Creating a System to Facilitate Translation of Evidence Into Standardized Clinical Practice: A Preliminary Report

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Study objective: The Institute of Medicine, through its landmark report concerning errors in medicine, suggests that standardization of practice through systematic development and implementation of evidence-based clinical pathways is an effective way of reducing errors in emergency systems. The specialty of emergency medicine is well positioned to develop a complete system of innovative quality improvement, incorporating best practice guidelines with performance measures and practitioner feedback mechanisms to reduce errors and therefore improve quality of care. This article reviews the construction, ongoing development, and initial impact of such a system at a large, urban, university teaching hospital and at 2 affiliated community hospitals.

Methods: The Committee for Procedural Quality and Evidence-Based Practice was formed within the Department of Emergency Medicine to establish evidence-based guidelines for nursing and provider care. The committee measures the effect of such guidelines, along with other quality measures, through pre- and postguideline patient care medical record audits. These measures are fed back to the providers in a provider-specific, peer-matched "scorecard."

Results: The Committee for Procedural Quality and Evidence-Based Practice affects practice and performance within our department. Multiple physician and nursing guidelines have been developed and put into use. Using asthma as an example, time to first nebulizer treatment and time to disposition from the emergency department decreased. Initial therapeutic agent changed and documentation improved.

Conclusion: A comprehensive, guideline-driven, evidence-based approach to clinical practice is feasible within the structure of a department of emergency medicine. High-level departmental support with dedicated personnel is necessary for the success of such a system. Internet site development (available at http://www.CPQE.com) for product storage has proven valuable. Patient care has been improved in several ways; however, consistent and complete change in provider behavior remains elusive. Physician scorecards may play a role in altering these phenomena. Emergency medicine can play a leadership role in the development of quality improvement, error reduction, and pay-for-performance systems. [Ann Emerg Med. 2008;51:80-86.]

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INTRODUCTION

In 1999, the Institute of Medicine published *To Err is Human: Building a Safer Health Care System*.[1] This groundbreaking report estimated that up to 100,000 hospitalized patients each year die of medical errors and poor-quality medical care. Although the number of deaths has been disputed, the report galvanized health care stakeholders to action.[2] The White House, Congress, industry, hospitals, and medical professionals were compelled to respond to the indictment, and many actions have been taken to address medical errors. This focus on errors has led to a consideration of the overall quality of care. In 2002, the Joint Commission

on Accreditation of Healthcare Organizations, the lead organization responsible for hospital oversight, made major changes in its accreditation process and implemented core measures as quality markers of health care delivery for acute myocardial infarction, congestive heart failure, community-acquired pneumonia, surgical infection prevention, and pregnancy-related conditions. These measures assess timeliness of care, therapeutic intervention, education, and mortality; they are now used as benchmarks for practice.[3] Further, health care payers are beginning to demand similar-quality data in exchange for reimbursement through programs labeled "pay for performance."[4]

In May 2000, the Society for Academic Emergency Medicine sponsored a conference on errors in emergency medicine.[5,6] The attendees agreed that there were few organized approaches addressing the problem of errors in the emergency department (ED) and there was little research and investigative structure to support specific corrective actions.[6] Despite the numerous and daunting barriers, the conference report states, "It is imperative to begin." A minimum of 14 areas of concern and potential improvement were identified, and one of the achievable goals identified for EDs was "simplification and standardization of processes." In support of standardization is a study of 6,712 patients treated for 30 acute and chronic conditions, which found that only 53.5% received the current recommended or "best care" for acute conditions.[7] One solution for standardizing care and ensuring that recommended diagnostics and treatments are delivered in the ED may be the implementation of evidence-based protocols and guidelines; it is likely that reduced variation in care decreases the likelihood of medical errors, particularly those of omission, and improves patient outcomes. Thus, in 2005, our department initiated a systematic approach to increase standardization of emergency procedures and clinical care through evidence-based medicine.

System Overview

Our quality initiative is led by the Committee for Procedural Quality and Evidence-Based Practice. Our Department of Emergency Medicine, in July 2003, formed the Committee for Procedural Quality and Evidence-Based Practice to meet the challenge of improving the quality of care provided in 1 large academic hospital's ED and 2 community hospital EDs. Previous attempts to standardize care within our complex system have been fragmented and lacked longevity; therefore, this novel centralized committee has been well resourced by the department chairperson to accomplish its goals. This high level of support is necessary for changes to be made to any complicated health care system.[8] The committee is directed by a dedicated faculty member and is codirected by a senior faculty member with experience in administration and quality improvement. A dedicated registered nurse with advanced computer skills constitutes the common thread through all meetings and functions of the committee and is vital to its overall success. She is responsible for coordination and publication of protocols, formatting and revision of all of the committee's products, data collection through medical record review, and data entry and is also the primary link from the Committee for Procedural Quality and Evidence-Based Practice to the hospital data systems. A biostatistician designs and builds data gathering instruments for monitoring and evaluating committee initiatives. A parallel meeting group of nurses and nursing management pursues the evidence-based practice of nursing care. Approval and institution of all committee initiatives rests within the committee's leadership, which makes the process manageable and responsive to end users' needs.

Overall, the Committee for Procedural Quality and Evidence-Based Practice seeks to positively influence the patient care plan throughout a typical patient care visit to the ED. Figure 1 represents a patient's care path and the areas of that path on which the committee is active. Activities include the creation of guidelines, order sets, evaluation forms, discharge instructions, and observation medicine protocols. Compliance with guidelines and protocols is then measured through structured audits, with feedback of these data and other quality measures given to the committee and then to providers in the form of physician scorecards. A core philosophy adopted by the Committee for Procedural Quality and Evidence-Based Practice is that physicians need not be required to use the practical tools offered but must be held accountable to the care standards outlined in guidelines and protocols. Thus, audits are not focused on use of the tools but on all documentation of care provided to patients, as described in detail below.

The ultimate goal of this process is to obtain complete compliance with standardized care, exceptional circumstances notwithstanding. The audit process is primarily designed to evaluate existing care against the objective criteria defined within the guidelines and protocols. This process then assesses the changes in care brought about by the implementation of and education about the guidelines. Failure to achieve complete care standardization is considered a means of identifying practice patterns that must be addressed with further educational intervention. In addition, the audit process provides a positive feedback mechanism by which providers are informed of their performance and how care standardization affects patient outcomes and ED resource use. For each guideline or protocol, those elements of patient outcome and resource use that are directly measurable within the context of the Committee for Procedural Quality and Evidence-Based Practice, such as time to treatment, admission rates, recidivism, and lengths of stay, are predetermined components of the audit process. Future reports will focus on the results of the audit process and determination of measurable, guideline-affected patient outcomes as objective measures of the effectiveness of the Committee for Procedural Quality and Evidence-Based Practice program.

