Published in final edited form as:

Ann Emerg Med. 2012 September ; 60(3): 309–316. doi:10.1016/j.annemergmed.2012.03.021.

From Comparative Effectiveness Research to Patient Centered Outcomes Research: Integrating Emergency Care Goals, Methods and Priorities

Zachary F. Meisel, MD, MPH, MS^{1,2}, Brendan G. Carr, MD, MA, MS^{1,2,3}, and Patrick H. Conway, MD, MS⁴

¹Department of Emergency Medicine, Perelman School of Medicine at the University of Pennsylvania, Philadelphia, PA

²Leonard Davis Institute of Health Economics, University of Pennsylvania, Philadelphia, PA

³Center for Biostatistics & Epidemiology, Perelman School of Medicine at the University of Pennsylvania, Philadelphia, PA

⁴Centers for Medicare and Medicaid Services, U.S. Department of Health and Human Services, Baltimore, MD

Abstract

Federal legislation placed Comparative Effectiveness Research (CER) and Patient Centered Outcomes Research (PCOR) at the center of current and future national investments in health care research. The Role of CER and PCOR in emergency care has not been well described. This report proposes an agenda for researchers and health care providers to consider CER and PCOR methods and results in order to improve the care for patients who seek, use, and require emergency care. This objective will be accomplished by: 1) exploring the definitions, frameworks, and nomenclature for CER and PCOR; 2) describing a conceptual model for CER in emergency care, 3) identifying specific opportunities and examples of emergency care related CER; and 4) categorizing current and planned funding for CER and PCOR that can include emergency care delivery.

Background

Comparative Effectiveness Research (CER) has emerged as a category of scientific medical investigation that increasingly captures the attention of the lay, medical, and policy-making communities. CER has been described as a patient-centered mechanism to identify the most efficient ways to deliver the right treatment to the right patient at the right time and to translate those discoveries into better and meaningful health outcomes.¹

For the community of researchers and care providers who focus on emergency care, the intense national focus on CER provokes a central, high-level question: what is the role of CER in the ongoing effort to improve the delivery of emergency care? CER has

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Disclosure: The views expressed in this manuscript represent the authors and not necessarily the views or policies of the Centers for Medicare and Medicaid Services or the University of Pennsylvania.

conventionally been organized around improving long-term outcomes for patients, often with chronic conditions, therefore how the delivery of episodic and time-sensitive emergency care fits with CER has received little emphasis. Notably, when the Institute of Medicine (IOM) produced its influential report to the U.S. Congress identifying the 100 initial priority conditions appropriate for CER investigations, the final list failed to include most treatments, tests, and conditions that are specific to emergency care (such as acute care for patients with stroke and acute myocardial infarction).²

Rationale and objectives

Twenty-eight percent of all acute care in the U.S. occurs in emergency departments, and 55% of all hospital admissions (excluding pregnancy and childbirth) begin in an emergency care setting.³ Acute exacerbations of chronic conditions such as obstructive lung disease, diabetes, hypertension and asthma account for the primary reason for visit for over 2.5 million of adult emergency care visits per year.⁴ Moreover, a recent analysis of national trends in ambulatory care demonstrated that of the 350 million visits per year that are made for acute care, fewer than half involve the patient's primary provider.⁵ Given that episodic emergency care represents a significant part of patients' health care trajectories, our overall aim is to propose an agenda for researchers and health care providers to consider CER methods and results in order to improve the care for patients who seek, use, and require emergency care. This objective will be accomplished by: 1) exploring the definitions, frameworks, and nomenclature for CER and its sister research portfolio, patient centered outcomes research (PCOR); 2) describing a conceptual framework for CER in emergency care, 3) identifying specific opportunities and examples of emergency care related CER; and 4) categorizing current and planned funding for CER and PCOR that can include emergency care delivery.

