



# The Development of Emergency Department Patient Quality/Safety Indicators

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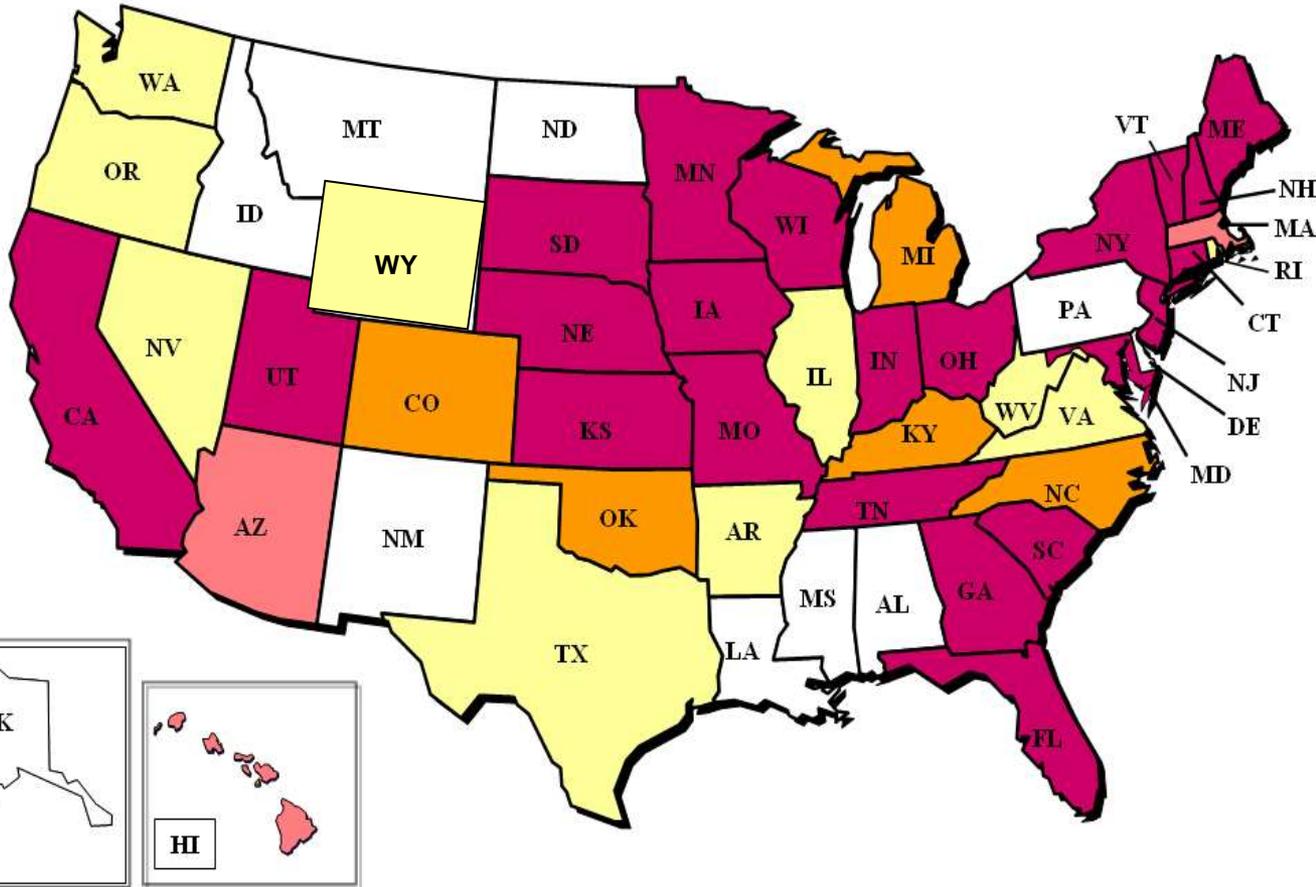
# Overview

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- HCUP and the AHRQ Quality Indicators
- Goals and scope of current project
- Literature review
- Conceptual frameworks
- Matrix of potential indicators
- Specification and testing
- Future steps



