0.0			0	0.0		
Terrorist acts	0	0.0			1	0.0		
External causes of morbidity and mortality	236	5.2	4.6	5.9	6,910	6.9	6.7	7.1
Total	617	13.7	12.6	14.8	15,150	15.1	14.9	15.4

Note: Rates for counts of less than 10 are considered unreliable. For these values, rates were neither calculated nor displayed graphically.

Data Source: CDC Wonder (<http://wonder.cdc.gov>)

Figure 13. Mortality Per 100,000 Residents for 10-14 Year Olds by ICD10 Category, 2000-2004



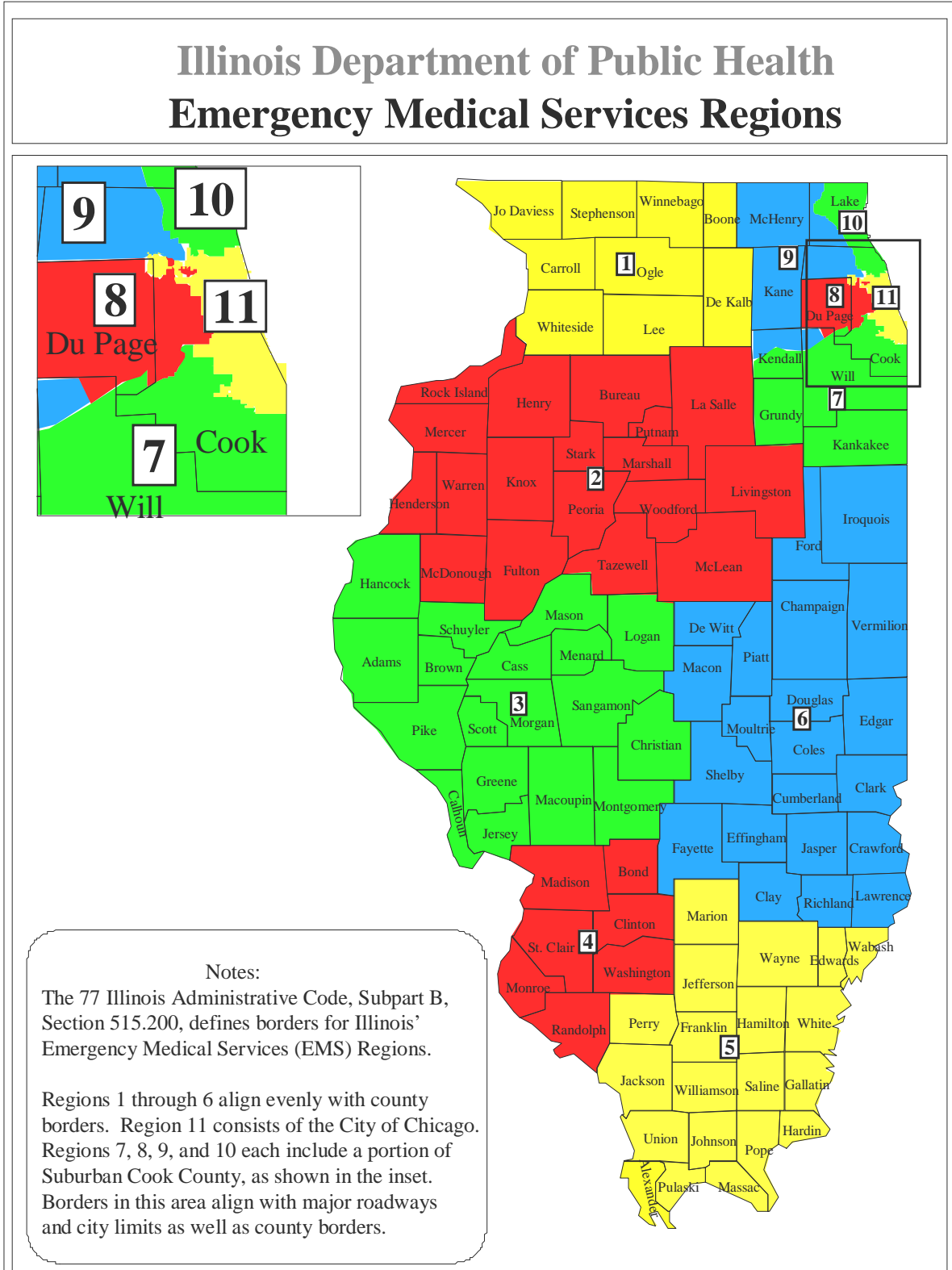
ICD10 Categories	Illinois				US			
	Count	Rate	95% CI		Count	Rate	95% CI	
Certain infectious and parasitic diseases	19	0.4	0.3	0.7	520	0.5	0.5	0.5
Neoplasms	116	2.5	2.1	3.0	2,847	2.7	2.6	2.8
Diseases of the blood & blood forming organs & immune system	13	0.3	0.2	0.5	237	0.2	0.2	0.3
Endocrine, nutritional and metabolic diseases	24	0.5	0.3	0.8	631	0.6	0.6	0.7
Mental and behavioural disorders	3				97	0.1	0.1	0.1
Diseases of the nervous system	66	1.4	1.1	1.8	1,432	1.4	1.3	1.4
Diseases of the eye and adnexa	0				2			
Diseases of the ear and mastoid process	0				6			
Diseases of the circulatory system	48	1.0	0.8	1.4	1,127	1.1	1.0	1.1
Diseases of the respiratory system	71	1.5	1.2	2.0	909	0.9	0.8	0.9
Diseases of the digestive system	20	0.4	0.3	0.7	325	0.3	0.3	0.3
Diseases of the skin and subcutaneous tissue	1				14	0.0	0.0	0.0
Diseases of the musculoskeletal system and connective tissue	6				133	0.1	0.1	0.2
Diseases of the genitourinary system	2				85	0.1	0.1	0.1
Pregnancy, childbirth and puerperium	0				7			
Certain conditions originating in the perinatal period	1				67	0.1	0.0	0.1
Congenital malformations, deformations & chromosomal deformities	31	0.7	0.5	1.0	1,003	1.0	0.9	1.0
Symptoms, signs and abnormal clinical & laboratory findings NEC	19	0.4	0.3	0.7	440	0.4	0.4	0.5
Injury, poisoning and certain other consequences of external causes	0				0			
Terrorist acts	0				3			
External causes of morbidity and mortality	392	8.5	7.7	9.4	10,411	9.9	9.7	10.1
Total	832	18.1	16.9	19.3	20,296	19.4	19.1	19.6

Note: Rates for counts of less than 10 are considered unreliable. For these values, rates were neither calculated nor displayed graphically.

Data Source: CDC Wonder (<http://wonder.cdc.gov>)

G. Map of Emergency Medical Services Regions in Illinois

For the next portion of this report, Section II, data for one of the Emergency Medical Services regions in Illinois are presented. The map below shows the location of these eleven regions.



Section II. Region 4 Report

Notes Regarding Interpretation of Regional Section

- **Location by Place of Treatment or Place of Residence**

In this regional report section, hospitalization and trauma cases (Sections A, B, C, and D below) are evaluated by **location of treatment**. This approach creates a bias of higher incidence for regions with tertiary care and specialty treatment centers, since serious cases are more likely to be treated at such centers.

- **Out-of-State Location of Treatment**

Discussion regarding Illinois residents that received treatment out-of-state is noted (Section E) because some regions experience a large number of such cases.

Note: Hospitalization data were available through 2006 for treatment by Illinois hospitals, but these data were available only through 2005 for treatment of Illinois residents by out-of-state hospitals in Indiana, Iowa, and Missouri. Because of this limitation, Section B (distribution of diagnoses for hospitalized inpatients) and Section D (analysis of transfer patients) are restricted to data through 2005. In this way a comparison can be made between in-state and out-of-state treatment.