CER and PCOR: definitions and key concepts

Although the term comparative effectiveness research was in use prior to 2008, the American Recovery and Reinvestment Act (ARRA) – which committed \$1.1 billion of governmental stimulus funds to CER (between 2008 to 2010) —placed CER at the center of the national discussion related to the goal of improving health care. The core element of CER is the process of identifying (and explaining) which types of medical care do and do not work for various populations of patients (Figure 1). The ARRA legislation mandated the creation of two distinct efforts to define and prioritize federal funding in this domain: The U.S. Department of Health and Human Services Federal Coordinating Council (FCC) on Comparative Effectiveness Research (for which one of the authors (PHC) served as executive director and another (ZFM) as staff) and the IOM Report to the President and to Congress on the Priorities for Comparative Effectiveness Research.

In 2010, the Patient Protection and Affordable Care Act (PPACA) created a new public-private entity, the Patient Centered Outcomes Research Institute (PCORI), committed specifically to the development and funding of patient-centered CER.⁶ To date, the PCORI has a working definition of PCOR that mimics the ARRA defined CER agenda but has updated the language of this endeavor to place the patient at the center, emphasizing the outcomes of alternative treatments and tests within the context of personal characteristics and preferences.⁷ (Figure 2). PCORI's mission, as a public-private entity seated outside of the federal government, is to be the home for public investments and research in CER.⁸ Due in part to the widespread confusion and political rancor surrounding the term “comparative effectiveness research” (including misperceptions that it is indistinguishable from cost effectiveness research and therefore is designed to ration care), CER projects that emanate from the Patient Centered Outcomes Research Institute have been rebranded as “PCOR”.

Some key components of CER/PCOR include the following concepts:

Effective (distinguished from efficacious) care: Effectiveness, defined as how well something works when it is implemented in a realistic setting, considers individual behavior, health care access, and the complex interactions between patients, their providers, and the systems in which health care is delivered.⁹ The Department of Health and Human Services explicitly placed “effectiveness” and the phrase “real world settings” at the leading edge of its definition of CER. By exploring what works in the “real world”, CER represents projects that seek to explain and advance effective care. This requirement acknowledges a limitation of many clinical trials, which only test *efficacy* -- how the intervention works under ideal conditions. What works for patients in some closely monitored and controlled clinical trials may not work as well in “real world” conditions. Therefore, CER takes a more realistic, practical, and generalizable perspective than many clinical studies in the mission to identify what actually works for patients.

Comparative: The comparative mandate of CER is to help clinicians, patients and policy makers determine what works *best*, not just what works. Therefore, ideal CER compares a given intervention (that is known or thought to be effective) *to another*. Many placebo controlled clinical studies, while essential in determining safety and efficacy, may not alone address the comparative vision of CER because they are only testing a single intervention. Therefore, direct comparisons of multiple treatments, systems, or diagnostic studies, are most likely to be classified as CER.

Priority Populations: The IOM, the FCC, and PCORI state that CER should address the needs of priority populations and sub-groups, especially those underrepresented in research. Racial and ethnic minorities, persons with disabilities, the elderly, children, and patients with multiple medical conditions, are all included as priority populations.^{2, 7, 10} Clinical studies have traditionally excluded many of these priority populations, using narrow clinical and demographic inclusion criteria in order to target high risk groups and minimize the confounding effects of heterogeneous patient characteristics. However, the national effort to prioritize these populations for CER is designed to reach beyond the limitations set by traditional clinical trials in order to answer important health questions for underrepresented populations.

Delivery system strategies: CER, as outlined in the FCC and IOM reports, explicitly includes the evaluation of delivery systems as in need of comparative, outcomes-oriented study.^{2, 10} Using the “3-T” model of translating research from the bench to the bedside, CER incorporates 2 translational aspects.¹¹ “T2” activities focus on patient-specific evidence of clinical effectiveness and “T3” activities include explorations of how to get the right care at the right time to the patients who need it. In this capacity, delivery systems are an essential component of the final stage of translating research to improve population health.