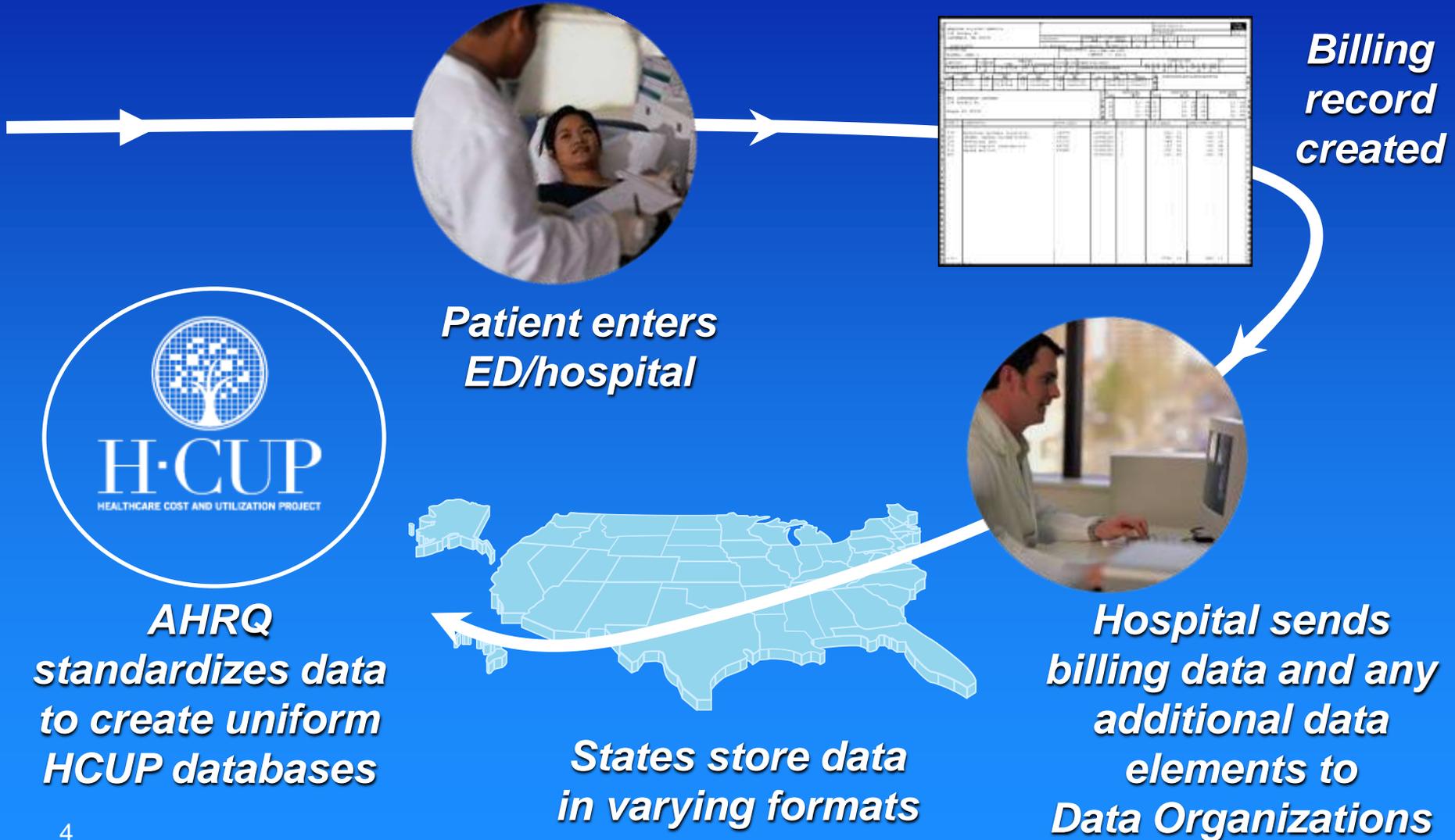
# The HCUP Partnership: A Voluntary Federal-State-Private Collaboration



