

# The HOMERUN Collaborative – Leveraging data to support comparative effectiveness research and catalyze healthsystem innovation

Andrew D Auerbach MD MPH

Associate Professor of Medicine

UCSF Department of Medicine – Division of Hospital Medicine

Peter K Lindenauer MD MSc

Associate Professor of Medicine

Baystate Medical Center – Center for Quality and Safety Research



# Overview

- Rationale for the Hospital Medicine Reengineering Network (HOMERUN)
  - CER and healthsystem innovation
  - Good science with ‘bad’ (read: Administrative) data
- Description of sites, work to date

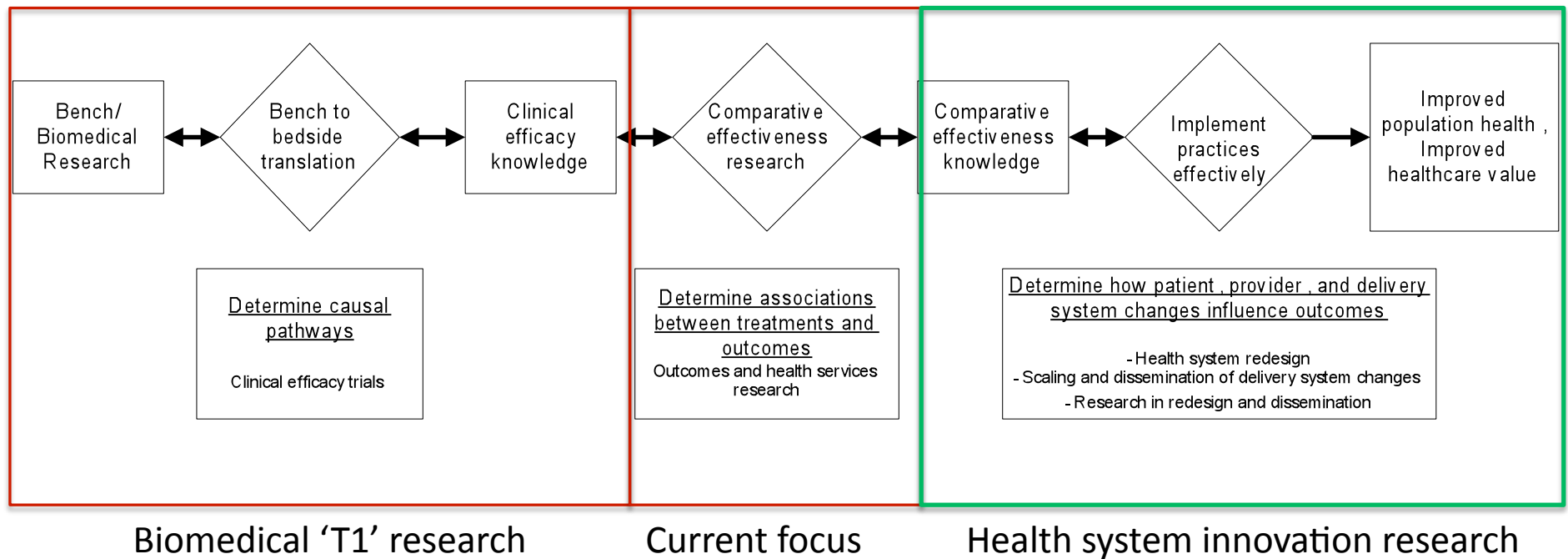


# Overview

- Key talking points:
  - What are the regulatory (or other) obstacles impacting your work?
  - What are the resource needs?
  - What are the priority short term "translational" questions that represent the most rapid payoff on investment?



# 21<sup>st</sup> century opportunity – Research to support health system innovation



Key ingredients include  
all of these (and more)

HIT and EMR's  
Education and training  
Policy makers



# CER and Healthsystem innovation research – key ingredients

- The ‘distal’ translational step should be made
  - No feedback to earlier steps as to what is practical or useful to patients and caregivers
  - Limited ability to inform policymakers
- Provide access to key methodologies:
  - Biostatistics, sociology, informatics, management theory, industrial design/engineering.
  - CTSA’s/University resources critical



# CER and Healthsystem innovation research – key ingredients

- Engage front-line caregivers and delivery systems
  - Community engagement may mean engaging communities of caregivers AND communities of patients



# CER and Healthsystem innovation research – key ingredients

- Develop networks
  - Rigorous CER, study of health system redesign or variations in practice need lots of ‘subjects’
    - Subjects: Hospitals, Clinics, Physicians... and patients
    - More subjects = More generalizability, more ability to undertake research using experimental designs (RCT's)