CER and Emergency Care: a conceptual framework

The outline established by the FCC for a national investment portfolio in CER includes four central categories: 1) direct research, 2) human and scientific capital (training programs and methods development), 3) data infrastructure (clinical and other information networks that can be used to perform comparative research), and 4) dissemination and translation of CER results (to improve uptake by patients, doctors and policy makers). Imbedded into each category are the cross cutting domains for: 1) priority populations (such as children and minorities), 2) priority conditions (as determined by the IOM and others), and 3) types of interventions including systems of care.¹⁰ This conceptual model, while broad in scope,

allows for CER projects to be categorized into multiple domains and emphasizes CER's role in answering questions for specific populations, conditions, and interventions.

A number of aspects of emergency care and emergency care research may address the goals of CER. Figure 3 demonstrates a proposed conceptual model of CER as viewed from an emergency care lens. This model integrates elements from the FCC framework and definition with factors that are specific to emergency care and research.¹² As exemplified in the proposed model, emergency care CER investigations would: 1) focus on conditions for which acute care is highly prevalent *or* for which rapid diagnosis and early intervention is known to improve patient outcomes¹³, 2) include priority populations such as children, minorities and patients with multiple chronic conditions, 3) study the question of interest in a "real world" setting, such as the emergency department or an out-of-hospital environment, 4) use comparative designs to explore 2 or more aspects of health care (delivered in an acute setting) to one another, 5) employ innovative research designs that allow "real world" studies to mimic the internal and external validity of traditional randomized controlled clinical trials, 6) measure and describe clinically meaningful outcomes for patients. While a single study may not embody all of these components, this model represents an emergency care approach to the priorities outlined by the federal government for CER.

Examples of published CER emergency care clinical studies (conducted in "real world settings" and measuring long-term meaningful outcomes) include comparative investigations of early goal directed therapy for patients with severe sepsis¹⁴ and active compression-decompression cardio pulmonary resuscitation (CPR) in prehospital care.¹⁵ Published CER emergency care systems research includes comparisons of regionalized with non-regionalized care for patients with acute ischemic stroke and severe injury.^{16, 17} Examples of diagnostic CER for emergency care have included comparisons of CT coronary angiography to resting stress tests for emergency department patients with low risk chest pain.¹⁸ Each of these treatment, systems, and diagnostic comparative investigations have impacted the delivery and organization of emergency care.

Despite examples of published emergency care CER, questions remain about how best to integrate the goals of CER with emergency care. How, for example, can comparative studies of acute, episodic care be designed to measure longer-term health outcomes? What are the specific methodological tools that can address the particular challenges of conducting research in emergency care settings? Which priority conditions, patients and interventions for CER resonate most with pressing questions in emergency care? To address these questions and to bring sharper focus to the conceptual model for CER in emergency care, opportunities and methods to integrate emergency care research with CER/PCOR are discussed below.

CER and Emergency Care: opportunities, and methods

Opportunities to leverage the common goals of emergency care research and comparative effectiveness research might begin with a focus on conditions identified by the IOM as priority conditions for CER.² Listed on Table 1 are the top 100 IOM conditions for CER evaluation. Table 2 demonstrates the 10 most common emergency department diagnoses or reasons for visits (RFV) for adults in 2007, as identified by the U.S. Centers for Disease Control.¹⁹ Integrating these lists allows for the identification of priority CER projects (table 1) with a significant acute or episodic component as defined by the most common reasons for visits in emergency care (table 2). A selection of explicitly defined IOM priority projects with emergency care relevance would include:

- Compare the effectiveness of traditional and newer imaging modalities when ordered for neurological and orthopedic indications by primary care practitioners, emergency department physicians and specialists.²
- Compare the effectiveness of treatment strategies for low back pain without neurological deficit or spinal deformity.²
- Compare the effectiveness of diagnostic imaging performed by radiologists and non-radiologists.²
- Compare the effectiveness of different treatment strategies in people with chronic severe migraine headaches.²

For each of these IOM-suggested studies (addressing one of the defined priority conditions), the prevalence of acute, unscheduled care is high enough to consider how interventions in an emergency care setting might best be integrated into the overall care for the patients. Other priority topics identified by the IOM with emergency care applications are identified in bold on Table 1. From this perspective, studies that explore outcomes for these conditions beyond the individual episode of care would best meet the goals of CER.