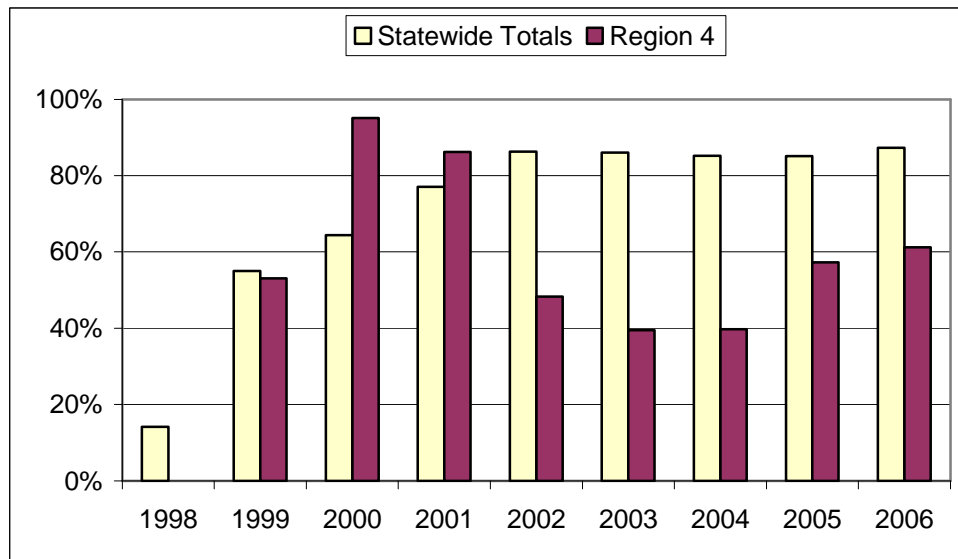
- **Aggregation of Five Years for Current Report**

EMSC receives data annually regarding hospitalization and trauma. However, for many regions, the numbers of hospitalized and/or trauma cases that occur in one year are too few to provide meaningful frequencies when categorized by diagnoses, causes of injury, etc. (Counts of ten or less are considered unreliable). As a result, many tables and graphs display aggregated data for the most recent five years available (2001-2005).

A. Development of Recognized Facilities

Facility recognition was extended to facilities in Region 4 as of May 1999. In 2006, 61.2 percent of all admissions from the emergency department for 0-15 year olds took place in Standby Emergency Department Approved for Pediatrics (SEDP), Emergency Department Approved for Pediatrics (EDAP), or Pediatric Critical Care Center (PCCC) facilities. By contrast, statewide in 2006, 87.3 percent of such admissions took place in SEDP, EDAP, or PCCC facilities (Figure 14).

Figure 14. Hospital Inpatient Admissions from the ED for 0-15 Year Olds By Percent of Cases Treated at SEDP, EDAP, or PCCC Facilities, 1998-2006 (Newborns Excluded)



Year	Region 4				Statewide Totals			
	Total Admissions	Admissions to Recognized Facilities	Admissions to Non-Recognized Facilities	Percent Recognized Facilities	Total Admissions	Admissions to Recognized Facilities	Admissions to Non-Recognized Facilities	Percent Recognized Facilities
1998	671	0	671	0.0%	37,974	5,392	32,582	14.2%
1999	633	336	297	53.1%	37,846	20,815	17,031	55.0%
2000	470	447	23	95.1%	37,734	24,282	13,452	64.4%
2001	465	401	64	86.2%	40,074	30,881	9,193	77.1%
2002	551	266	285	48.3%	38,610	33,342	5,268	86.4%
2003	712	281	431	39.5%	37,767	32,521	5,246	86.1%
2004	539	214	325	39.7%	36,753	31,321	5,432	85.2%
2005	603	345	258	57.2%	37,659	32,086	5,573	85.2%
2006	603	369	234	61.2%	36,423	31,799	4,624	87.3%

Data Sources: Illinois Hospital Association, Illinois Department of Public Health

Notes: EDAP status was extended to facilities in Region 4 as of May 1999.

Newborns, identified by admission type or by Diagnosis Related Group (DRG), were excluded.

B. Diagnoses for Hospital Inpatients Admitted from the Emergency Department⁴

Region-to-State Comparison

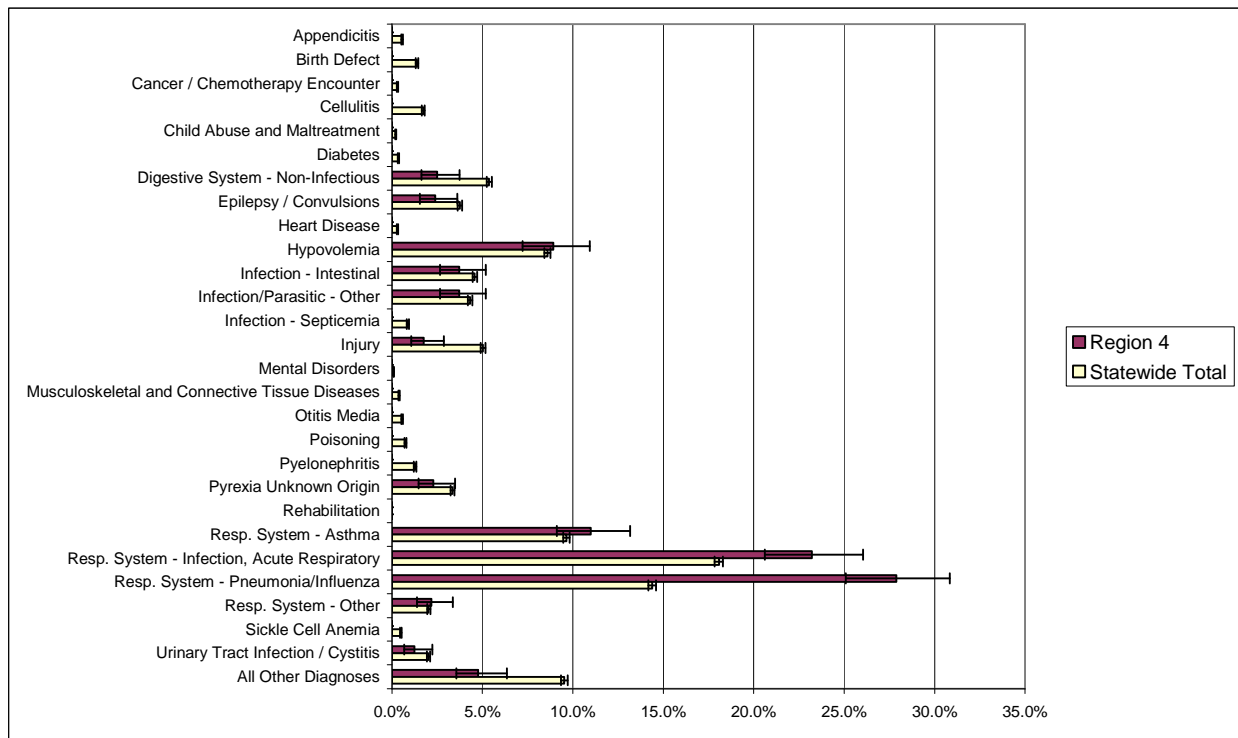
For the period of 2001-2005, Region 4 inpatients admitted from the Emergency Department (ED) compared with statewide admissions as follows (Figures 15, 16, and 17):

- ❑ A lower percentage of injury patients than appeared statewide for 10-15 year olds (9.1% vs 13.8%)
- ❑ A higher percentage of mental disorder patients than appeared statewide for 5-9 year olds (25.7% vs 4.2%) and for 10-15 year olds (51.8% vs 22.9%)
- ❑ A higher percentage of patients with acute respiratory infection for 0-4 year olds (23.2% vs 18.1% statewide)
- ❑ A higher percentage of patients with pneumonia/influenza for 0-4 year olds (27.9% vs 14.4% statewide) and for 5-9 year olds (15.0% vs 8.9%)

(Note: Modified diagnosis groupings were used for this report. Please see Appendix B, Section 1a.)

