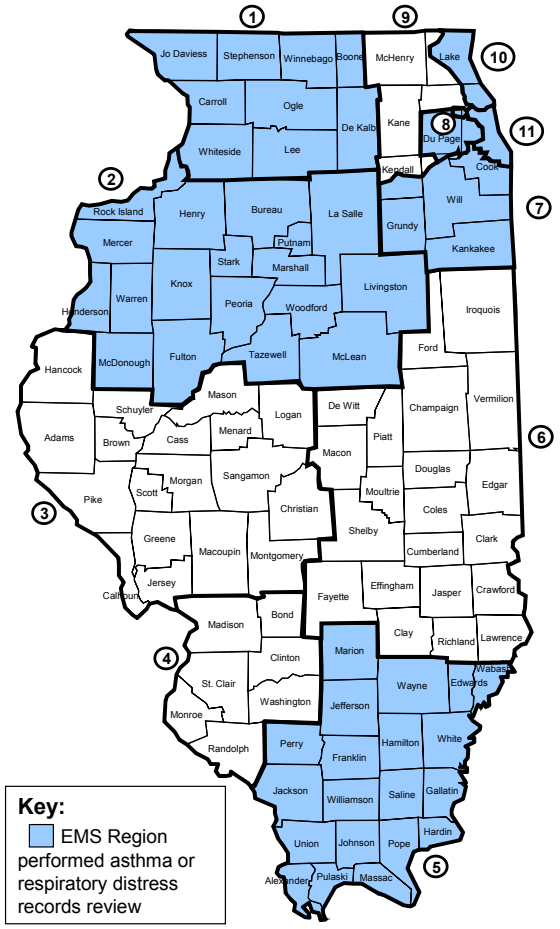
Illinois EMS for Children
Asthma and Respiratory Distress Record Review, 2002-2005

1. Introduction

From January 2002 through June 2005, as part of the ongoing EMSC Continuous Quality Improvement program, 68 hospital emergency departments (ED) in Illinois performed a total of 4,617 record reviews of pediatric patients with asthma or respiratory distress. These reviews were part of quality indicators defined by ED representatives at EMSC regional meetings. The regions performing these reviews included both urban and rural areas (see map below).

The focus of the reviews differed by region, but taken as a whole the reviews encompassed the continuum of care from treatment at home and by ambulance (pre-hospital) through emergency department care, outcomes, and patient education. Results of these reviews are presented in the following sections according to these components of patient care.

EMS Regions Performing Records Reviews of Pediatric Asthma or Respiratory Distress 2002-2005



Note Regarding Variation in Sample Size:

For this report, data were aggregated from seven of the eleven EMS regions in Illinois. Each region had its own focus in examining respiratory distress patients, and so each used a distinct set of record review items. A table showing the number of reviews by region and item appears in Appendix A.

When record review items for regions overlapped, the data were pooled. This resulted in variation in sample size by item. For example, in Table 1 on the next page, a smaller number of records appear for patients taking medications at home (247) than for those compliant with medications prescribed (468). The two numbers are not equal because different pools of records were used for the two items.

When items overlapped for many regions the number of records was large. For example, 2,202 records noted whether ED steroids were used. By contrast, when items did not overlap between regions the number of records was small. For example, few regions reviewed records for pre-hospital care, and most of their patients did not arrive by ambulance. As a result, less than 100 records were reviewed for pre-hospital treatment.

For this reason, 95% confidence intervals were used throughout this report. These intervals help qualify results particularly for small sample sizes.

2. Treatment at Home

For pediatric patients with respiratory distress, 60% took home medications or treatments before arriving at the emergency department (ED), and 81% reported compliance with their medications when they had received prescriptions (Table 1).