Health care delivery systems represent another approach to identifying opportunities for CER in emergency care. Identified by the federal government as an area in need of comparative effectiveness exploration, delivery systems investigations pose specific questions for emergency care: what are the best ways to deliver time-critical care for any patient in need? Another pressing systems question: what is the best way to deliver care to patients who cannot receive needed care from any other source? Examples of CER funded emergency care systems research include a \$1.39 million dollar grant from the Agency for Health Care Research and Quality to Rutgers University to study the comparative effectiveness of prehospital and hospital-based emergency care systems.²⁰ Similarly, under the CER rubric, emergency care researchers have obtained federal investigator-initiated research project grants (RO1), and mentored career development (K) awards comparing regionalized to non-regionalized emergency care for specific populations (including children) and conditions (including stroke and severe injury).^{21–23}

Additional opportunities within emergency care to achieving CER's goal of improving meaningful, patient-centered, outcomes may be found in shared clinical distributed data networks^{24, 25}, all-payer claims data systems²⁶, expanded clinical registries, and clinical research networks^{27, 28}. These data sources, each supported by federal CER infrastructure funds, can allow clinical and health services researchers to identify and measure outcomes including ED recidivism, hospital readmissions and long term mortality. Such outcome measures, which extend beyond the one-time episodic ED or hospital stay, fit the CER goal of improving meaningful, and long-term patient centered outcomes.

Dissemination and translation of comparative evidence for health promotion is a major component of the national investment in CER. This area represents another opportunity for emergency care researchers and practitioners to consider CER. Patients who seek emergency care differ from those who get set care in other settings, often along the dimensions of demographics, disease severity, and access to care. For these populations, engaging acute care settings and providers to disseminate and translate comparative health information (including how to obtain care for chronic disease management) represents an opportunity for both research and care.²⁹

Last, specialized methods that address the unique challenges of generating comparative evidence in emergency care are useful to consider. For example, programs that seek to improve processes for using exceptions to informed consent in clinical trials of time-

sensitive care for incapacitated patients represent a pathway to expand the scope of comparative trials in emergency care.³⁰ Another CER-emergency care methods application is the development and use of tools to account for the factors that can confound and modify the effect of outcomes in observational emergency care studies. For example, observational studies that seek to measure the effect of time-to-hospital care for EMS patients with acute conditions are often confounded by the fact that patients with higher complexity episodes may also be more likely to receive longer and more intensive care prior to hospital arrival. Instrumental variable³¹, propensity score³², and multilevel mixed-effects analyses³³ specifically for research in time-sensitive care would likely strengthen the internal validity and scope of comparative emergency care research.

The Patient Centered Outcomes Research Institute (PCORI)

PCORI, the independent non-profit institute created by the 2010 ACA health reform law, is charged with setting national research priorities, sponsoring comparative research, and disseminating and translating comparative research results. PCORI promises to be the most important and centralized organization and funding body for comparative effectiveness research in the near future. PCORI grants will flow directly from this organization, with AHRQ serving some administrative roles for the distribution of these grants. The investments that PCORI will make in this domain are financed through a trust fund that will not be subject to annual appropriations debates. These policy initiatives assure an ongoing and high-impact role for this field of research on healthcare delivery and policy.³⁴ The impact of PCORI on emergency care will be determined in part by both its efforts for methods development and the funding resources that it will put towards CER. For both of these domains, substantial opportunities exist for emergency care research to be integrated into the PCORI portfolio.

PCORI Methods

The PCORI methodology committee is charged with advancing the science and methodologies for comparative clinical effectiveness research.³⁵ Research methodologies that address the specific challenges of advancing comparative evidence in emergency care (as discussed above) are likely applicable to PCORI's methods development program.