⁴ The distribution of diagnoses is reported as percentages and compares the region to the state. Rates require information by location of patient's residence and therefore are not available.

Figure 15. Hospital Admissions from the ED for 0-4 Year-Olds by EMS Region of Facility, Excluding Newborns, 2001-2005



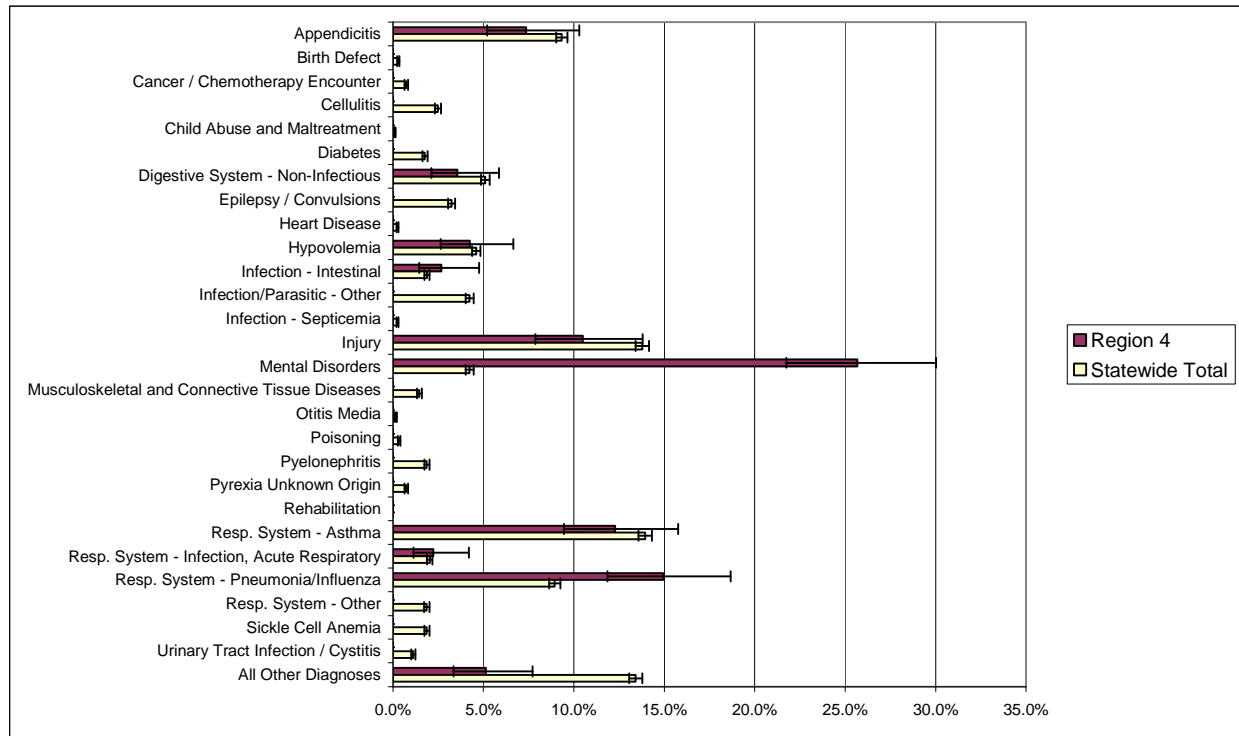
Diagnosis Group	Region 4		95% CI		Statewide Total		95% CI	
	Number	Percent	Lower	Upper	Number	Percent	Lower	Upper
Appendicitis	2	*		0.8%	577	0.6%	0.5%	0.6%
Birth Defect	3	*			1,423	1.4%	1.3%	1.5%
Cancer / Chemotherapy Encounter	0	*			319	0.3%	0.3%	0.3%
Cellulitis	5	*			1,792	1.7%	1.7%	1.8%
Child Abuse and Maltreatment	0	*			215	0.2%	0.2%	0.2%
Diabetes	0	*			365	0.4%	0.3%	0.4%
Digestive System - Non-Infectious	24	2.5%	1.6%	3.7%	5,529	5.4%	5.2%	5.5%
Epilepsy / Convulsions	23	2.4%	1.6%	3.6%	3,862	3.8%	3.6%	3.9%
Heart Disease	1	*			317	0.3%	0.3%	0.3%
Hypovolemia	86	8.9%	7.2%	10.9%	8,842	8.6%	8.4%	8.8%
Infection - Intestinal	36	3.7%	2.7%	5.2%	4,711	4.6%	4.5%	4.7%
Infection/Parasitic - Other	36	3.7%	2.7%	5.2%	4,448	4.3%	4.2%	4.4%
Infection - Septicemia	5	*			903	0.9%	0.8%	0.9%
Injury	17	1.8%	1.1%	2.9%	5,180	5.0%	4.9%	5.2%
Mental Disorders	7	*			102	0.1%	0.1%	0.1%
Musculoskeletal and Connective Tissue Diseases	0	*			407	0.4%	0.4%	0.4%
Otitis Media	7	*			584	0.6%	0.5%	0.6%
Poisoning	7	*			760	0.7%	0.7%	0.8%
Pyelonephritis	6	*			1,317	1.3%	1.2%	1.4%
Pyrexia Unknown Origin	22	2.3%	1.5%	3.5%	3,439	3.3%	3.2%	3.5%
Rehabilitation	0	*			2	*		
Resp. System - Asthma	106	11.0%	9.1%	13.2%	9,924	9.6%	9.5%	9.8%
Resp. System - Infection, Acute Respiratory	224	23.2%	20.6%	26.0%	18,599	18.1%	17.8%	18.3%
Resp. System - Pneumonia/Influenza	269	27.9%	25.1%	30.8%	14,812	14.4%	14.2%	14.6%
Resp. System - Other	21	2.2%	1.4%	3.4%	2,095	2.0%	2.0%	2.1%
Sickle Cell Anemia	0	*			512	0.5%	0.5%	0.5%
Urinary Tract Infection / Cystitis	12	1.2%	0.7%	2.2%	2,080	2.0%	1.9%	2.1%
All Other Diagnoses	46	4.8%	3.5%	6.4%	9,802	9.5%	9.3%	9.7%
Total for All Diagnoses	965	100.0%			102,918	100.0%		

Data Source: Illinois Hospital Association

Notes: Newborns, identified by admission type or by Diagnosis Related Group (DRG), were excluded.

*For counts of less than 10, percentages are considered unreliable and so were neither noted nor displayed graphically.