Table 1. Treatments at Home

Record Review Item	Review Results			95% Confidence Intervals	
	Number	Total	Percent	Lower	Upper
Taking Home Meds/Tx	247	411	60%	55%	65%
Compliance with Medications	468	575	81%	78%	84%

3. Pre-Hospital Care

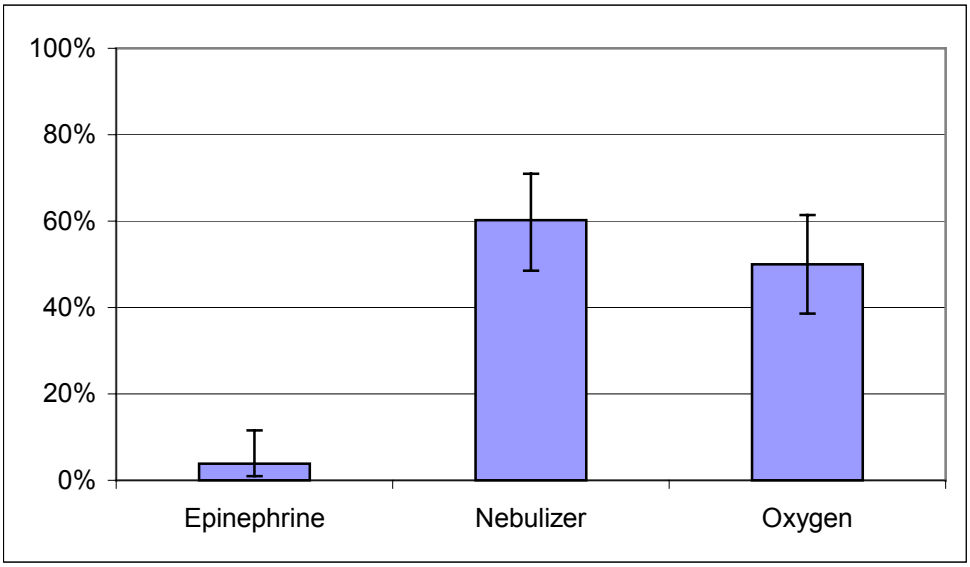
a) Pre-Hospital Assessment. For patients receiving pre-hospital care, either by Advanced Life Support (ALS) or Basic Life Support (BLS) ambulances, 89% of their records recorded respiratory effort and 99% recorded pulse oximetry (Table 2). For records with pulse oximetry available, 19% recorded SaO2 values of less than 92%.

Table 2. Pre-Hospital Assessment

Record Review Item	Review Results			95% Confidence Intervals	
	Number	Total	Percent	Lower	Upper
Respiratory Rate Documented	80	90	89%	80%	94%
Initial Pulse Oximetry Documented	89	90	99%	93%	100%
If Documented, Pulse Oximetry < 92%	16	83	19%	12%	30%

b) Pre-Hospital Treatment. For patients receiving ALS pre-hospital care, 83% were treated with at least one of epinephrine (4%), nebulizer (60%), and/or oxygen (50%), as shown in Figure 1. An insufficient number of BLS pre-hospital cases were reviewed to evaluate for treatments provided.

Figure 1. Pre-Hospital ALS Treatment[1]



Advanced Life Support (ALS) Tx	Review Results Number	Total	Percent	95% Confidence Intervals Lower	Upper
Epinephrine	3	78	4%	1%	12%
Nebulizer	47	78	60%	49%	71%
Oxygen	39	78	50%	39%	61%

4. Emergency Department Care

a) Emergency Department Assessment. Assessment of pediatric respiratory distress patients was recorded at high levels for patient weight (92%), respiratory effort (90%), breath sounds (89%), respiratory rate (99%), pulse oximetry (93%), and mental status (91%), as shown in Table 3. Recorded less often were skin color (75%), blood pressure (55%), and patient height (23%).