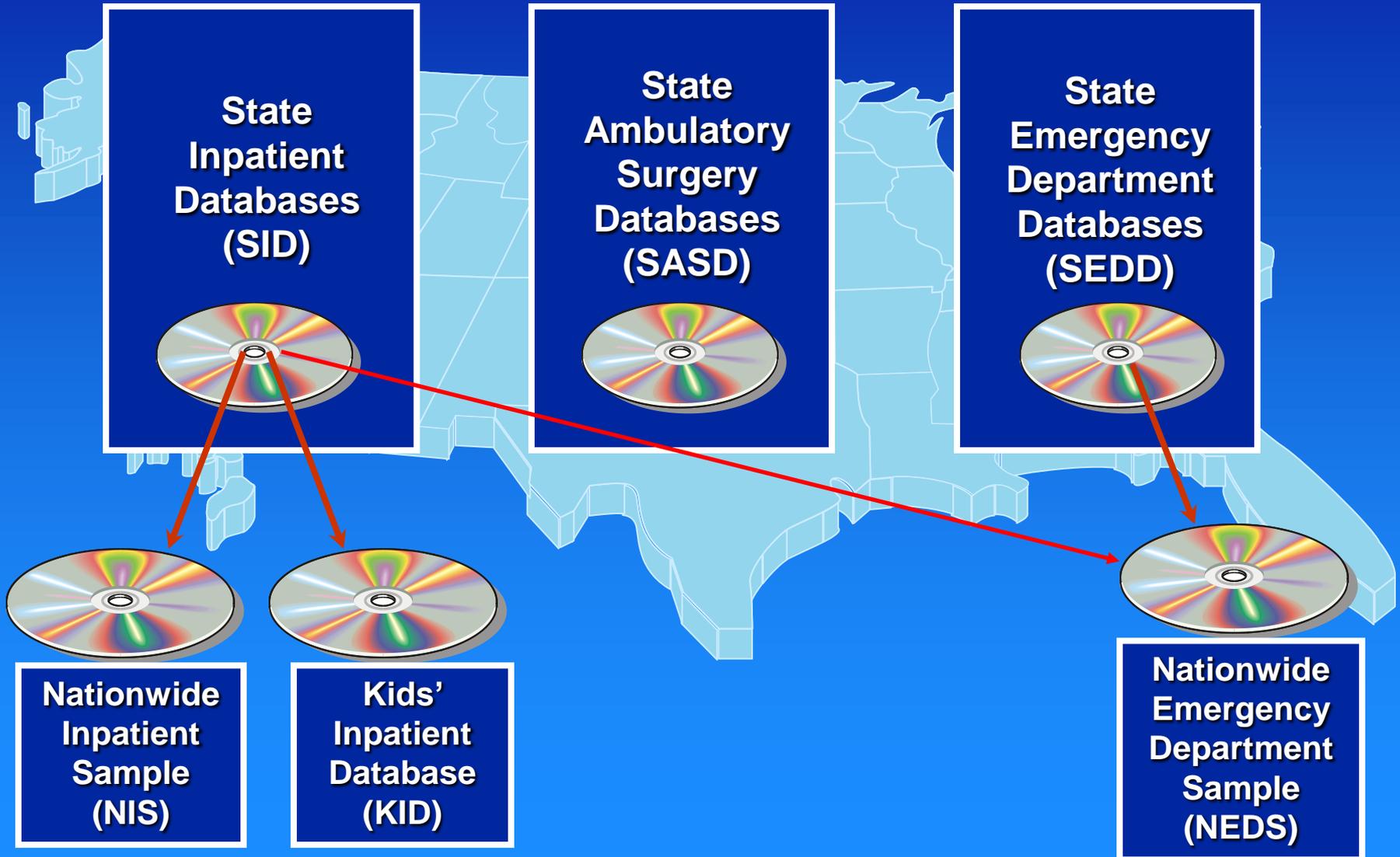
**40+ states**  
**90% of all discharges**  
**24+ states submit ED encounters**

Key:	Non-participating	Partners Providing Inpatient Data Only	Partners Providing Inpatient & Ambulatory Surgery Data	Partners Providing Inpatient & Emergency Department Data	Partners Providing Inpatient, Ambulatory Surgery, & Emergency Department Data
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# The Making of HCUP Data