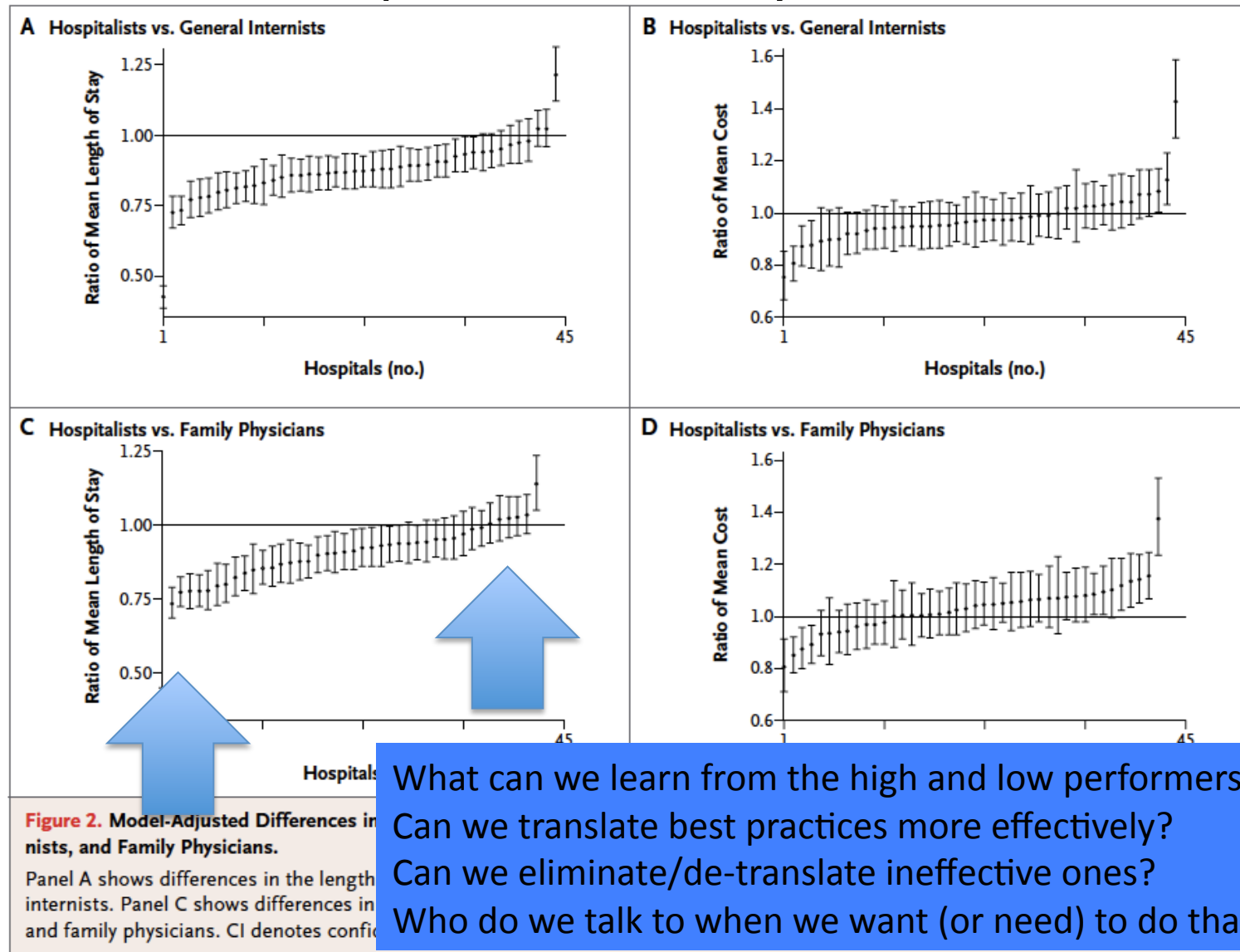
## Example 1 – Compare delivery models: Hospital medicine systems

- Study question:
  - Do hospitalists provide more effective and less expensive care? (Lindenauer, NEJM 2007)
- Comparison of hospital medicine (hospitalist) physician care to internists to family medicine
- 45 Hospitals, ~60,000 patients
- Summary of results:
  - Hospitalists provided care that was generally lower cost, but had similar mortality





# Example 1 – Compare delivery models: Hospital medicine systems



Example 2 – Compare treatments.  
Venous thromboembolism prevention in joint replacement  
surgery

- Study question:
  - Is aspirin an effective alternative to standard preventive treatments for thromboembolism after knee replacement?  
(Bozic, JBJS 2009)
- 60,000 total knee replacement surgeries, ~200 hospitals
- Aspirin: equivalent protection to enoxaparin, warfarin treatment, slightly less risk for bleeding.