The Committee for Procedural Quality and Evidence-Based Practice Process

Guidelines, also known as algorithms,[9] and pathways have become common tools during the past 15 years in all branches

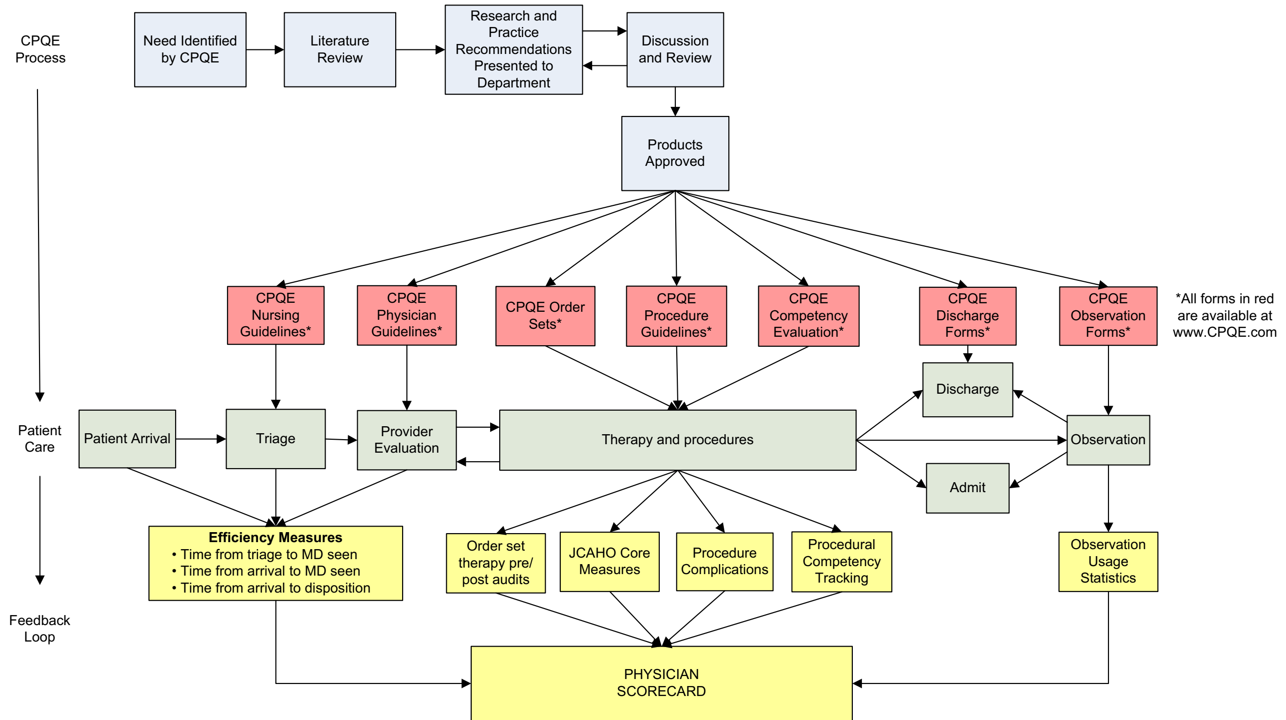

Figure 1. Impact and feedback. This diagram represents the Committee for Procedural Quality and Evidence-Based Practice process, beginning with an identified need and progressing to a product that may affect many aspects of a patient's treatment experience. The impact of these products on the originally identified need is then measured and fed back to stakeholders. *CPQE*, Committee for Procedural Quality and Evidence-Based Practice; *JCAHO*, Joint Commission on Accreditation of Health Organizations.

of medicine to improve quality and efficiency of care.[10] The Committee for Procedural Quality and Evidence-Based Practice, facing a broad goal to influence quality across our entire department, has developed a reproducible, sustainable process of guideline development and a medical record audit system to measure the benefits of our system. The process is an inclusive design encompassing the entire department. Figure 2 illustrates the flow of information from physicians and nurses into the committee and back out into practice. Development of a guideline, implementation, and the audit process is best illustrated with an example.

Asthma was the first disease process addressed because it has been well studied, resulting in published and generalizable treatment algorithms.[11] Such guidelines have been found to be an effective means for treating asthma patients and have reduced resource use while improving patient outcomes.[12,13] To explore existing guidelines, update them with new knowledge, and adapt them to our system, a literature review was undertaken by an emergency medicine resident, with the express goal of producing a 1- to 2-page guideline for the treatment of asthma within our 3-hospital system. The patient population is predominantly nonpediatric as a result of the nearby presence of a large children's hospital; therefore, the guidelines are adult specific. The resident was instructed to use MEDLINE and to access sources of existing guidelines. Particular emphasis was placed on review articles and meta-analyses, such as those conducted by the Cochrane Group; although scientific inquiry frequently discounts such articles, they are fundamental to the condensation of extensive information into practical, evidence-based guidelines. As the guideline was developed, the needs of all involved in the care of the patient were considered. In this example of asthma, pulmonologists from all 3 clinical sites were consulted to incorporate their needs in the finalization of the guidelines. Institutional variations in formulary and staffing responsibilities were accommodated through these interactions. The guidelines and a summary of the literature review were then presented during a monthly evidence-based conference to the emergency medicine faculty, residents, and nurses for open discussion, comment, corrections, and modification. The committee then finalized the guidelines, developed a flowchart design, and published them for use. An order set and discharge sheets were also created to facilitate incorporation of the guidelines into individual practice patterns. To avoid complexity in the system, a single asthma order sheet was made to encompass the greatest number of patients. Blank order lines are available to add specific medications for atypical patients.

The guidelines developed for providers are diagnosis based. To encapsulate the entire practice of emergency medicine within the Committee for Procedural Quality and