Figure 16. Hospital Admissions from the ED for 5-9 Year-Olds by EMS Region of Facility, 2001-2005

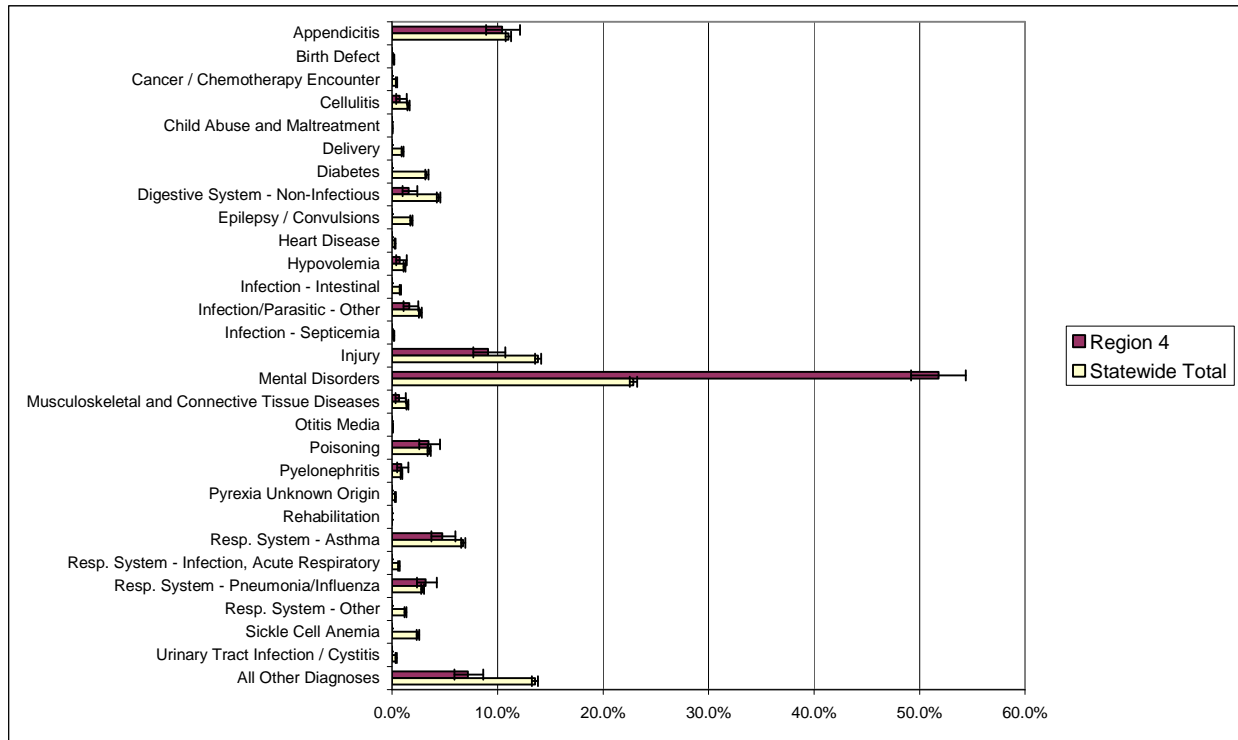


Diagnosis Group	Region 4		95% CI		Statewide Total		95% CI	
	Number	Percent	Lower	Upper	Number	Percent	Lower	Upper
Appendicitis	33	7.4%	5.2%	10.3%	3,137	9.3%	9.0%	9.6%
Birth Defect	0	*			100	0.3%	0.2%	0.4%
Cancer / Chemotherapy Encounter	0	*			246	0.7%	0.6%	0.8%
Cellulitis	9	*			835	2.5%	2.3%	2.7%
Child Abuse and Maltreatment	0	*			36	0.1%	0.1%	0.1%
Diabetes	0	*			593	1.8%	1.6%	1.9%
Digestive System - Non-Infectious	16	3.6%	2.1%	5.9%	1,715	5.1%	4.9%	5.3%
Epilepsy / Convulsions	4	*			1,088	3.2%	3.0%	3.4%
Heart Disease	0	*			82	0.2%	0.2%	0.3%
Hypovolemia	19	4.2%	2.6%	6.7%	1,547	4.6%	4.4%	4.8%
Infection - Intestinal	12	2.7%	1.5%	4.8%	632	1.9%	1.7%	2.0%
Infection/Parasitic - Other	9	*			1,423	4.2%	4.0%	4.5%
Infection - Septicemia	6	*			81	0.2%	0.2%	0.3%
Injury	47	10.5%	7.9%	13.8%	4,633	13.8%	13.4%	14.1%
Mental Disorders	115	25.7%	21.7%	30.0%	1,423	4.2%	4.0%	4.5%
Musculoskeletal and Connective Tissue Diseases	2	*			492	1.5%	1.3%	1.6%
Otitis Media	0	*			54	0.2%	0.1%	0.2%
Poisoning	4	*			113	0.3%	0.3%	0.4%
Pyelonephritis	5	*			630	1.9%	1.7%	2.0%
Pyrexia Unknown Origin	1	*			247	0.7%	0.6%	0.8%
Rehabilitation	0	*			2	*		
Resp. System - Asthma	55	12.3%	9.5%	15.8%	4,688	13.9%	13.6%	14.3%
Resp. System - Infection, Acute Respiratory	10	2.2%	1.1%	4.2%	685	2.0%	1.9%	2.2%
Resp. System - Pneumonia/Influenza	67	15.0%	11.9%	18.7%	3,007	8.9%	8.6%	9.3%
Resp. System - Other	4	*			629	1.9%	1.7%	2.0%
Sickle Cell Anemia	1	*			631	1.9%	1.7%	2.0%
Urinary Tract Infection / Cystitis	6	*			378	1.1%	1.0%	1.2%
All Other Diagnoses	23	5.1%	3.4%	7.7%	4,510	13.4%	13.0%	13.8%
Total for All Diagnoses	448	100.0%			33,637	100.0%		

Data Source: Illinois Hospital Association

Notes: For counts of less than 10, percentages are considered unreliable and so were neither noted nor displayed graphically.

Figure 17. Hospital Admissions from the ED for 10-15 Year-Olds by EMS Region of Facility, 2001-2005



Diagnosis Group	Region 4		95% CI		Statewide Total		95% CI	
	Number	Percent	Lower	Upper	Number	Percent	Lower	Upper
Appendicitis	151	10.4%	8.9%	12.1%	5,999	11.0%	10.8%	11.3%
Birth Defect	1	*			102	0.2%	0.2%	0.2%
Cancer / Chemotherapy Encounter	0	*			244	0.4%	0.4%	0.5%
Cellulitis	11	0.8%	0.4%	1.4%	857	1.6%	1.5%	1.7%
Child Abuse and Maltreatment	0	*			24	0.0%	0.0%	0.1%
Delivery	8	*			552	1.0%	0.9%	1.1%
Diabetes	6	*			1,793	3.3%	3.2%	3.5%
Digestive System - Non-Infectious	23	1.6%	1.0%	2.4%	2,404	4.4%	4.3%	4.6%
Epilepsy / Convulsions	8	*			1,000	1.8%	1.7%	2.0%
Heart Disease	0	*			161	0.3%	0.3%	0.3%
Hypovolemia	11	0.8%	0.4%	1.4%	649	1.2%	1.1%	1.3%
Infection - Intestinal	5	*			430	0.8%	0.7%	0.9%
Infection/Parasitic - Other	24	1.7%	1.1%	2.5%	1,457	2.7%	2.5%	2.8%
Infection - Septicemia	4	*			99	0.2%	0.1%	0.2%
Injury	132	9.1%	7.7%	10.7%	7,517	13.8%	13.5%	14.1%
Mental Disorders	750	51.8%	49.2%	54.4%	12,426	22.9%	22.5%	23.2%
Musculoskeletal and Connective Tissue Diseases	10	0.7%	0.4%	1.3%	794	1.5%	1.4%	1.6%
Otitis Media	0	*			36	0.1%	0.0%	0.1%
Poisoning	50	3.5%	2.6%	4.6%	1,913	3.5%	3.4%	3.7%
Pyelonephritis	13	0.9%	0.5%	1.6%	482	0.9%	0.8%	1.0%
Pyrexia Unknown Origin	3	*			176	0.3%	0.3%	0.4%
Rehabilitation	0	*			2	*		
Resp. System - Asthma	69	4.8%	3.8%	6.0%	3,665	6.7%	6.5%	7.0%
Resp. System - Infection, Acute Respiratory	6	*			359	0.7%	0.6%	0.7%
Resp. System - Pneumonia/Influenza	46	3.2%	2.4%	4.3%	1,576	2.9%	2.8%	3.0%
Resp. System - Other	6	*			696	1.3%	1.2%	1.4%
Sickle Cell Anemia	2	*			1,339	2.5%	2.3%	2.6%
Urinary Tract Infection / Cystitis	5	*			214	0.4%	0.3%	0.5%
All Other Diagnoses	104	7.2%	5.9%	8.7%	7,357	13.5%	13.3%	13.8%
Total for All Diagnoses	1,448	100.0%			54,323	100.0%		

Data Source: Illinois Hospital Association

Notes: *Percentages for counts of less than 10 are considered unreliable. For these values, percents were neither noted nor displayed graphically.