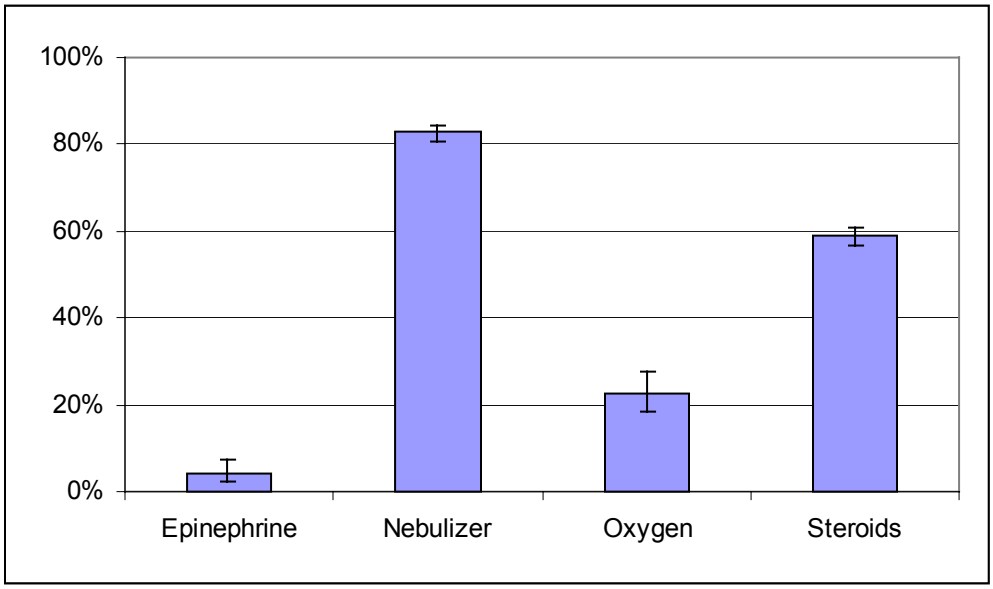
Table 3. Emergency Department Assessment

Record Review Item	Review Results Number	Total	Percent	95% Confidence Intervals Lower	Upper
Weight Documented	328	356	92%	89%	95%
Respiratory Effort Documented	1,333	1,483	90%	88%	91%
Breath Sounds Documented	1,321	1,483	89%	87%	91%
Respiratory Rate Documented	1,038	1,051	99%	98%	99%
Pulse Oximetry Documented	1,402	1,501	93%	92%	95%
Mental Status Documented	1,352	1,484	91%	90%	92%
Skin Color Documented	507	676	75%	72%	78%
Blood Pressure Documented	136	247	55%	49%	61%
Height Documented	71	315	23%	18%	28%

[1]Note: In this and all subsequent charts, error bars represent 95% confidence intervals.

b) Emergency Department Treatment of Both Asthma and Respiratory Distress Patients. Treatment of asthma and respiratory distress patients included 83% receiving nebulizer, 59% steroids, 23% oxygen, and 4% epinephrine, as shown in Figure 2.

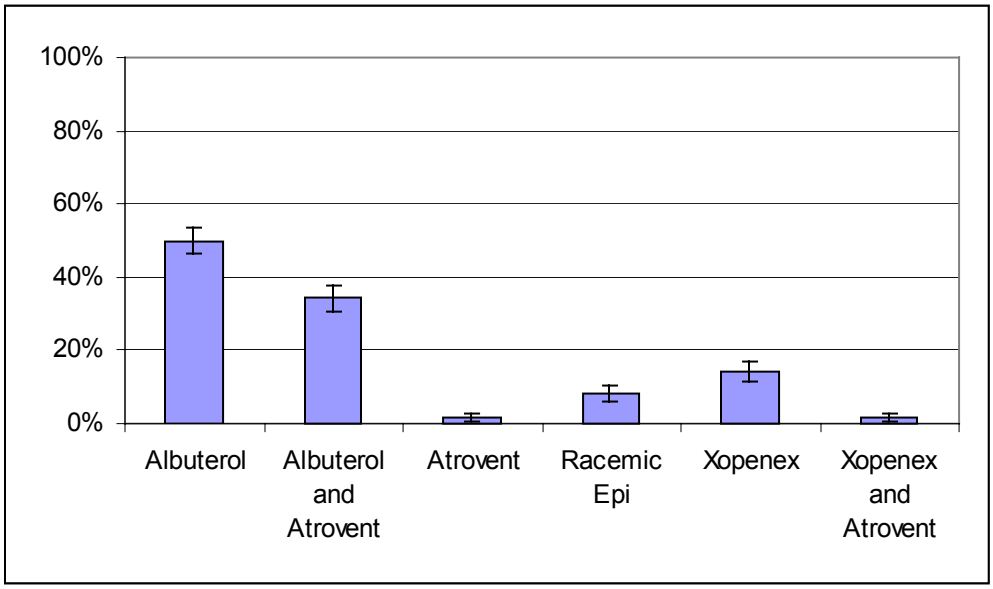
Figure 2. Emergency Department Treatment



Record Review Item	Review Results			95% Confidence Intervals	
	Number	Total	Percent	Lower	Upper
Epinephrine	14	327	4%	2%	7%
Nebulizer	1,284	1,552	83%	81%	85%
Oxygen	74	327	23%	18%	28%
Steroids	1,299	2,202	59%	57%	61%

For patients receiving nebulizer therapy, 71% received one treatment, 22% two treatments, and 7% three or more treatments. Medications included Albuterol (50%), Albuterol and Atrovent (34%), Xopenex (14%), Racemic Epi (8%), Xopenex and Atrovent (2%), and Atrovent alone (1%), as shown in Figure 3. (Note: These values add up to more than 100% because the same patient may have received different medications during therapy.)