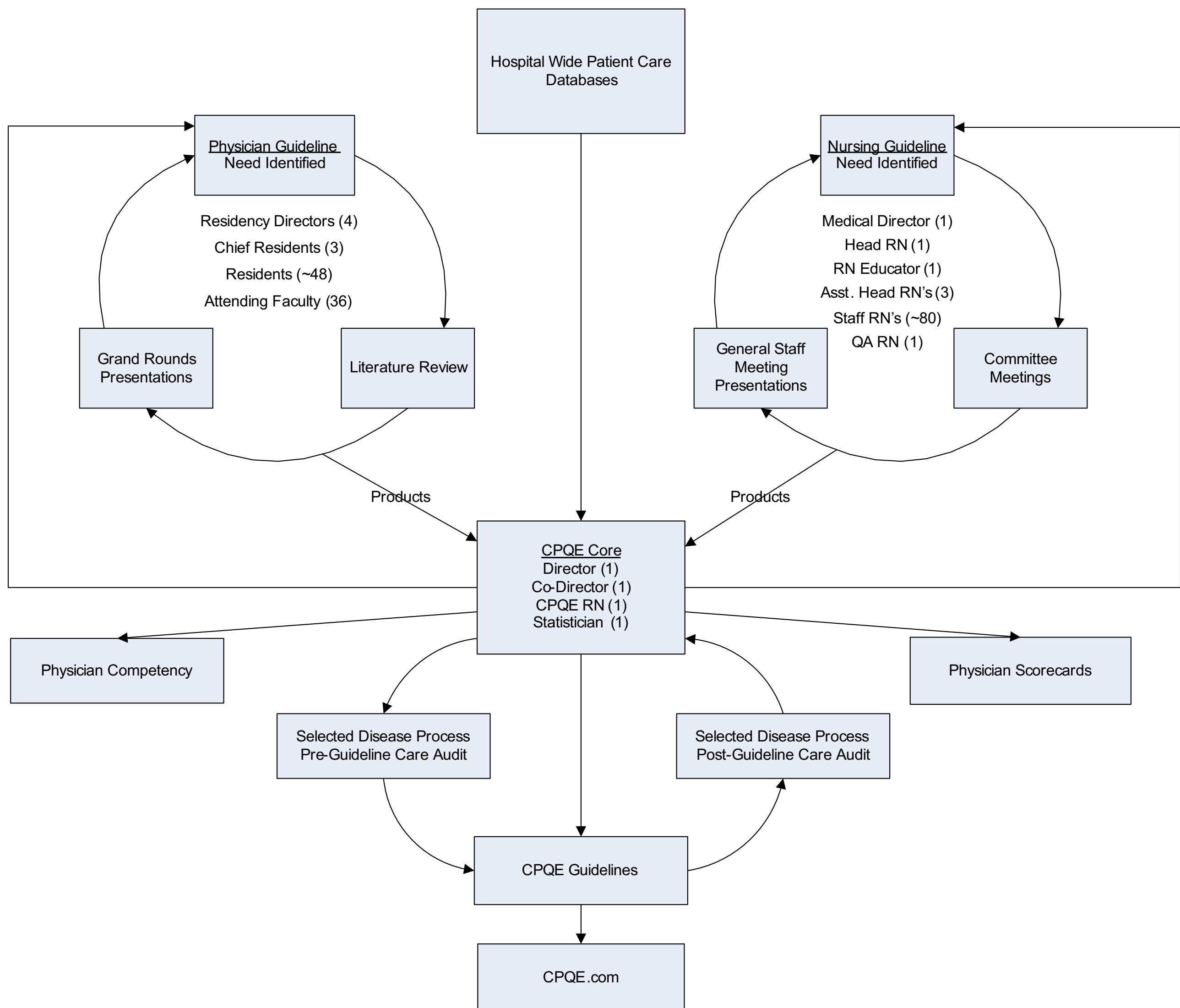

Figure 2. Continuous flow of information from physicians, nurses, and electronic sources into the Committee for Procedural Quality and Evidence-Based Practice, with resulting guideline development and feedback into each stakeholder group.

Evidence-Based Practice process, the nursing guideline development group develops chief complaint-based guidelines complementary to the condition guideline and order sets. The nursing guidelines, which are initiated at triage by standing orders, become the clinical starting point for the committee process. If asthma becomes the likely diagnosis according to the nursing guidelines for shortness of breath, for example, the asthma guideline and order set are initiated by the treating physician. All Committee for Procedural Quality and Evidence-Based Practice products are developed simultaneously to ensure seamless progression from the complaint-based nursing guideline to the diagnosis-based order set.

In addition to developing guidelines, the Committee for Procedural Quality and Evidence-Based Practice process allows for evaluation of impact of the guidelines. Evaluation is important for 2 distinct purposes: to identify needed guideline revisions in response to unanticipated systems barriers and to measure guideline compliance, changes in resource use, and patient outcomes. This evaluation serves as evidence to providers that the process has an effect and offers evidence on the return on investment in the committee process. To accomplish evaluation, a rigorous comparison of patient care between the pre- and postguideline periods is conducted. The committee nurse uses a standardized medical record review form, designed to capture all components of guideline-driven care and predetermined patient outcomes and resources expected to be affected by the guidelines, to abstract either a consecutive or a random sample of patients. For asthma, this evaluation process abstracted data on the evaluation, treatment, time to treatment, disposition, and recidivism. The data are

Table 1. Characteristics of a baseline sample of 140 patients presenting to the ED between December 30, 2004, and June 30, 2005, and the postguideline sample of 142 patients presenting to the ED between April 1, 2006, and May 31, 2006. Data are given as frequencies and percentages except as otherwise indicated. Groups were demographically similar; length of stay declined without affecting 72-hour readmittance rate.

Demographic	Preguideline, N=140	Postguideline, N=142
Age, y (mean, SD)	39.7 (13.9)	38.7 (15.1)
Race		
Black	104 (74.3)	111 (78.2)
Caucasian	30 (21.4)	26 (18.3)
Other/mixed race	6 (4.3)	5 (3.5)
Sex		
Male	52 (37.1)	55 (38.7)
Female	88 (62.9)	87 (61.3)
Insurer		
Private	20 (14.3)	20 (14.1)
Medicare	22 (15.7)	28 (19.7)
Medicaid/other federal source	34 (24.3)	40 (28.2)
Uninsured	64 (45.7)	54 (38.0)
Length of stay, h (mean, SD)	5.1 (3.5)	4.3 (2.4)
Readmitted within 72 h	6 (4.3)	6 (4.2)

Table 2. Types of bronchodilator therapy. Choice of initial therapy moved away from MDI and toward albuterol/ipratropium HHN after guideline initiation.

Initial Therapy	Preguideline, Patients, No. (%)	Postguideline, Patients, No. (%)
Albuterol MDI with spacer	28 (21.1)	8 (6.0)
Albuterol HHN	14 (10.5)	10 (7.5)
Albuterol/ipratropium HHN	90 (67.7)	113 (84.3)
Continuous nebulization: Albuterol up to 10 mg/1 h	0 (0.0)	2 (1.5)
Ipratropium 1 mg by nebulization/1 h, added to albuterol	1 (0.8)	1 (0.7)

MDI, Metered-dose inhaler; *HHN,* Handheld nebulizer.

Table 3. Time to first treatment (mean, SD) for each acuity level in hours. Time to first treatment declined for all triage levels after initiation of guidelines.

	Preguideline		Postguideline	
ESI Triage Level	Hours	SD	Hours	SD
2	1.15	(2.47)	0.60	(0.77)
3	1.05	(0.90)	0.86	(1.26)
4	2.29	(1.81)	1.69	(1.84)
5	4.23	(5.47)	3.29	(2.13)

ESI, Emergency Severity Index (ref. AHRQ Publication No. 05-0046-DVD).[19]

entered into a customized database built to support all committee data needs, and they are then analyzed by the biostatistician to estimate change in practice and change in outcomes.