# Types of HCUP Databases



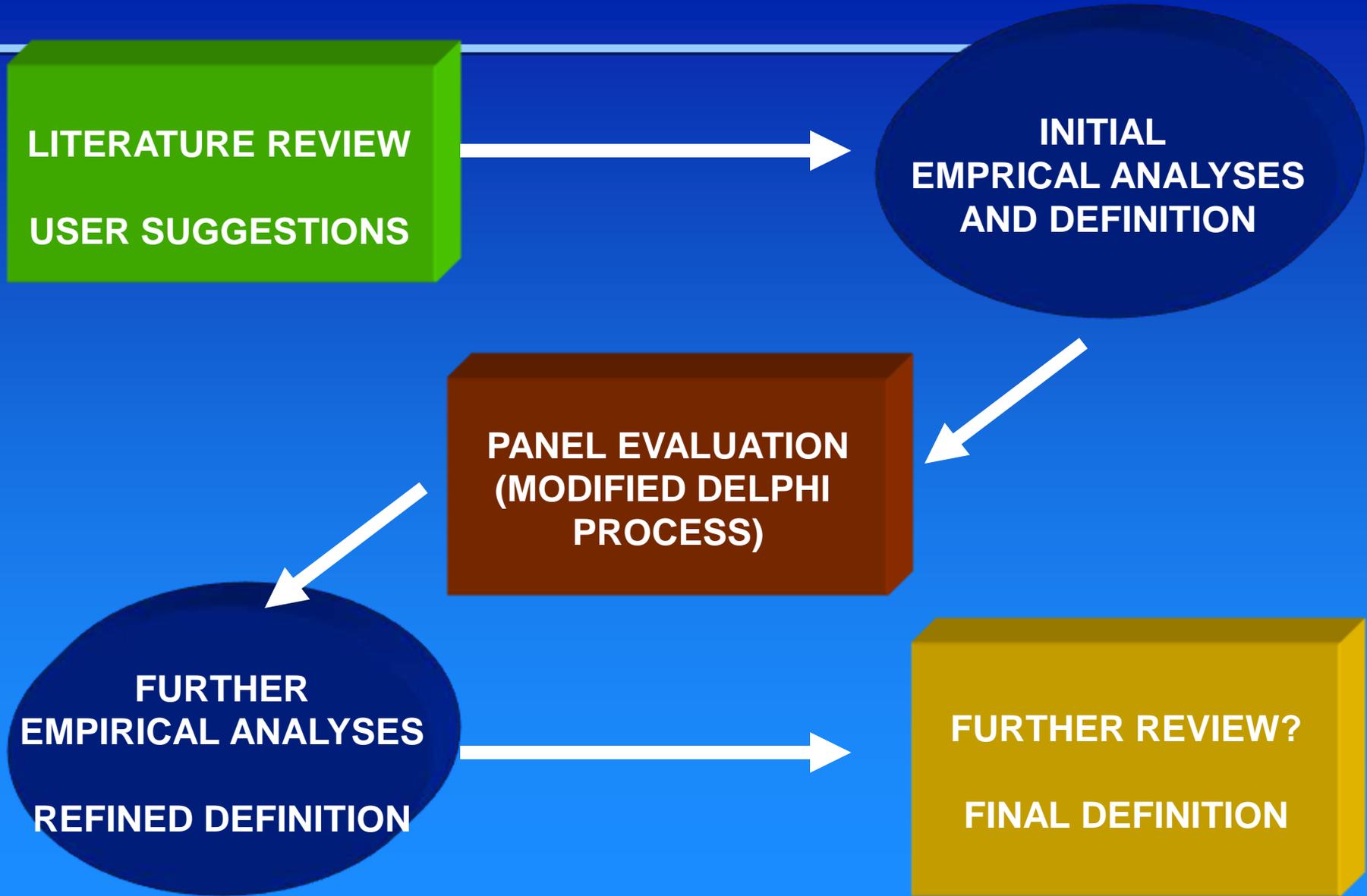


# AHRQ Quality Indicators (QIs)

- Developed through contract with UCSF-Stanford Evidence-based Practice Center & UC Davis, maintained and extended through contract with Battelle
- Use existing HCUP (hospital discharge) data, based on readily available data elements
- Incorporate a range of severity adjustment methods, including APR-DRGs\* and comorbidity groupings
- Disseminate software and support materials free via [www.qualityindicators.ahrq.gov](http://www.qualityindicators.ahrq.gov)
- Provide technical support to users
- Continuous improvement through user feedback, annual coding updates, validation projects