C. Trauma⁵

a) Causes of Injury for Trauma Registry Patients

Region-State Comparison

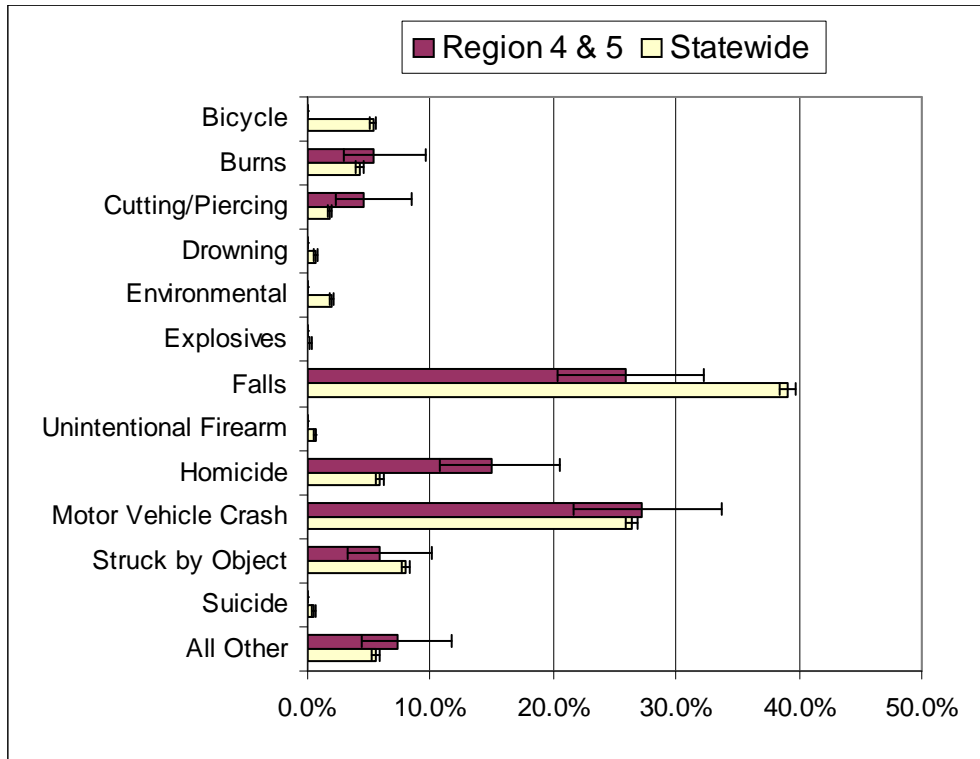
Using E-Codes for 0-15 year old patients recorded in the trauma registry from 2000-2004, Region 4 and 5 trauma centers compared with statewide trauma centers as follows (Figure 18):

- A lower percentage of falls than appeared statewide (25.9% vs 39.1%)
- A higher percentage of homicides than appeared statewide (15.0% vs 5.9%)

(Notes: These data used region of treatment, not location of occurrence. Also, for the evaluation of causes of trauma injury, patients transferred out to another trauma center were not counted in order to avoid duplication.)

⁵ The distribution of trauma cases is reported as percentages and compares the region to the state. Rates require information by location of patient's residence and therefore are not available.

Figure 18. Causes of Injury for Children 0-15 Years Old by Location of Treatment for Cases Reported to the Trauma Registry, 2000-2004



Cause of Injury (E-Code Group)	Region 4 & 5		95% CI		Statewide		95% CI	
	Count	Percent	Lower	Upper	Count	Percent	Lower	Upper
Bicycle	5	*			1,370	5.3%	5.0%	5.6%
Burns	12	5.5%	3.0%	9.6%	1,091	4.2%	4.0%	4.5%
Cutting/Piercing	10	4.5%	2.3%	8.4%	456	1.8%	1.6%	1.9%
Drowning	1	*			166	0.6%	0.6%	0.8%
Environmental	8	*			492	1.9%	1.7%	2.1%
Explosives	1	*			63	0.2%	0.2%	0.3%
Falls	57	25.9%	20.4%	32.3%	10,089	39.1%	38.5%	39.7%
Unintentional Firearm	3	*			158	0.6%	0.5%	0.7%
Homicide	33	15.0%	10.7%	20.6%	1,518	5.9%	5.6%	6.2%
Motor Vehicle Crash	60	27.3%	21.6%	33.7%	6,808	26.4%	25.9%	26.9%
Struck by Object	13	5.9%	3.3%	10.1%	2,038	7.9%	7.6%	8.2%
Suicide	1	*			124	0.5%	0.4%	0.6%
All Other	16	7.3%	4.4%	11.8%	1,423	5.5%	5.2%	5.8%
Totals	220	91.4%			25,796	100.0%		

Data Source: IDPH Illinois Trauma Registry

Notes: Transfers to superseding trauma centers were counted only for the receiving facility.

*Percentages for counts of less than 10 are considered unreliable. For these values, percents were neither noted nor displayed graphically.

The EMS region in which the patient was treated, not the location of occurrence, reports cases.

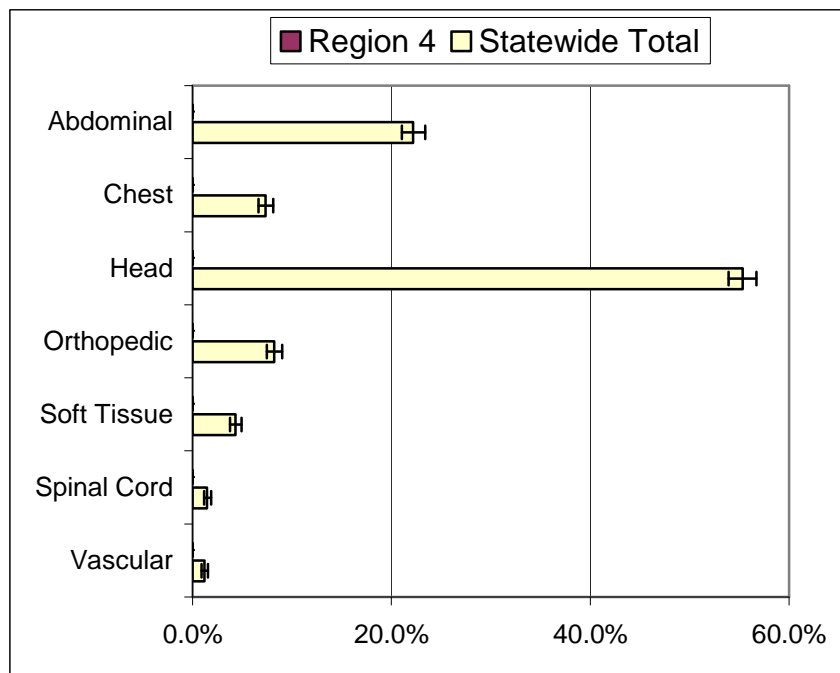
b) Types of Injury

Region-State Comparison

A small set of diagnosis codes representative of a seriously injured trauma population were used to categorize trauma injury type (see Appendix B, Section 2). Checking for these codes as the principal diagnosis for all 0-15 year old inpatients admitted from the ED between 2001-2005, all hospitals in Region 4 compared with all hospitals statewide as follows (Figure 19):