Preliminary Results

Appendix E1 (available online at http://www.annemergmed.com) shows the guidelines, flowchart, order sets, and chart abstraction forms for asthma. Results were analyzed from the quality-improvement data gathered through the chart audit process. Patient groups were similar in the pre- and postcommittee guideline period (Table 1). Length of stay was decreased while not affecting the number of patients readmitted at 72 hours (Table 1). Initial bronchodilator therapy was altered between the groups (Table 2). Time to first treatment was faster in postguidelines group (Table 3), and documentation of therapy improved (Table 4).

Cultural Change: Acceptance of Guidelines

A major challenge to the Committee for Procedural Quality and Evidence-Based Practice process was to obtain buy-in from the users of the system. Our nursing staff has embraced this new focus on quality care and the use of guidelines, yet physicians, despite forming and applauding the process, have proven difficult to influence consistently. The paradigm shift from reliance on memory to using written guidelines is a considerable one for most practitioners. Research has shown that multiple, separate interventions are needed to overcome barriers to acceptance and to initiate changes in provider behavior.[14-17] This use of multiple methods to influence adult learners has been shown to be more effective than a single intervention alone.[14-17] The guideline development uses local expert consensus in conjunction with published evidence. Product ease of use has been a pillar of development since the committee's inception. Guidelines have been introduced using multiple, short (5-minute), educational events during weekly conference time and conducted in conjunction with a new guidelines publication, supplemented with periodic e-mail reminders.

Feedback: Physician Scorecards

The final step in changing physicians' behavior may be through the use of performance feedback to providers. The Committee for Procedural Quality and Evidence-Based Practice provides the results of the patient-care audits as they occur, and more comprehensive feedback is provided using quarterly scorecards. These scorecards primarily include Joint Commission on Accreditation of Healthcare Organizations core measures and the Committee for Procedural Quality and Evidence-Based Practice guidelines compliance. The scorecards are provider specific and allow each provider to compare their compliance rates against those of the entire group. The scorecards also include practitioner-specific procedure complication rates and patients treated per hour. We believe the Committee for Procedural Quality and Evidence-Based Practice scorecards with peer comparison are critical to complete the feedback loops to the practitioners of the system and will lead to the persistent changes in provider behavior that have been elusive.

Table 4. The number and proportion of discharged patients who satisfied discharge goals or who had undocumented discharge goals. Documentation of several factors involving nursing care improved, whereas provider documentation of improved pulmonary examination result or repeat assessment changed little.

	Preguideline, N=81				Postguideline, N=89			
	Satisfied Goal		Undocumented		Satisfied Goal		Undocumented	
Documentation Item	Patients, No.	%	Patients, No.	%	Patients, No.	%	Patients, No.	%
Successful walking trial	10	(12.3)	71	(87.7)	19	(21.3)	70	(78.7)
Sao_2 >95%	38	(46.9)	37	(45.7)	61	(68.5)	19	(21.3)
Improved respiratory rate	24	(29.6)	47	(58.0)	34	(38.2)	28	(31.5)
Improved peak flow	21	(25.9)	60	(74.1)	32	(36.0)	57	(64.0)
Improved pulmonary examination result	67	(82.7)	14	(17.3)	70	(78.7)	19	(21.3)
Improved according to physician assessment	60	(74.1)	21	(25.9)	67	(75.3)	22	(24.7)

Electronic Support (http://www.CPQE.com): A Quality Initiative Web Site

The Committee for Procedural Quality and Evidence-Based Practice process takes advantage of the expanding role of bioinformatics in health care. To overcome the lack of an electronic medical record at our institutions, paper-based guidelines, order sets, and a manual audit process are used. However, the committee recognized the need for an electronic repository for its products early in the process because paper format quickly proved difficult to store and led to limited use of the committee's products. The guidelines, order sets, and other documents are stored electronically and accessed and printed for use through the Internet. The Web site http://www.CPQE.com was built with the educational publishing software Lectora (Trivantis Corporation, Cincinnati, OH) to catalogue end-user information. The goal is for www.CPQE.com to be the one place health care providers can access all of the informational tools necessary to care for a patient within our system.

As a result of the popularity of the electronic storage system developed for the committee, paper storage systems are being phased out of the ED, additionally reinforcing provider desire to use and become familiar with the electronic repository. We hypothesize that this will increase access to and awareness of disease-specific guidelines by directing the provider to a comprehensive library, and it will smooth the inevitable transition to electronic data systems by providing familiarity with computer-based systems and by phasing in the underlying data structure that will ultimately be involved in implementing those systems.

Expansion and Longevity

The sheer diversity of diagnoses and chief complaints presenting to EDs could easily overwhelm a newly minted system such as ours. Therefore, a measured approach to guideline development has allowed us to focus on conditions that we believe have maximal systems and patient-care impact. The need for additional guideline development, expansion of evaluation measures to include patient and system outcomes, and continuous quality monitoring of guidelines already in place, however, calls for an ever-expanding role for initiatives such as the Committee for Procedural Quality and Evidence-Based Practice. An appropriate balance between resources and benefits must be achieved to avoid long-term failure of the initiative. We contend that recognition of the ED as a compressed model of the entire health care delivery system[18] has allowed the Committee for Procedural Quality and Evidence-Based Practice to engage resources available within our health system but outside the ED. These resources, such as decision support and quality assurance, have aided the implementation and testing of our quality initiative. The ED, with its "health system in a box" organization, makes the ideal microcosm to develop practice initiatives that can be scaled to meet the needs of an entire health care system.

Summary

This article describes a structure and method for initiation of a quality process and demonstrates that it is feasible to implement evidence-based quality initiatives in the ED. Our process encompasses a busy, urban ED and 2 community EDs. The Committee for Procedural Quality and Evidence-Based Practice is a process designed to promote patient care that is evidence based, efficient, and reproducible from triage through disposition and encompasses physician and nursing care.
The Committee for Procedural Quality and Evidence-Based Practice has shown that modification of systems to incorporate evidence-based care into practice through education, guideline development, work-saving tools, and feedback can influence patient care positively. However, provider behavior change has not been uniform or to the extent expected. The Committee for Procedural Quality and Evidence-Based Practice has led the Department of Emergency Medicine to become a leader in quality initiatives within our health system. The committee director, codirector, and department chairman have been asked to present this initiative at multiple levels of administration and to consult internally in response to this effort. However, long-term success of this endeavor relies on acceptance and use by all stakeholders, including providers; therefore, further development and study of the Committee for Procedural Quality and Evidence-Based Practice are necessary. Provider-

specific, peer-comparison scorecards hold promise to influence practitioners to accept guidelines and evidence-based care.