\* All Patient Refined - Diagnosis Related Groups

# Evidence-based indicator development





# Key considerations in the evaluation of each prospective indicator

**Application/experience:** Is there reason to believe the indicator will be feasible and useful?

**Fosters real quality improvement:** Is the indicator unlikely to be gamed or cause perverse incentives?

**Construct validity:** Does the indicator identify quality of care problems that are suspected using other methods?

**Minimum bias:** Is it possible to account for differences in severity of illness & other factors that confound comparisons?

**Precision:** Is there substantial “true” variation at the level of provider measurement?

**Face validity/consensual validity:** Does the indicator capture an important and modifiable aspect of care?

# AHRQ Quality Indicator modules

## Inpatient QIs

*Mortality,  
Utilization,  
Volume*

## Prevention QIs

*(Area Level)  
Avoidable  
Hospitalizations /  
Other Avoidable  
Conditions*

## Pediatric QIs

**Neonatal  
QIs**

## Patient Safety QIs

*Complications,  
Unexpected Death*



# Goals and Scope

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## ■ Goals

- Develop two sets of quality indicators that are applicable to the emergency department setting
  - Patient Safety Indicators (PSI)
  - Prevention Quality Indicators (PQI)
- Set the stage for future incorporation into publicly available AHRQ QI software

## ■ Scope

- Implement the established AHRQ QI measurement development process
- Adapt existing AHRQ QI to ED setting when possible
- Identify and evaluate new candidate indicators based on established measurement concepts



# Literature review: strategy

## Search goal:

- To find studies that introduced or used quality of care measures to assess patient safety in hospital emergency departments.

## Search strategy using MESH headings in PubMed:

- ("Quality Assurance, Health Care"[Mesh] OR "Quality Indicators, Health Care"[Mesh] OR "Quality of Health Care"[Mesh] OR "Health Care Quality, Access, and Evaluation"[Mesh] OR "United States Agency for Healthcare Research and Quality"[Mesh] OR "Outcome Assessment (Health Care)"[Mesh])  
AND "Emergency Service, Hospital"[Mesh]  
AND ("Medical Errors"[Mesh] OR "Malpractice"[Mesh] OR "Safety"[Mesh] OR "Equipment Safety"[Mesh] OR "Safety Management"[Mesh])

## Validation using title and/or abstract keywords:

- “patient safety” OR “adverse event” OR “avoidable condition”  
AND “quality”  
AND (“emergency room” OR “emergency department”
- For the most important papers, we searched for ‘all related articles’.



# Literature review: process

- PubMed:
  - 1,050 abstracts, decreased to 687 when limited to human subjects, English language, date within 10 yrs.
  - All abstracts were reviewed for relevance (i.e., describing one or more measures of ED quality/safety).
- National Quality Measures Clearinghouse
  - <http://qualitymeasures.ahrq.gov/>
- Organizations and websites
  - National Quality Forum
  - Federal: AHRQ and CMS/QualityNet
  - ED: ACEP and SAEM
  - AMA: Physician Consortium for Performance Improvement
  - Other developers: NCQA and The Joint Commission
  - Institute of Medicine/National Academy of Sciences
  - Canada: Institute for Clinical Evaluative Sciences, Canadian Institute for Health Information



# Literature review: key themes

## 40 journal papers, 23 documents and reports

- Some TJC Core Measures address processes of care in ED management of pneumonia or myocardial infarction
- Critical trauma or shock care, generally based on detailed "peer" review of medical records to assess appropriateness and timeliness of diagnostic and therapeutic interventions
- Time-based measures, generally focused on waiting time, total LOS in the ED, ED disposition time for admitted/transferred patients
- Appropriate prescribing and avoidance of medication errors for common conditions such as asthma, bronchiolitis, gastroenteritis, laceration
- Appropriate use of imaging studies, laboratory, ECG
- Appropriate assessment of pain, oxygenation, mental status/cognition
- "Left without being seen" or "left AMA" (premature discharge from ED)
- Other adverse consequences of crowding/boarding
- "Missed diagnosis" identified by return within defined time window for a serious condition
- Revisits to ED within defined time window for same or related condition