Figure 3. Medication Distribution



Medication Distribution	Review Results			95% Confidence Intervals	
	Number	Total	Percent	Lower	Upper
Albuterol	365	731	50%	46%	54%
Albuterol and Atrovent	250	731	34%	31%	38%
Atrovent	10	731	1%	1%	3%
Racemic Epi	58	731	8%	6%	10%
Xopenex	103	731	14%	12%	17%
Xopenex and Atrovent	11	731	2%	1%	3%

c) Emergency Department Treatment of Asthma Patients. For asthma patients specifically, asthma flow sheets were used in 43% of records, evaluation peak flow in 36%, and post-treatment peak flow in 34% (Table 4).

Table 4. Asthma Patient Treatment

Record Review Item	Review Results			95% Confidence Intervals	
	Number	Total	Percent	Lower	Upper
Asthma Flowsheet Used	399	937	43%	39%	46%
Evaluation Peak Flow Completed	127	354	36%	31%	41%
Post-Tx Peak Flow Completed	122	354	34%	30%	40%

d) Emergency Department Reassessment. Reassessments were performed at much lower rates than initial assessments. These included 57% documentation of breath sounds, 72% respiratory rate, 64% pulse oximetry, and 70% mental status (Table 5). By contrast, initial assessments recorded 89% documentation of breath sounds, 99% respiratory rate, 93% pulse oximetry, and 91% mental status.

Table 5. Emergency Department Reassessment

Record Review Item	Review Results			95% Confidence Intervals	
	Number	Total	Percent	Lower	Upper
Breath Sounds Documented	481	850	57%	53%	60%
Respiratory Rate Documented	650	898	72%	69%	75%
Pulse Oximetry Documented	578	898	64%	61%	67%
Mental Status Documented	153	219	70%	63%	76%

5. Outcomes

Outcome measurements showed very high levels of patient improvement. These included 95% improvement in the work of breathing, 98% improved (cleared) after treatment, and 96% not having 48-hour-return visits to the same ED (Figure 4). It is important to note that the return rate only captures patients returning to the same facility. If a patient needed treatment within 48 hours at another emergency department, clinic, or physician's office, this information was not available.

After ED care, 84% of patients went home, 14% were admitted, and 2% were transferred. No mortalities were recorded among these patients.