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REFERENCES

1. Kohn L. To err is human: an interview with the institute of medicine's Linda Kohn. *Jt Comm J Qual Improv*. 2000;26:227-234.
2. Kennedy P, Pronovost P. Shepherding change: how the market, healthcare providers, and public policy can deliver quality care for the 21st century. *Crit Care Med*. 2006;34:S1-S6.
3. Getting started with core measures. *Jt Comm Perspect*. 2002;22:7-8.
4. Integrated Healthcare Association. History of IHA's pay for performance initiative. Available at: http://www.iha.org/payfprfd.htm. Accessed.
5. Biros MH, Adams JG, Wears RL. Errors in emergency medicine: a call to action. *Acad Emerg Med*. 2000;7:1173-1174.
6. Vincent C, Simon R, Sutcliffe K, et al. Errors conference: executive summary. *Acad Emerg Med*. 2000;7:1180-1182.
7. McGlynn EA, Asch SM, Adams J, et al. The quality of health care delivered to adults in the United States. *N Engl J Med*. 2003;348:2635-2645.
8. Handler JA, Feied CF, Coonan K, et al. Computerized physician order entry and online decision support. *Acad Emerg Med*. 2004;11:1135-1141.
9. Schriefer J. The synergy of pathways and algorithms: two tools work better than one. *Jt Comm J Qual Improv*. 1994;20:485-499.
10. Grimshaw J, Freemantle N, Wallace S, et al. Developing and implementing clinical practice guidelines. *Qual Health Care*. 1995;4:55-64.
11. Velez LI, Benitez F, Todd CW, et al. An update on the emergency department management of asthma. *Emerg Med Rep*. 2006;27:38-45.
12. Emond SD, Woodruff PG, Lee EY, et al. Effect of an emergency department asthma program on acute asthma care. *Ann Emerg Med*. 1999;34:321-325.
13. Goldberg R, Chan L, Haley P, et al. Critical pathway for the emergency department management of acute asthma: effect on resource utilization. *Ann Emerg Med*. 1998;31:562-567.
14. Bero LA, Grilli R, Grimshaw JM, et al. Closing the gap between research and practice: an overview of systematic reviews of interventions to promote the implementation of research findings. The Cochrane Effective Practice and Organization of Care Review Group. *BMJ*. 1998;317:465-468.
15. Cabana MD, Rand CS, Powe NR, et al. Why don't physicians follow clinical practice guidelines? a framework for improvement. *JAMA*. 1999;282:1458-1465.
16. Davis DA, Thomson MA, Oxman AD, et al. Changing physician performance. A systematic review of the effect of continuing medical education strategies. *JAMA*. 1995;274:700-705.
17. Wensing M, Grol R. Single and combined strategies for implementing changes in primary care: a literature review. *Int J Qual Health Care*. 1994;6:115-132.
18. Feied CF, Smith MS, Handler JA, et al. Emergency medicine can play a leadership role in enterprise-wide clinical information systems. *Ann Emerg Med*. 2000;35:162-167.
19. Gilboy N, Tanabe P, Travers DA, et al. *Emergency Severity Index, Version 4: Implementation Handbook*. AHRQ Publication No. 05-0046-2. Rockville, MD: Agency for Healthcare Research and Quality. May 2005.

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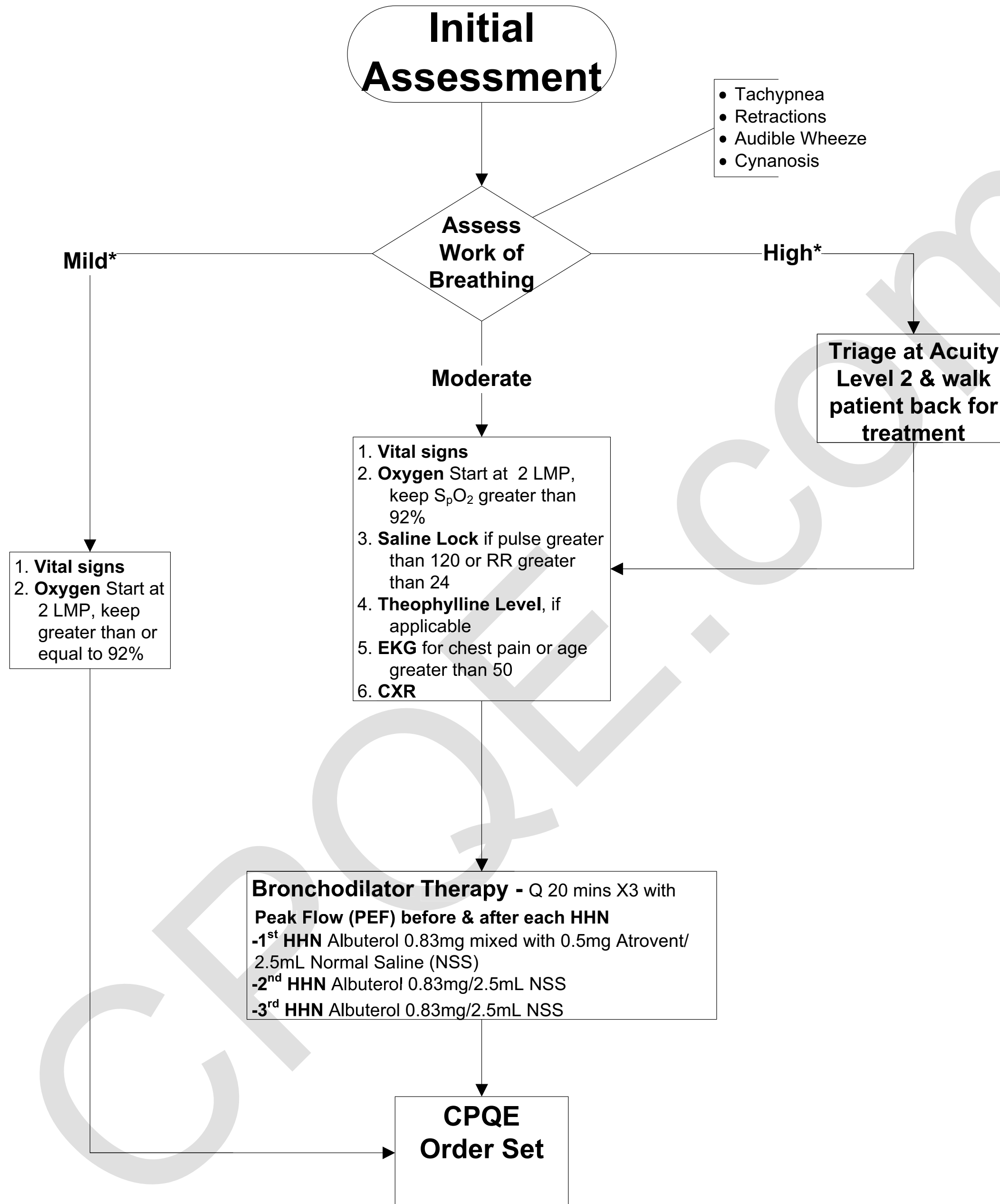
Appendix E1. CPQE products developed for asthma.