# Conceptual framework for prioritization: American College of Emergency Physicians, 2009



<b>Domain</b>	<b>Examples</b>
Access to emergency care	Access to providers, access to treatment centers, financial barriers, hospital capacity
Quality and patient safety environment	State-supported systems, institutional barriers
Medical liability environment	Legal atmosphere, insurance availability, tort reform
Public health and injury prevention	Traffic safety and drunk driving, immunization, injury control, state injury prevention efforts, health risk factors
Disaster preparedness	Financial resources, state coordination, hospital capacity, personnel



# Conceptual framework for prioritization: Institute of Medicine, 2010

Crosscutting Dimensions		Components of Quality Care	Type of Care		
			Preventive Care	Acute Treatment	Chronic condition management
E Q U I T Y	V A L U E	Effectiveness			
		Safety			
		Timeliness			
		Patient/family-centeredness			
		Access			
		Efficiency			
	Care Coordination				
	Health Systems Infrastructure Capabilities				



# Conceptual framework for prioritization: Institute of Medicine, 2007

Domain	Application to the ED
Safe	High-risk, high-stress environment “fraught with opportunities for error” ... frequent interruptions and distractions, crowding, need for rapid decision-making with incomplete information, barriers to effective communication and teamwork, difficulty obtaining timely diagnostic tests
Effective	Limited by deficiencies in pre-hospital care, unavailability of trained specialists, lack of access to patients’ prior medical records, poor primary care follow-up, inability to coordinate care across settings
Patient-centered	Crowding, long wait times, boarding of admitted patients in hallways, design emphasis on visibility and monitoring rather than privacy
Timely	Designed to provide timely care for emergent medical problems, but often overwhelmed by the demand for their services...
Efficient	Frequently asked to provide care for which it is not the most efficient setting... primary care, urgent care for minor complaints, and inpatient care to admitted patients compromises efficiency
Equitable	EMTALA requires EDs to treat all patients equitably... (but) variation in resources and personnel across communities may create inequities in how patients in different EDs are treated



# Conceptual framework for prioritization: ICES/Alberta Quality Matrix for Health, 2010

Domain	Examples
Acceptability	Health services are respectful and responsive to user needs, preferences and expectations.
Accessibility	Health services are obtained in the most suitable setting in a reasonable time and distance.
Appropriateness	Health services are relevant to user needs and are based on accepted or evidence-based practice.
Effectiveness	Health services are provided based on scientific knowledge to achieve desired outcomes.
Efficiency	Resources are optimally used in achieving desired outcomes.
Safety	Mitigate risks to avoid unintended or harmful results.
Healthy workplace	Provision of health services does not lead to an unhealthy work environment for health care staff.



# Application of conceptual framework

	Structure	Process	Outcome
<b>Effective</b>	Nurse staffing and skill mix (RN/total) in ED	<b>Aspirin at arrival for AMI (TJC/CMS)</b>	Percentage of asthma encounters followed by revisit (or admission to hospital) within 3 days
<b>Patient Centered</b>	Use of survey data in PDSA cycles to improve patient centered care in ED	Percentage of patients undergoing painful procedures who have pain score documentation	<b>Percentage of patients leaving ED without being seen by a physician (proxy outcome, LSU Health Services)</b>
<b>Timely</b>	ED triage policies to ensure timely evaluation of high-acuity patients	<b>Median time from ED arrival to ED departure for admitted ED patients (CMS)</b>	Percentage of orthopedic pain patients with 3-point reduction in pain score within 60 minutes
<b>Safe</b>	Computerized physician order entry with decision support tools to detect medication errors	<b>Confirmation of endo-tracheal tube placement (Cleveland Clinic Foundation)</b>	<b>Death or disability due to air embolism from a medical device (NQF)</b>
<b>Efficient</b>	Availability of laboratory and radiologic support to facilitate rapid evaluation and disposition in ED	Percentage of low back pain patients with appropriate diagnostic test utilization	Dollars per episode of low back pain evaluated in the ED
<b>Equitable</b>	Availability of adequate interpreting services in ED	Percentage of non-English speaking patients for whom interpreting services are used	Disparity in any other outcome according to primary language