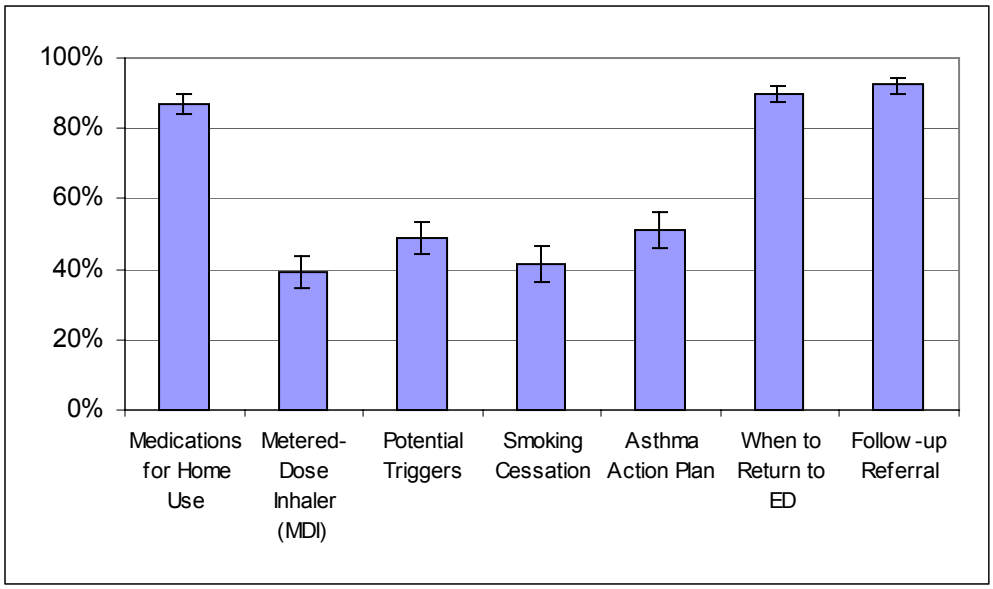
Figure 4. Outcomes

Record Review Item	Review Results			95% Confidence Intervals	
	Number	Total	Percent	Lower	Upper
Improvement (Clearing) with Treatment	692	704	98%	97%	99%
Work of Breathing Improved	274	288	95%	92%	97%
No 48-Hour-Return to Same ED	1,652	1,719	96%	95%	97%

6. Patient Education

In patient education, high percentages of records recorded patient teaching in areas directly relating to the ED and immediate treatment, such as 87% for home use of medications, 90% when to return to the ED, and 92% for follow-up referral. Lower percentages were found for less directly ED-related topics such as 39% for using a metered-dose inhaler, 49% for potential triggers, 42% for smoking cessation, and 51% for an asthma action plan.

Figure 5. Patient Education



Patient Education Provided	Review Results			95% Confidence Intervals	
	Number	Total	Percent	Lower	Upper
Medications for Home Use	557	639	87%	84%	90%
Metered-Dose Inhaler (MDI)	177	451	39%	35%	44%
Potential Triggers	253	517	49%	45%	53%
Smoking Cessation	147	354	42%	36%	47%
Asthma Action Plan	211	413	51%	46%	56%
When to Return to ED	594	661	90%	87%	92%
Follow-up Referral	551	596	92%	90%	94%

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7. Conclusion

This report presents a baseline of descriptive information available to the Illinois EMSC program regarding care of pediatric asthma and respiratory distress patients. It may provide useful benchmark data for later evaluations of care in this area.

Appendix A. Record Reviews by Region

Table A-1. Number of Record Reviews by Region and Topic

Topic	Region 1	Region 2	Region 5	Region 7	Region 8	Region 10	Region 11	Total
Treatments at Home								
Taking Home Meds/Tx		411						411
Compliance with Medications		575						575
Prehospital Assessment								
Respiratory Rate Documented					90			90
Initial Pulse Oximetry Documented					90			90
If Documented, Pulse Oximetry < 92%					83			83
Advanced Life Support (ALS) Tx								
Epinephrine					78			78
Nebulizer					78			78
Oxygen					78			78
Emergency Department Assessment								
Weight Documented			356					356
Respiratory Effort Documented	450		356				677	1,483
Breath Sounds Documented	450		356				677	1,483
Respiratory Rate Documented			356				695	1,051
Pulse Oximetry Documented	450		356				695	1,501
Mental Status Documented	450		356				678	1,484
Skin Color Documented							676	676
Blood Pressure Documented			247					247
Height Documented					315			315
Emergency Department Treatment								
Epinephrine					327			327
Nebulizer		871		354	327			1,552
Oxygen					327			327
Steroids		847			327	1028		2,202
Medication Distribution								
Albuterol		731						731
Albuterol and Atrovent		731						731
Atrovent		731						731
Racemic Epi		731						731
Xopenex		731						731
Xopenex and Atrovent		731						731
Asthma Patient Treatment								
Asthma Flowsheet Used						937		937
Evaluation Peak Flow Completed				354				354
Post-Tx Peak Flow Completed				354				354
Emergency Department Reassessment								
Breath Sounds Documented			172				678	850
Respiratory Rate Documented			220				678	898
Pulse Oximetry Documented			220				678	898
Mental Status Documented			219					219
Outcomes								
Improvement (Clearing) with Treatment		704						704
Work of Breathing Improved					288			288
No 48-Hour-Return to Same ED		794				925		1,719
Patient Education								
Medications for Home Use							639	639
Metered-Dose Inhaler (MDI)							451	451
Potential Triggers							517	517
Smoking Cessation							354	354
Asthma Action Plan							413	413
When to Return to ED							661	661
Follow-up Referral							596	596