*Work of breathing assessment according to dyspnea scale

Nursing Process for Bronchospasm / Wheezing

Assessment	Triage (Acuity Level)	Nursing Interventions	Physician Intervention	Evaluation for Disposition	Outcomes
▪ **Initial Assessment** ○ Onset of symptoms ○ Dyspnea, cough, wheezing ○ Tightness in chest ○ Symptoms of infection: productive cough, fever, general "cold" symptoms such as malaise, sore throat, "stuffy nose" ○ Exposure to known allergens ○ Foreign body in airway ○ Restlessness ○ History of intubation: ▪ Hospitalizations ▪ Steroids ▪ **Objective Assessment** ○ Speaks in phrases or full sentences ○ Auscultation of Breath Sounds – ▪ Wheezes ▪ Diminished ▪ Absence ○ Assess work of breathing, tachypnea, retractions, audible wheezes, cyanosis and accessory muscle use (even or labored) – position (tri-poding) ○ Diaphoretic ▪ **Associated Symptoms** ▪ **Pre-hospital treatment** – RN to document ▪ **Past History** ○ Asthma ▪ **Medications/Allergies** ▪ **Social** ○ Alcohol/Drug ○ Tobacco Use ▪ **Baseline vital signs** ▪ **Room Air O_2 Saturation**	▪ **Resources:** Based on Risk Assessment, Resource Utilization & Acute Distress	***Work of Breathing per Dyspnea scale:*** ***Mild:*** ○ **Vital Signs** ○ **O_2 at 2 LPM** if RA saturation less than or equal to 92%, keep greater than 92% ○ CPQE order set after MD diagnosis ***Moderate*:** ***Above interventions PLUS*:** ▪ **O_2** if RA le4ss than or equal to 92%, Start at 2 LPM to keep greater than 92% ▪ **Peak Expiratory Flow (PEF)** (expressed in liter per minute & percent of predicted) ▪ **Initiate Bronchodilator Therapy q 20 minutes with PEF before & after each HHN** ○ **1st HHN** - Albuterol 0.83 mg mixed with Atrovent 0.5mg/2.5 mL Normal Saline (NSS) given via HHN ○ **2nd HHN** Albuterol 0.83mg/2.5mL NSS ○ **3rd HHN** Albuterol 0.83mg/2.5mL NSS ▪ **Saline Lock** if pulse greater than 120 or RR greater than 24 ▪ **Serum Theophylline Level** (if applicable) ▪ **EKG** for chest pain or age greater than 50 ▪ **Chest X-Ray** for fever greater than 100.4, productive cough or chest pain ▪ **Reassess** after aerosol treatments: ○ Respiratory rate ○ Oxygen saturation ○ Peak flow ***High:*** ***Above interventions PLUS:*** ○ Triage "2" and bring immediately to treatment area	▪ **Based on diagnosis** ▪ **CPQE orders if applicable**	▪ BP, Pulse, Respiratory Rate, Oxygen Saturation ▪ Breath Sounds ▪ Accessory Muscle Use ▪ Patient Response ▪ Speaks in words of sentences ▪ Peak Flow (80% predicted) ▪ Activity tolerance	▪ **Discharge** **RN Performs:** ▪ Asthma teaching includes Aero-chamber & inhaler use ▪ Asthma care instructions, prescriptions and follow up care ▪ **RDTC:** Follow rapid protocol orders ▪ **Admit:** Follow admission orders

Reference: Kathleen Saunders Jordon, *Emergency Nursing Core Curriculum, 5th Edition,* (Philadelphia, PA: W.B. Saunders Company) 2/28/2006

CPQE.com

CPQE: Asthma Exacerbation

Initial Assessment:

1. All patients: BP P RR O_2 Saturation Peak Flow
2. Signs of pneumonia, PTX or foreign body: Portable CXR (PA & Lateral views preferred for stable patients)
3. Chest pain or over age 50: EKG
4. Patient taking theophylline: Serum theophylline level

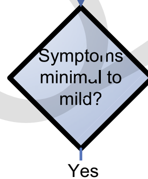
ED Treatment

1. Insert saline lock for P>120, RR>24
2. Supplemental oxygen for SaO_2 < 92%
3. Bronchodilator therapy:
   Atrovent 2.5 ml, 0.02% soln. / Albuterol 5 ml, 0.5% soln., HHN X1
   Then Albuterol 5ml, 0.5% soln, HHN q 20 minutes x 2 doses

   ***Alternative for moderate to severe exacerbations:*
   1. *Continuous nebulization: Albuterol up to 10 mg over one hour*
   2. *Ipratropium 1 mg by nebulization over one hour, added to Albuterol*
4. Systemic Corticosteroids:
   Prednisone 0.5 – 1 mg/kg po (60 mg in average adult) **or**
   Decadron 10 mg IV or IM **or**
   Solumedrol 125 mg IV or IM

   ***For discharged patients, in lieu of outpatient corticosteroid burst:*
   Methylprednisolone acetate 160 mg IM

Reassessment
RR
RA Pulse Oximetry
PEF (% predicted)



No →

For persistent wheezing, dyspnea or incomplete response to therapy consider:
1. Admission to RDTC
2. Repeat bronchodilator regimen for one hour
3. Admit inpatient

Yes ↓

Assess for Discharge (Goals)

1. No breathlessness or oxygen desaturation with trial of walking
2. SaO_2 greater than 95%
3. Improvement in respiratory rate, peak flow & pulmonary exam
4. Signs and symptoms are minimal or mild 30-60 minutes after most recent dose of bronchodilator therapy

Discharge Plan and Instructions

1. Prednisone 40 mg daily, for average sized adult, for 5-7 days
   (If methylprednisolone acetate not administered)
2. Initiate inhaled corticosteroids if patient is a mild to moderate persistent asthmatic not already on them (i.e. Fluticasone 110 micrograms, 2 puffs BID)
3. Instruct in asthma care and use of Aero Chamber
3. Refer for follow-up visit
4. Education regarding action plan for managing recurrence

1/25/06

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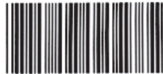