## Example 2 – Compare treatments.

### Venous thromboembolism prevention in joint replacement surgery

- Aspirin:
  - Seemed to be used in a few hospitals or by a few surgeons in a single hospital
  - Patients also had shorter LOS, were more likely to go home (rather than rehab)
- Conclusion:
  - Aspirin is not superior, but the systems where it used may have features worth replicating (Translating into practice)
  - At least 1 RCT now in the works – how to select the correct patients for a less expensive, easier, and equally effective drug



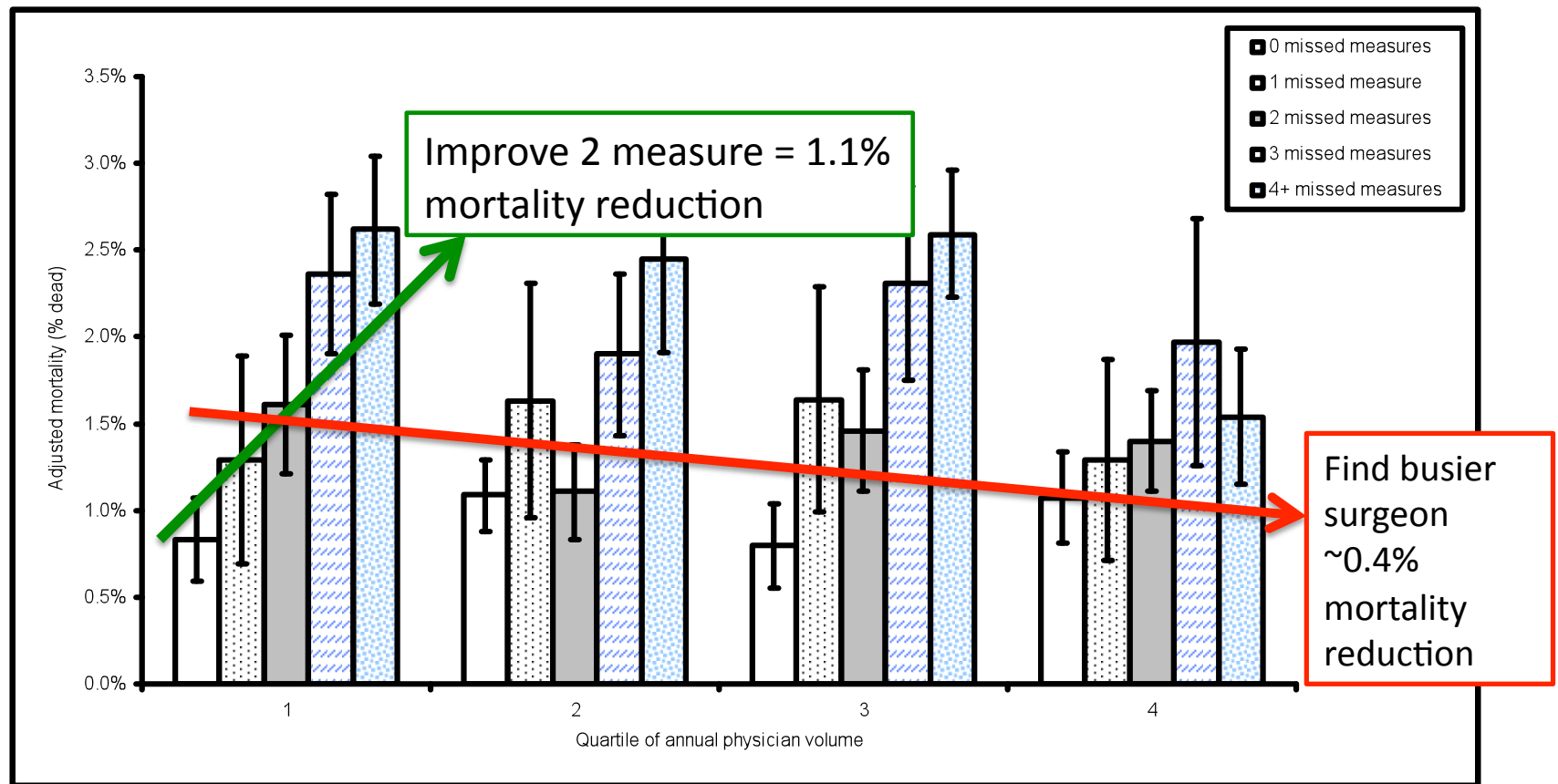
## Example 3: Understand opportunities for improvement

### Volume and care quality in cardiac surgery

- Study question:
  - Should patients seek the busiest hospitals/surgeons when getting bypass surgery, or should they look at the highest-rated hospitals (e.g. [hospitalcompare.org](http://hospitalcompare.org))? (Auerbach Annals of IM 2009)
- 81,000 surgeries, ~300 hospitals
- First level analyses:
  - Individual measures of quality (derived from RCT data) very inconsistently associated with improved outcomes
  - Busier surgeons had somewhat better outcomes
  - But which is more important?