Funding

PCORI's funding for CER (for original studies, systematic reviews, and the dissemination and translation of comparative evidence) is codified by PPACA. By federal statute, the annual PCORI appropriations are \$50 million in 2011, \$150 million in 2012, and \$150 million per year plus additional fees (\$2 per beneficiary) imposed on Medicare and private health insurance companies from 2013 through 2019. These federal appropriations will automatically grow without being subject to annual congressional budget debates and are expected to exceed \$500 million per year by 2015.³⁶ Although these funding streams are small compared to the overall NIH budget, they represent a significant portion of clinical, health services and CER research. Emergency care researchers might consider these sources of potential funding for clinical research given the large and continued investment in CER via PCORI in the near future.

Caveats—what is not emergency care CER/PCOR

Although there are many reasons to embrace shared missions of emergency care and comparative effectiveness research, there also may be substantial limitations to an overzealous approach to conflating these enterprises. Studies that are not comparative (such as pure placebo controlled trials), or that measure mere efficacy without exploring “real world” care, are unlikely to be considered true CER. Similarly, studies that are merely

comparative, but don't meet the mission or operational goals of outcomes-driven, patient-oriented high impact research do not represent the mission of PCOR/CER. For example, small, single site emergency department studies which use surrogate endpoints to compare two therapies (such as for acute asymptomatic hypertension) are unlikely to be able to demonstrate meaningful differences in health outcomes for specific populations of patients.

Conclusions

Emergency care represents an underexplored but viable area for comparative effectiveness and patient centered outcomes research. The study of acute, episodic, unscheduled care can be integrated into the overarching goal of improving meaningful long term health outcomes for many patients.¹² Much as the clamor for a federal research institute dedicated to emergency care has been replaced by recognition that each NIH institute might focus some of its attention on condition-specific emergency care research³⁷, a portion of the national CER portfolio, while broad in scope, clearly includes acute conditions or the acute exacerbation of chronic conditions. Moreover, emergency care, which sits at the interface of hospitals and their respective communities, represents a research domain which can address the needs of classically under-studied and underserved -- and thus *priority* -- populations.

This report explores the domains of CER from an emergency care perspective. We have sought to accomplish this task by defining CER and PCOR, describing a conceptual framework for CER/PCOR in emergency care, and identifying specific opportunities and examples of emergency care related CER. We have also outlined current and planned funding for CER and PCORI that can include emergency care and conditions.

The role of emergency care within the CER and PCOR initiatives goes beyond the narrow effort to stake a claim for a medical subspecialty (emergency medicine) or a location of care (emergency department, trauma bay, or prehospital). Emergency care providers and researchers who wish to consider CER methods, concepts, and funds could consider the bridge that connects acute, unscheduled, and episodic care to an integrated approach to caring for patients. When one considers the primary goal of CER --to discover what, where and when works best for whom—real opportunities to consider acute care from this perspective emerge. Given the early stages of the U.S. investment in CER and PCOR, now is the time to seek these goals for the large and growing number of patients who receive emergency care each year.

Acknowledgments

We thank Dr. Joshua Metlay for guidance and mentorship in comparative effectiveness research and Dr. Donald Yealy for his encouragement and thoughtful perspectives on an earlier version of this manuscript.

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Defined by U.S. Department of Health and Human Services¹⁰

The Conduct and synthesis of research comparing the benefits and harms of different interventions and strategies to prevent, diagnose, treat and monitor health conditions in “real world” settings. The purpose of this research is to improve health outcomes by developing and disseminating evidence-based information to patients, clinicians and other decision-makers, responding to their expressed needs, about which interventions are most effective for which patients under specific circumstances. To provide this information, comparative effectiveness research must assess a comprehensive array of health-related outcomes for diverse patient populations and sub-groups. Defined interventions compared may include medications, procedures, medical and assistive devices and technologies, diagnostic testing, behavioral change, and delivery system strategies. This research necessitates the development, expansion and use of a variety of data sources and methods to assess comparative effectiveness and actively disseminate the results.