- For none of these injury types were there a sufficient number of cases (10) to perform a comparison with statewide totals

Figure 19. Trauma Injury Types for Children 0-15 Years Old Admitted From the ED, Using Selected Diagnoses, by EMS Region of Facility, 2001-2005



Trauma Type for Selected Diagnoses	Region 4		95% CI		Statewide Total		95% CI	
	Count	Percent	Lower	Upper	Count	Percent	Lower	Upper
Abdominal	3	*			1,078	22.2%	21.0%	23.4%
Chest	7	*			356	7.3%	6.6%	8.1%
Head	3	*			2,688	55.3%	53.9%	56.7%
Orthopedic	2	*			398	8.2%	7.4%	9.0%
Soft Tissue	4	*			209	4.3%	3.8%	4.9%
Spinal Cord	0	*			71	1.5%	1.2%	1.9%
Vascular	0	*			58	1.2%	0.9%	1.6%
Total	19	100.0%			4,858	100.0%		

Data Source: Illinois Hospital Association

Notes: *Percentages for counts of less than 10 are considered unreliable. For these values, percents were neither noted nor displayed graphically.

D. Decline in Injury Mortality Compared with National Data

The decline in mortality for high severity injury that was found in Illinois EDAP facilities, as described earlier in this report (see “Measures Associated with Facility Recognition”, pages 3-4), is a particularly important finding for the EMSC program. To investigate this finding further, a “benchmark” comparison was performed to similar cases where no facility recognition program is available.

A nationally representative sample of hospital inpatients was obtained for the years 1994 through 2005.⁶ During this time period, the large majority of states did not offer facility recognition programs. As a result, the national sample overall serves as a “non-facility recognition” comparison group.

The national sample consists of six million to eight million inpatient records submitted each year by hospitals throughout the United States. The records are weighted to represent the full inpatient experience for all U.S. hospitals. To compare these data with the Illinois EDAP findings, inpatients from this national sample were selected as follows:

- Age 0 through 15 years
- Admitted from the emergency department
- Principal diagnosis of injury

Also, as with the Illinois data, the software ICDMAP90[®] (The Johns Hopkins University and Tri-Analytics, Inc.) was applied to obtain injury severity scores for these records. For comparison purposes, both data sets were further restricted as follows:

- Inpatients with high severity injuries (ISS 17-75)

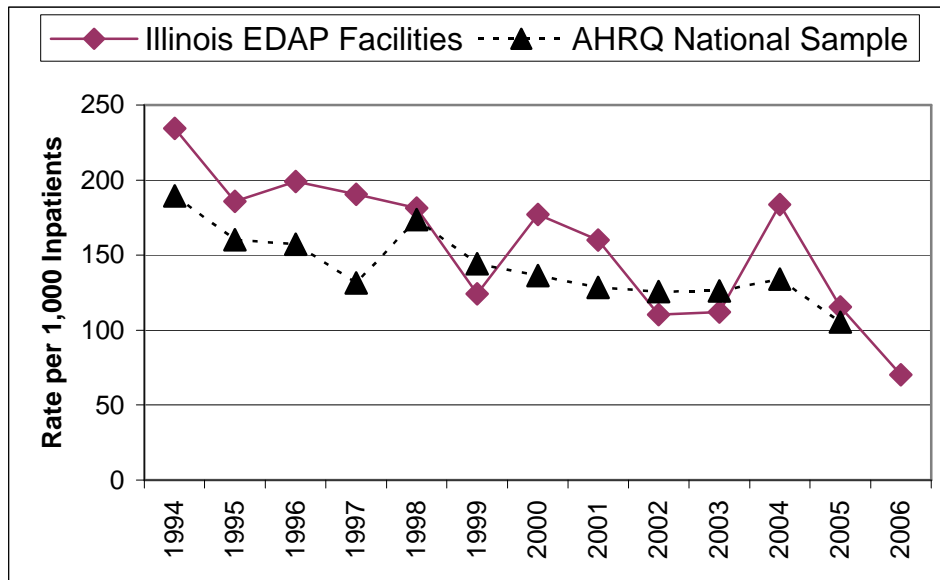
Using this selected subset of patients for both the national sample and Illinois EDAP facilities, annual mortality rates per 1,000 inpatients were calculated for 0-15 year olds admitted from the ED with severe injuries. Figure 20 shows the annual rates for the two data sets. (Note that the national data sample was available only through 2005.)

Using established epidemiological methods for estimating changes in rate over time,⁷ the Illinois rate for EDAP facilities declined 6.5% per year ($p < 0.01$, 95% CI = 9.8%, 3.1%) and the national sample rate declined 3.7% per year ($p < 0.01$, 95% CI = 5.3%, 2.0%). Although the difference was not statistically significant, the Illinois decline was greater.

⁶ HCUP Nationwide Inpatient Sample (NIS). Healthcare Cost and Utilization Project (HCUP). 1994-2005. Agency for Healthcare Research and Quality, Rockville, MD. www.hcup-us.ahrq.gov/nisoverview.jsp. Accessed June 25, 2007.

⁷ National Cancer Institute. Available at http://seer.cancer.gov/seerstat/WebHelp/seerstat.htm#Trend_Algorithms.htm. Accessed June 28, 2007.

Figure 20. Mortality Rates per 1,000 Injury-Related Inpatient Admissions from the ED For 0-15 Year Olds with Severe Injuries (ISS 17-75), 1994-2006
 (Note: AHRQ data were available only through 2005)



Year	Illinois EDAP Facilities			AHRQ National Sample		
	Mortalities	Total	Rate per 1,000	Mortalities	Total	Rate per 1,000
1994	45	192	234.4	999	5278	189.4
1995	42	226	185.8	869	5422	160.3
1996	39	196	199.0	854	5432	157.3
1997	36	189	190.5	657	4997	131.4
1998	35	193	181.3	921	5297	173.8
1999	23	185	124.3	816	5651	144.3
2000	31	175	177.1	568	4166	136.3
2001	28	175	160.0	563	4385	128.5
2002	19	172	110.5	630	5009	125.7
2003	23	205	112.2	727	5757	126.3
2004	34	185	183.8	948	7073	134.0
2005	20	173	115.6	623	5916	105.4
2006	11	157	70.1	N/A	N/A	N/A

Data Sources: AHRQ, Illinois Hospital Association, Illinois EMSC

As noted previously, decreases in mortality can likely be attributed to multiple factors, one of which may be the increased awareness and attention to pediatric emergency care needs emphasized through the facility recognition process.

E. Out-Of-State Hospitalization

For some EMS regions in Illinois, a considerable proportion of patients may be admitted to out-of-state hospitals. Using hospital discharge records that the Illinois Hospital Association obtained from Indiana, Iowa, and Missouri for 2001-2005, the percentage of such cases for 0-15 year olds was calculated.

When that value exceeded five percent, the diagnoses of in-state hospitalizations were compared with diagnoses from all hospitalizations (including out-of-state) for residents of that region. In this way we looked for biases in this report.