EDREC

EMERGENCY DEPARTMENT

PHYSICIAN ORDER SHEET

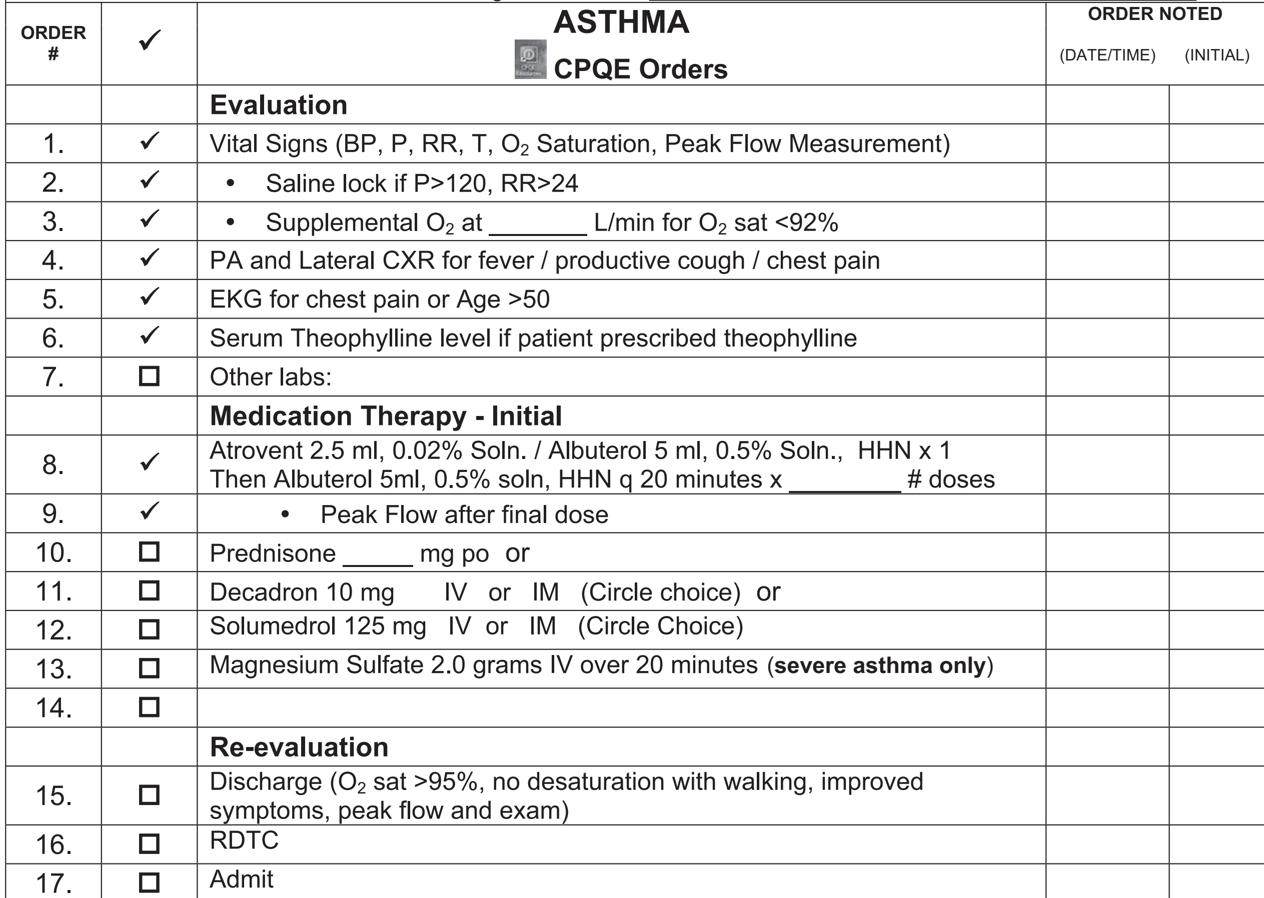
All **applicable** orders have been checked.
ORDERS **NOT CHECKED** ARE NOT TO BE FOLLOWED

Orders are modified according to the medical condition of the patient. All orders are to be dated, timed and signed by a physician. Additional orders may be entered at the end of the order set. If the orders are transcribed in sessions, the transcriber must date, time, and initial in the section marked order noted.

PAGE 1 OF 1

Please Stamp Here

ALLERGIES: ☐ None Known ☐ Yes, Drug/Reaction: ____________________



ORDER #	✓	ASTHMA CPQE Orders	ORDER NOTED (DATE/TIME)	(INITIAL)
		Evaluation		
1.	✓	Vital Signs (BP, P, RR, T, O_2 Saturation, Peak Flow Measurement)		
2.	✓	• Saline lock if P>120, RR>24		
3.	✓	• Supplemental O_2 at _______ L/min for O_2 sat <92%		
4.	✓	PA and Lateral CXR for fever / productive cough / chest pain		
5.	✓	EKG for chest pain or Age >50		
6.	✓	Serum Theophylline level if patient prescribed theophylline		
7.	☐	Other labs:		
		Medication Therapy - Initial		
8.	✓	Atrovent 2.5 ml, 0.02% Soln. / Albuterol 5 ml, 0.5% Soln., HHN x 1 Then Albuterol 5ml, 0.5% soln, HHN q 20 minutes x ________ # doses		
9.	✓	• Peak Flow after final dose		
10.	☐	Prednisone _____ mg po or		
11.	☐	Decadron 10 mg IV or IM (Circle choice) or		
12.	☐	Solumedrol 125 mg IV or IM (Circle Choice)		
13.	☐	Magnesium Sulfate 2.0 grams IV over 20 minutes (**severe asthma only**)		
14.	☐			
		Re-evaluation		
15.	☐	Discharge (O_2 sat >95%, no desaturation with walking, improved symptoms, peak flow and exam)		
16.	☐	RDTC		
17.	☐	Admit		

Provider DISCHARGE CONSIDERATIONS

Prescriptions:
- Albuterol MDI w/ refill
- Prednisone x 5 days
- Flonase
- Singulair
- Advair
- Allegra (or other anti-histamine)
- Other inhaler as appropriate

Education:
- Instruct pt re: MDI use with spacer
- Instruct pt re: peak-flow use
- Smoking cessation

Follow-up:
- Return to the ER if symptoms worsen, fever, productive cough, chest pain, difficulty breathing, increased rescue inhaler use, or any concern.
- Return to established primary care physician within one week.
- Provide appropriate Health Clinic referral: physician/PA fax form & nurse provide patient handout.

Attending MD Signature:__________________ Date:_____________ Time:_________

Developed by: Emergency Medicine Date 2/6/06 Review Date ______________________

CPQE

ASTHMA DISCHARGE INSTRUCTIONS

Please Stamp Here

A. You have been diagnosed with an acute asthma exacerbation.

B. Medications

☐ Prednisone ________mg by mouth daily for 5 days. Take your first dose **today / tomorrow**

☐ Inhaler(s):

____

____

☐ Other:

____

____

C. Follow-up

☑ Return to the emergency department if your symptoms worsen or you develop fever, productive cough, chest pain, difficulty breathing, increased rescue inhaler use, or any other concern.

☐ See your primary physician within 7 days, call for an appointment.

☐ A referral for asthma management was submitted on your behalf to:

____.

Please call this health care facility to arrange a follow up appointment.