# Matrix of potential indicators Inclusion/exclusion criteria

- Identified from published source
  - Literature review (40 journal articles)
  - Organizations and websites (if a consensus-based approach and/or modified Delphi approach was used)
  - Similar review by Alessandrini et al. for PECARN
- Address the domains of effectiveness and/or safety
  - A few measures of timeliness were included because the measure developer characterized them as having implications for safety in the ED
- Focus on care provided within the ED (not pre-hospital care)
- Clinical guidelines, standards of care, and ED decision rules were not included unless operationalized as indicators
- Can be implemented in at least one HCUP partner state using available HCUP data
- When  $\geq 2$  indicators appeared to address the same outcome, only the more recent and/or more clearly specified indicator was retained
- Measures that were evaluated and discarded or rejected through a consensus-based expert panel process were not included



# Matrix of potential indicators

## Application of existing inpatient PSIs

- Foreign body left in
- Iatrogenic pneumothorax
- “Postoperative” hip fracture
- “Postoperative” hemorrhage or hematoma
- Accidental puncture or laceration
- Transfusion reaction
  
- BUT critical problem is timing
  - Only 5 states (GA, MA, MN, NJ, TN) have POA in SEDD; only MA and TN also have PNUM
  - In SID, POA means “present at the time the order for inpatient admission occurs” (i.e., after some period of ED treatment)
  - ED diagnoses are “lost” in SID when patient admitted to same hospital



# Matrix of potential indicators

## 35 new candidate indicators

- Age range
  - 12 for children only
  - 10 for adults only
  - 13 for both children and adults
- Donabedian's typology
  - 11 process
  - 17 outcome (or proxy outcome such as revisit)
  - 6 hybrid (“missed serious diagnosis”)
  - 1 patient experience or health risk behavior (“left AMA”)
- Developer(s)
  - 20 Institute for Clinical Evaluative Sciences, specified in ICD-10-CA
  - 3 ACEP and/or PCPI
  - 3 CMS
  - 4 other organizations
  - 5 researchers
- Endorsement - 6 endorsed by NQF



# Matrix of potential indicators

## 35 new candidate indicators

- Revisits - 13
  - 4 within 24 hours (1 specified as 24 hrs or 72 hrs)
  - 3 within 48 hours (2 specified as 48 hrs or 72 hrs)
  - 6 within 72 hours (1 specified as 72 hrs or 1 week)
- Missed serious diagnoses - 7
  - 1 unanticipated death within 7 days following ED care
  - 6 admission for missed diagnosis (AMI/ACS, SAH, ectopic pregnancy, traumatic injury, appendicitis)
- Appropriate use of diagnostic test or imaging – 5
- Acute complications of ED procedures – 3
- Time within ED awaiting definitive care – 3
- Appropriate admission for inpatient care – 2
- Appropriate use of treatment or intervention – 1
- Left “against medical advice” – 1



# Challenges in specification and testing

- Identification of patients “at risk”
  - What procedures place patients at risk for hemorrhage or accidental puncture/laceration?
- Timing
  - Did the fall occur prior to ED arrival, in ED, or later?
- Low frequency with “true” frequency unknown
  - Unable to choose “best” specification
- Use of utilization flag variables to identify patients who had specific procedures
  - ultrasound, ECG, CT scan, transfusion
- Unable to operationalize all specifications
  - Exclusion of “planned” (or “invited”) return visits to ED
  - All presenting symptoms for “missed diagnoses”



# Future steps

- Complete testing of adapted inpatient PSIs
- Prioritize 23 candidate indicators applicable to adults to select 7-12 for full specification and testing
  - Denominator inclusion/exclusion rules
  - Numerator definition
- Assess face validity based on empirical analyses of HCUP data from 9 states
- Recommend 5-7 indicators for review and feedback by an external “work group” with a diverse set of stakeholders
- Formal evaluation by expert panels through a modified Delphi panel process?
- Release of new module of ED PSIs?



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