For the period of 2001-2005, admissions from the emergency department experienced by residents of Region 4 (excluding newborns) occurred in out-of-state hospitals at percentages higher than 5 percent for all three age groups used in this report (84.1% for 0-4 year olds, 79.0% for 5-9 year olds, and 57.0% for 10-15 year olds). A comparison of out-of-state diagnoses to all-resident diagnoses (including out-of-state) showed the following:

- For 0-4 year old residents, a lower percentage were admitted for pneumonia/influenza (12.0% vs 14.4%)
- For 10-15 year old residents, a higher percentage were admitted for injury (20.2% vs 15.5%) and a lower percentage for mental illness (6.2% vs 26.7%)

References

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4. Agency for Healthcare Research and Quality. *AHRQ Quality Indicators - Guide to Prevention Quality Indicators: Hospital Admission for Ambulatory Care Sensitive Conditions*. 2001, Rockville, MD: Agency for Healthcare Research and Quality. AHRQ Pub. No. 02-R0203.
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7. Illinois Center for Health Statistics, *Vital Statistics Illinois 1999*. 2003, Springfield, IL: Illinois Department of Public Health.
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Appendix A. COI Program Improvement for EMS Region 5

Illinois EMS for Children Quality Improvement and Indicator Monitoring Report

Title of Project: **Respiratory Symptoms Assessment**
 Date of Report: January 10, 2007
 EMSC Region: Region 5
 Facility: All Participating Facilities in the Regional CQI Effort

1. Opportunity / Issue / Problem Identification (PLAN)

- Opportunity: Assessment of respiratory symptoms in the ED
- Problem: Less than adequate reassessment of breath sounds (37%), respiratory rate (63%) and SpO2 (57%)
- Goals: Improved reassessment

2. Most Likely Causes

- Lack of staff awareness of expectations
- Lack of existing guidelines, protocols
- Lack of pediatric reassessment knowledge

3. Solution(s) Implemented (DO)

- Educational presentations
- Support of leadership teams
- Collaboration amongst CQI liaisons

4. Data Elements Collected for Evaluation

- Age
- Weight
- Initial assessment documented
- Reassessment documented
- Each hospital evaluates 30 charts per quarter for pediatric patients presenting with any form of respiratory symptoms such as cough, congestion, wheezing, trouble breathing, asthma, etc.

5. Results and Data Analysis (STUDY)

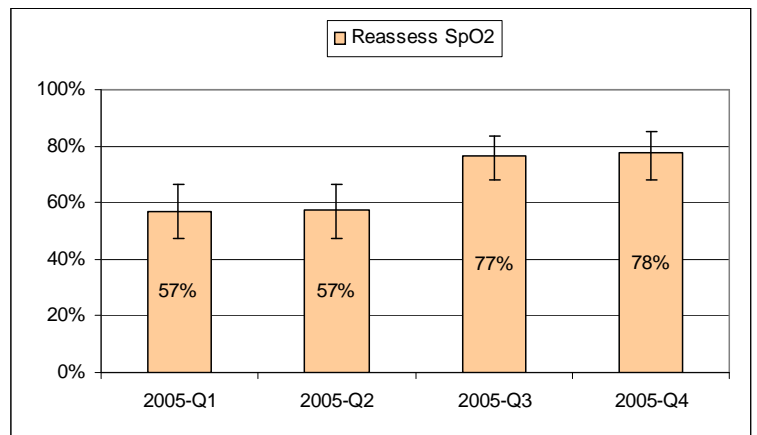
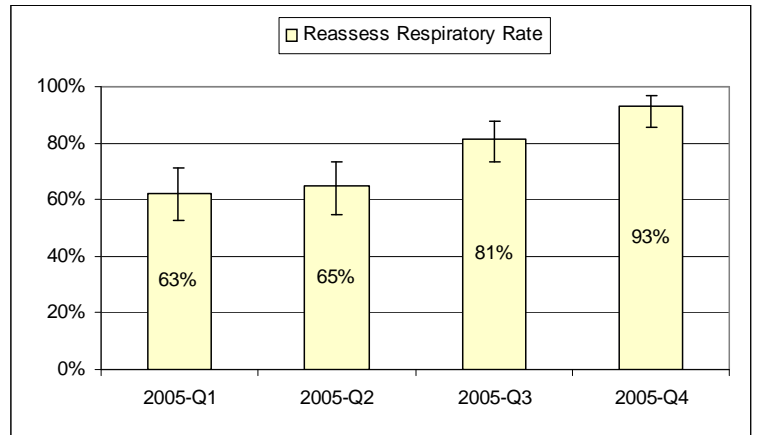
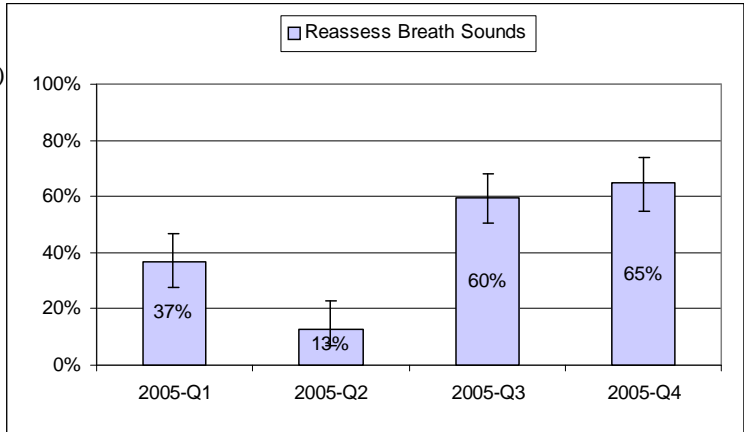
- Reassessment of breath sounds: 28% improvement
- Reassessment of respiratory rate: 30% improvement
- Reassessment of SpO2: 21% improvement

6. Conclusions and Recommendations (ACT)

- Conclusion: The emergency departments in Illinois EMSC Region 5 have shown progress toward the goals of improving reassessment for children presenting with respiratory symptoms. This improvement follows educational efforts. This improvement follows educational efforts.
- Recommendations: Continue on-going efforts to maintain positive clinical outcomes in pediatric respiratory symptom reassessment. Attempt to further identify barriers. On-going data analysis.

Region 5 EMSC CQI – Respiratory Symptoms Assessment Regional Totals for 2005

Note: Error bars represent 95% confidence intervals.



Appendix B: Methods

1. Recodes

The code groups used in this report to categorize diagnoses and causes of injury are based on established sources for persons of all ages. However, a focus on children resulted at times in small numbers for some of these groups and/or an excessive number in the catchall “other” categories. As a result slight modifications were made in the group coding for these sets of data.

a. ICD-9-CM Diagnosis Groups. The diagnosis groups are based on groupings used in the EMS Reporting System, a Web-based tool available on the IDPH Web site (<http://app.idph.state.il.us/emsrpt/index.htm>). This categorization was modified from the Community Health Information System (CHIS), a data set originally developed by the Illinois Hospital Association. The categories were modified to identify diagnosis groups found for children, as shown in Table A-1.

Table A-1. Diagnosis Categories Used in Report

Modified Groups for Report	Codes
Appendicitis	540-543
Birth Defect	740-759
Cancer / Chemotherapy Encounter	140-208, 235-239, V581
Cellulitis	681-682
Child Abuse and Maltreatment	995.5, V61.21
Delivery	D370-375
Diabetes	250
Digestive System - Non-Infectious	529-537, 550-579
Epilepsy / Convulsions	345, 7803
Heart Disease	393-398, 402, 404-429
Hypovolemia	2765
Infection – Intestinal	001-009
Infection/Parasitic – Other	010-139 (excludes 038)
Infection – Septicemia	038
Injury	800-959
Mental Disorders	290-319
Musculoskeletal & Connective Tissue Diseases	710-739
Newborn	D385-391
Otitis Media	381-382
Poisoning	960-989
Pyelonephritis	590
Pyrexia Unknown Origin	7806
Rehabilitation	D462
Resp. System – Asthma	493
Resp. System - Infection, Acute Respiratory	460-466
Resp. System - Pneumonia/Influenza	480-487
Resp. System – Other	470-478, 490-492, 494-519
Sickle Cell Anemia	282.6
Urinary Tract Infection / Cystitis	595, 5990
All Other Diagnoses	

b. Cause of Injury Groups. The groups for cause of injury are based on the EMS Reporting System, a Web-based tool available on the IDPH Web site (<http://app.idph.state.il.us/emsrpt/index.htm>). This categorization was based on groups of selected ICD-9-CM codes for external cause of injury (E-Codes). Further modifications helped identify cause of injury categories for children, as shown in Table A-2.