☐ Other: ____

D. Education

☑ MDI use with spacer

☑ Peak-flow use

☑ Smoking cessation

E. ☐ **Patient / Family verbalizes understanding of discharge plan.**

Work excuse given ☐ Yes ☐ No Return to work/school on:________________________

Restrictions / Limitations ☐ No ☐ Yes (Describe: ______________________________

____)

MD________________________ Nurse______________________ Patient________________________

Date:__________________________

ASTHMA

You have been treated for an acute asthma exacerbation. Asthma is a chronic disease in which the lining of the lung airways becomes blocked by inflammation and mucous. There is no cure for asthma, but asthma symptoms can be controlled. It is best to work with your primary care physician to come up with the medication that is best for you. Therefore, please see your primary care, or family, doctor regularly to prevent asthma attacks. It is especially important to see your doctor after an acute asthma attack that requires treatment in the Emergency Department.

Some asthma attacks occur because of triggers. Smoking is an extremely damaging habit for people with asthma. Common asthma triggers include:

- Allergens: pollen, mold, animal dander, dust mites, cockroaches
- Viral infections of the respiratory tract (colds, bronchitis)
- Irritants: strong odors, sprays, chemicals, pollutants
- Tobacco or wood smoke
- Exercise

Following discharge from the Emergency Department:

1. Keep track of your asthma triggers to determine which ones affect you.
2. Avoid circumstances which trigger your asthma symptoms.
3. See your primary care physician, or family doctor, regularly.
4. Stop smoking, if you currently smoke.

NOTIFY YOUR DOCTOR, OR RETURN TO THE EMERGENCY DEPARTMENT, IF YOU HAVE:

- Shortness of breath unrelieved by your inhaler(s)
- Chest pain
- High fever or productive cough
- Any concern

Follow Up

A visit to the Emergency Department cannot substitute for having a family doctor. Plan to see your regular doctor. Please review your discharge instructions sheet for specific instructions regarding your follow-up and medications.

This is to inform you the examination and treatment you have received in the Emergency Department has been given on an emergency basis only and is not intended to be a substitute for complete medical care. It is important you seek follow-up care with your own doctor, clinic, or the doctor to whom you have been referred. Follow-up care is YOUR responsibility and is very important because it is NOT ALWAYS POSSIBLE TO RECOGNIZE and treat all aspects of illness or injury in a single Emergency visit. If you are a member of an HMO, please contact your personal primary care physician regarding further services/follow-up. If you do not have a personal primary care physician, you should contact the University Hospital Outpatient Services at 584-4001.

MR#: ____________ Account#: ____________ Acuity: ____________

Physician: Attending:

CPQE
ASTHMA EXACERBATION GUIDELINES
CASE REPORT FORM

Demographics

Date of Birth: __ __/__ __/__ __ __ __ (dd) (mm) (yyyy)

Race: □ African American
□ American Indian/Alaska Native
□ Asian/Pacific Islander
□ Caucasian
□ Hispanic
□ Other

Insurance:
□ Private □ Medicaid/Other Federal
□ Medicare □ Uninsured/Self

Gender: □ Male
□ Female

Emergency Department Arrival and D/C:

Arr. Date:__ __/__ __/__ __ __ (dd) (mm) (yyy) Arr. Time:____________

Dis. Date:__ __/__ __/__ __ __ (dd) (mm) (yyy) Dis. Time:____________

Initial Assessment

Respiratory Rate: ____________ □ None Documented

RA Pulse Oximetry: ____________ □ None Documented

PEF (% predicted): ____________ □ None Documented

P>120 or RR>24 on initial assessment?	□ Yes	□ No
Saline lock inserted ?	□ Yes	□ No
Criteria for CXR present (signs and symptoms of pnuemonia, PTX, FB)?	□ Yes	□ No
CXR completed?	□ Yes	□ No
Patient experiencing chest pain?	□ Yes	□ No
EKG completed?	□ Yes	□ No
Patient taking theophylline?	□ Yes	□ No
Theophylline level completed?	□ Yes	□ No
Was SaO2 < 92 at any point?	□ Yes	□ No
Was supplemental oxygen administered?	□ Yes	□ No

Bronchodilator Therapy

Patient Received Bronchodilator Therapy: □ Yes □ No

First Order: Type: ____________ # of Treatments ____________ Intervals ____________ min.

Administered:

Treatment #1	Type ____________	Time ____________
Treatment #2	Type ____________	Time ____________
Treatment #3	Type ____________	Time ____________
Treatment #4	Type ____________	Time ____________
Treatment #5	Type ____________	Time ____________
Treatment #6	Type ____________	Time ____________

□ More than 6

A. Albuterol MDI with spacer
B. Albuterol HHN
C. HHN Albuterol / Ipatropium (Duo Neb)
D. Continuous nebulization: Albuterol up to 10mg over one hour.
E. Ipatropium 1mg by nebulization over one hour, added to Albuterol.

Systemic Coritcosteroids

Patient able to tolerate oral medications? □ Yes □ No

Corticosteroid patient received:

Prednisone 0.5 - 1 mg/kg po (60 mg in average adult)	□ Yes	□ No
Solumedrol 125 mg IV	□ Yes	□ No
Methylprednisolone acetate 160mg IM	□ Yes	□ No
Other	□ Yes	□ No ____________

Reassessment
Last Recorded - (One hour or more after treatment initiated)

Respiratory Rate: ________ ☐ None Documented

RA Pulse Oximetry ________ ☐ None Documented

PEF (% predicted) ________ ☐ None Documented

Disposition

☐ Left AMA

☐ Admit to RDTC

☐ Admit Patient

☐ Discharge to home

☐ Death

Discharge Goals

Successful walking trial per protocol:	☐ Yes	☐ No	☐ Not documented
SaO2 greater than 95% on room air	☐ Yes	☐ No	☐ Not documented
Improved RR:	☐ Yes	☐ No	☐ Not documented
Improved Peak Flow:	☐ Yes	☐ No	☐ Not documented
Improved Pulmonary Exam:	☐ Yes	☐ No	☐ Not documented
Improvement based on physician assesment:	☐ Yes	☐ No	☐ Not documented

Discharge Plan and Instructions

Was prednisone prescribed? ☐ Yes ☐ No

If yes, Duration(days) ________

If no: Was other prescribed? ☐ Yes ☐ No

Is patient a mild to moderate persistent asthmatic not already on inhaled corticosteroids? ☐ Yes ☐ No

Inhaled Corticosteroids initiated? ☐ Yes ☐ No ☐ N/A

Was patient referred for follow-up visit? ☐ Yes ☐ No ☐ Not documented

If yes, was appointment documented? ☐ Yes ☐ No

Was education presented regarding action plan for managing recurrence? ☐ Yes ☐ No ☐ Not documented

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Asthma Re-admission within 72 hours? ☐ Yes ☐ No

Asthma Re-admission within 30 days? ☐ Yes ☐ No

Used CPQE.com Protocol Form? ☐ Yes ☐ No