Figure 1.
Comparative Effectiveness Research (CER)

Working Definition by the National Patient Centered Outcomes Research Institute (PCORI)³⁴:

Patient-Centered Outcomes Research (PCOR) helps people make informed health care decisions and allows their voice to be heard in assessing the value of health care options. This research answers patient-focused questions:

“Given my personal characteristics, conditions and preferences, what should I expect will happen to me?”

“What are my options and what are the benefits and harms of those options?”

“What can I do to improve the outcomes that are most important to me?”

“How can the health care system improve my chances of achieving the outcomes I prefer?”

To answer these questions, PCOR:

Assesses the benefits and harms of preventive, diagnostic, therapeutic, or health delivery system interventions to inform decision making, highlighting comparisons and outcomes that matter to people;

Is inclusive of an individual's preferences, autonomy and needs, focusing on outcomes that people notice and care about such as survival, function, symptoms, and health-related quality of life;

Incorporates a wide variety of settings and diversity of participants to address individual differences and barriers to implementation and dissemination; and

Investigates (or may investigate) optimizing outcomes while addressing burden to individuals, resources, and other stakeholder perspectives.

Figure 2.
Patient Centered Outcomes Research (PCOR)

Figure 3.
Integrated Model for Comparative Effectiveness Research and Emergency Care

Table 1

IOM Initial National Priorities for Comparative Effectiveness Research by condition and research question

1	Atrial fibrillation—effective treatments
2	Hearing loss—effective treatments
3	Falls in older adults—primary prevention
4	Gastroesophageal reflux disease—role of endoscopy
5	Dissemination and translation of CER for patients, clinicians, and payers—best practices
6	Care coordination for patients with severe chronic disease—compare models
7	Autoimmune diseases—effectiveness of biologic pharmaceuticals
8	Methicillin resistant staph aureus eradication in communities and hospitals—effectiveness of screening and treatment
9	Reduction of central line, urinary catheter and other health care associated infections-- strategies
10	Prostate cancer—role of treatment modalities
11	Low back pain without neurologic deficit—registry to compare effective treatments
12	Dementia—detection and management
13	Alzheimer's disease and behavioral disorders—role of pharmacologic treatment
14	Childhood obesity—prevention
15	Obesity, diabetes, heart disease in urban poor—prevention
16	Ductal carcinoma in situ—effective treatment
17	Medical imaging for cancer—comparisons for diagnosis and staging
18	Biomarkers in cancer—prevention and treatment
19	Dental caries in children— treatment delivery models
20	Attention deficit hyperactivity disorder—treatment
21	Emotional disorders in adults—treatment setting
22	Cardiovascular disease, diabetes, cancer, musculoskeletal disease and birth outcomes—interventions to reduce disparities
23	Chronic disease (general)—role of literacy sensitive treatment
24	Infant mortality—prevention
25	Unintended pregnancies—prevention (including expanding delivery sites for contraception)
26	Autism spectrum disorder—treatment
27	Developmental disorder in children—identification and treatment
28	Neonatal intensive care—treatment after discharge
29	Vascular claudication—treatment
30	Anxiety, depression, pain and cardiovascular disease—comparison of mindfulness interventions
31	Hip and vertebral fractures—prevention
32	Angina and asthma—shared decision making treatments
33	Medication adherence— methods to promote
34	Diagnostic treatment decisions in patients with limited English language proficiency or education—role of decision support tools for patients
35	Robot assistant surgery for common procedures-- effectiveness
36	Chronic disease management—role of telemedicine and remote monitoring
37	Transitions in care for patients after hospital discharge
38	Chronic disease—role of accountable care systems
39	Functional impairments in elderly patients—compare type of residential care
40	Chronic kidney disease—compare renal replacement therapies