Table A-2. Cause-of-Injury Categories Used in Report

Modified Groups for Report	Codes
Bicycle	E826
Burns	E890-E899, E924
Cutting/Piercing	E920
Drowning	E910
Environmental	E900-E909
Explosives	E921-E923
Falls	E880-E888
Unintentional Firearm	E922-E922.9
Foreign Body	E914-E915
Homicide	E960-E969
Motor Vehicle Crash	E810-E825
Struck by Object	E916-E918
Suicide	E950-E959
All Other	

2. Trauma Injury Types

A small set of diagnosis codes representative of a trauma population have been used to categorize trauma injury type (the Washington State Hospital Commission's report, *Trauma Incidence and Care: A Retrospective Assessment*, September 8, 1989, Olympia, WA). These codes and the related type are presented in Table A-3. For this report, we examined records for these codes as the principal diagnosis.

Table A-3. ICD-9-CM Codes Representative of a Trauma Population by Injury Type

Injury Type	ICD-9-CM Code	Description
Abdominal	863	Injury to gastrointestinal tract
	864	Injury to liver
	865	Injury to spleen
	866	Injury to kidney
	867	Injury to pelvic organs
	868	Injury to other intra-abdominal organs
	869	Internal injury to unspecified organs in chest, abdominal, and pelvic areas
	902	Injury to blood vessels of abdomen and pelvis
Chest	807	Fracture of rib(s), sternum, larynx and trachea
	860	Traumatic pneumothorax and hemothorax
	861	Injury to heart and lung
	862	Injury to other intrathoracic organs
	875	Open wound of chest (wall)
	901	Injury to blood vessels of thorax
	926	Crushing injury of trunk
Head	800	Fracture of the vault of the skull
	801	Fracture of the base of the skull
	803	Other skull fractures
	804	Multiple fractures involving skull or face with other bones
	850.3	Concussion - with prolonged loss of consciousness and return to pre-existing consciousness level
	850.4	Concussion - with prolonged loss of consciousness without return to pre-existing consciousness level
	851	Cerebral laceration and contusion
	852	Subarachnoid, subdural, and extradural hemorrhage, following injury
	853	Other intracranial hemorrhage following injury
	854	Intracranial injury, unspecified
Orthopedic	805	Fracture of the vertebral column without mention of spinal cord injury
	808	Fracture of the pelvis
	819	Multiple fractures involving both upper limbs, and upper limb with rib(s) and sternum
	828	Multiple fractures involving both lower limbs, lower with upper limb, lower limb(s) with rib(s) and sternum
	839	Other lower limb fracture, multiple, and ill-defined locations
	887	Traumatic amputation of arm and hand (complete) (partial)
	896	Traumatic amputation of foot (complete) (partial)
	897	Traumatic amputation of leg(s) (complete) (partial)
	928	Crushing injury of lower limb
	929	Crushing injury of multiple and unspecified sites
Soft Tissue	874	Open wound of neck
	876	Open wound of back
	879	Open wound of unspecified sites, except limbs
	890	Open wound of hip and thigh
Spinal Cord	806	Fracture of the vertebral column with spinal cord injury
	952	Spinal cord injury without evidence of spinal bone injury
Vascular	900	Injury to blood vessels of head and neck
	903	Injury to blood vessels of upper extremity
	904	Injury to blood vessels of lower extremity and unspecified sites

Source: Washington State Hospital Commission, Olympia, WA, September 1989

3. Census Estimates

Actual census data for the years 1990 and 2000 and census estimates for the years 1991-1999 and 2001 were downloaded from the U.S. Census Bureau Web site (<http://www.census.gov>). These were used throughout this report except for one set of values. This set consisted of information for Region 11 (Chicago) and the related values for Suburban Cook County.

Annual estimates for Chicago for the age group of 0-15 years were not available on the Census Web site. The Illinois Center for Health Statistics (ICHS) suggested an alternative approach, under certain assumptions of migration and fertility for the age groups of interest (personal communications, January 2002 and September 2003). The approach used two ICHS estimates for Chicago for the period 1991-1999 and 2001 – those for 0-14 year olds and for 15-19 year olds – and performed a calculation to estimate 15 year olds. The calculation was to average the proportion of 15 year olds among 15-19 year olds from actual census data for the years 1990 and 2000, and apply that average proportion to the 1991-1999 estimates for this group. For 2001 estimates, a similar process was applied, but using the proportion from 2000 only. The results are shown in Table A-4.

Table A-4. Actual and Estimated Populations for 0-15 Year Olds for the City of Chicago, 1990-2001

Type	Year	Population
<i>Actual</i>	1990	644,784
Estimate	1991	656,788
Estimate	1992	680,425
Estimate	1993	693,527
Estimate	1994	700,122
Estimate	1995	708,650
Estimate	1996	701,091
Estimate	1997	696,182
Estimate	1998	696,196
Estimate	1999	696,966
<i>Actual</i>	2000	681,847
Estimate	2001	679,384

Data Source: U.S. Census Bureau for actual populations in 1990 and 2000

Further, because of Chicago's location within Cook County, Suburban Cook County population estimates were derived by subtracting the Chicago estimates from the census estimates for all of Cook County.

4. Mortality Rates

Mortality rate calculations and presentation were performed in a style consistent with the Illinois Department of Public Health's *Vital Statistics Illinois 1999* (Illinois Center for Health Statistics, Springfield, IL, October 2001). In particular, crude death rates and cause-specific death rates were calculated as noted in that publication's Appendix 2 (page IV-14). Also the repression of unreliable rates for values less than 10 is described in Appendix 1 (pages IV-4 and IV-5). This appendix is also available on the Web (<http://www.idph.state.il.us/vital/pdf/appendices.pdf>).

5. Confidence Intervals

Confidence intervals were used in the same manner as in the publication *Vital Statistics Illinois 1999* (Illinois Center for Health Statistics, Springfield, IL: Illinois Department of Public Health, March 2003, page IV-5). To quote from that source:

In general, vital rates should be thought of and treated as estimations of “true” underlying rates. When the number of events is very large, the calculated rate will approach the value of the underlying rate. However, the opposite happens as the number of events becomes small and thus the rates are subject to greater chance fluctuations. Commonly, 90 or 95 percent confidence intervals or probability ranges can be calculated for rates. A 95 percent interval means that the true rate has a 19 in 20 chance of lying within the specified rate (which is normally distributed, meaning there is a central tendency within the range). See the Illinois Center for Health Statistics’ *Vital Statistics Basic Research Series* articles “The Pros and Cons of Standardized Rates” (Vol. 2, No. 1) and “The Interpolation and Practical Limitations of Mortality Measures” (Vol. 2, No. 4) for further discussion of confidence intervals and their calculation.

For this report, confidence intervals were calculated according to Joseph L. Fleiss’ *Statistical Methods for Rates and Proportions, Second Edition* (John Wiley & Sons, Inc., New York, 1981). In particular, the upper and lower limits are described in two equations in section 1.4, “Inferences About a Single Proportion” (page 14). These equations were used for both rate and percentage confidence intervals. The same approach for rates was used by the Illinois Department of Public Health in its publication *Adverse Pregnancy Outcomes in Illinois: County-Specific Prevalence and Related Infant Mortality, 1989-1998* (Epidemiologic Report Series 2000:4, Division of Epidemiologic Studies, Springfield, IL: Illinois Department of Public Health, May 2000).