- 41 **Neck/cervical disc pain—compare treatments**
- 42 Breast cancer detection—imaging modality
- 43 Colorectal cancer—screening
- 44 End of life care—role of coordinated care
- 45 Major depressive disorder—treatment
- 46 **Asthma in children—models of treatment**
- 47 Psoriasis—treatment
- 48 Post traumatic stress disorder—treatment
- 49 Normal pregnancy—role of ultrasound
- 50 Normal pregnancy—effectiveness of free standing birthing centers
- 51 **Acute and non- cancer chronic pain—opioid vs. non-opioid pain relievers**
- 52 Stable coronary disease—management
- 53 Congestive heart failure—treatment strategies
- 54 **Coronary heart disease—risk stratification**
- 55 **New onset Type 2 diabetes—treatment**
- 56 General conditions—role of acupuncture using cluster randomized trial
- 57 General high prevalence conditions—role of dietary supplements
- 58 Retinal vein occlusion and macular degeneration—treatment modality
- 59 Open angle glaucoma—treatment strategies
- 60 Type 2 diabetes—role of educational support
- 61 Chronic disease—methods to improve compliance with evidence based guidelines
- 62 General conditions—role of biomarkers in motivating behavior change
- 63 **Acute and chronic conditions—quality improvement strategies in diverse populations**
- 64 Hospital costs—role of formulary management practices
- 65 Chronic diseases—insurance benefit design impact on access and utilization
- 66 **HIV—screening strategies**
- 67 Cervical spondylotic myelopathy—treatment
- 68 **Acute neurologic and orthopedic conditions—compare imaging modalities**
- 69 Multiple sclerosis—care models
- 70 Obesity —treatment to prevent poor outcomes
- 71 Periodontal disease—prevention
- 72 Mental illness—comparison of labeled and off-label medications
- 73 Mental illness—treatment strategies after suicide attempt
- 74 **General conditions—role of strategies to improve health care access for high disparity populations**
- 75 Chronic lower extremity wounds—treatment modalities
- 76 **Smoking cessation—treatments in understudied populations**
- 77 **Coronary stenosis and coronary syndromes—diagnostic testing**
- 78 Knee arthroplastic surgery—effectiveness of anticoagulation treatment
- 79 Cerebral palsy in children—treatment
- 80 Medication adherence in elderly—strategies
- 81 Chronically ill patients/ special needs—role of clinical decision support
- 82 Chronic disease with functional impairments—role of interdisciplinary care
- 83 Abdominal surgery—surgical modality
- 84 **Health behavior change in children and adults—role of economic incentives**

- 85 Diagnostic imaging performance—compare radiologist to non-radiologist**
- 86 Informed consent—different techniques**
- 87 General chronic disease—strategies to activate patients
- 88 Hypertension in minorities—delivery models
- 89 Hepatitis C—management
- 90 Osteoarthritis—prevention of disabilities
- 91 Cervical disc herniation—effectiveness of surgical treatment
- 92 Migraine headaches—treatments**
- 93 Intractable epilepsy—pharmacologic control
- 94 Liver metastases—treatment
- 95 End of life—role of hospital based palliative care
- 96 Serious mental illness—avoiding early mortality and co-morbidities
- 97 Mental illness—health care integration models
- 98 Depression after myocardial infarction—treatments
- 99 Acne—long term treatments
- 100 Breastfeeding —methods to promote use**

Table 2

Estimated number of adult emergency department visits by principal reasons for visit (RFV), United States (age>15).¹⁹

1	Abdominal Pain (7.6 million)
2	Chest pain and related symptoms (5.9 million)
3	Headache (2.8 million)
4	Back Pain (2.7 million)
5	Pain, no referable to a specific body system (2.5 million)
6	Shortness of Breath (2.0 million)
7	Throat Pain/Symptoms (1.6 million)
8	Vomiting/Nausea (1.1 million)
9	Vertigo/Weakness (1.1 million)
10	Leg Symptoms (0.8 million)