## Example 3: Understand opportunities for improvement Volume and care quality in cardiac surgery



If all surgeons in our data improved by just 1 quality measure = 140 lives saved/year

If all 700K CABG in 1997 improved by just 1 quality measure = 3,500 lives saved/year



# Take aways

- You can do a lot with widely available (administrative) data
  - Simply linking pharmacy charge data to administrative data allows powerful studies
  - Good news: Pharmacy charge data are key part of hospital accounting



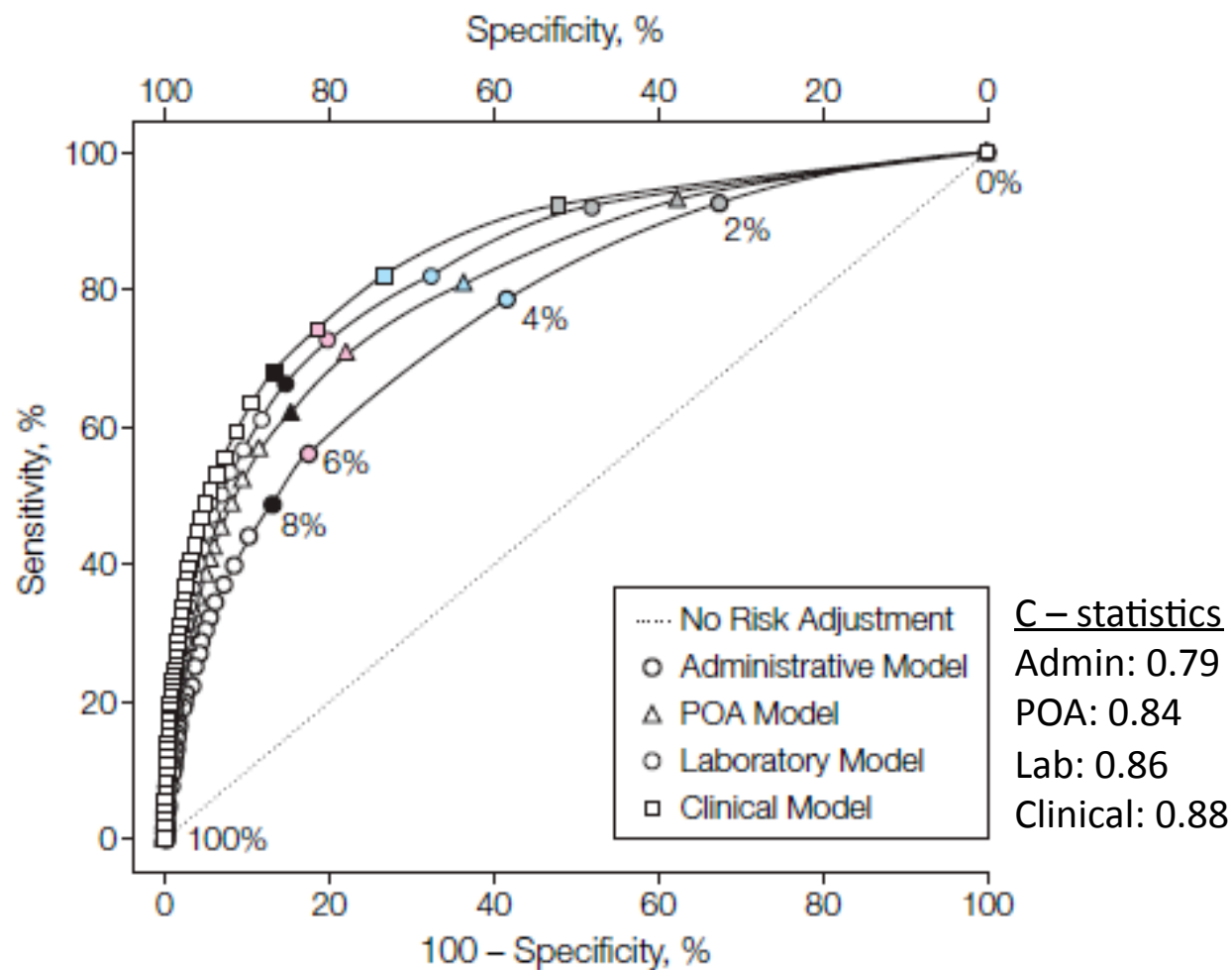
# Take aways

- Everyone's patients are sicker than everyone else's
    - ...and administrative data not viewed as adequate
- Risk adjustment key for both scientific validity and engagement of front line providers



**Figure.** Receiver Operating Characteristic Curves for the Models

PINE JAMA 2007, 297: 71-76



**Good news: These risk adjustment data are available in standard data systems**



# Hospital Medicine Reengineering Network (HOMERUN)

- Leveraging the role of hospitalists in the care of general medical patients in US hospitals
  - >60% of Medicare patients getting care from hospitalists
  - <1,000 in US in 1999, now >20,000



# Why hospitalists?

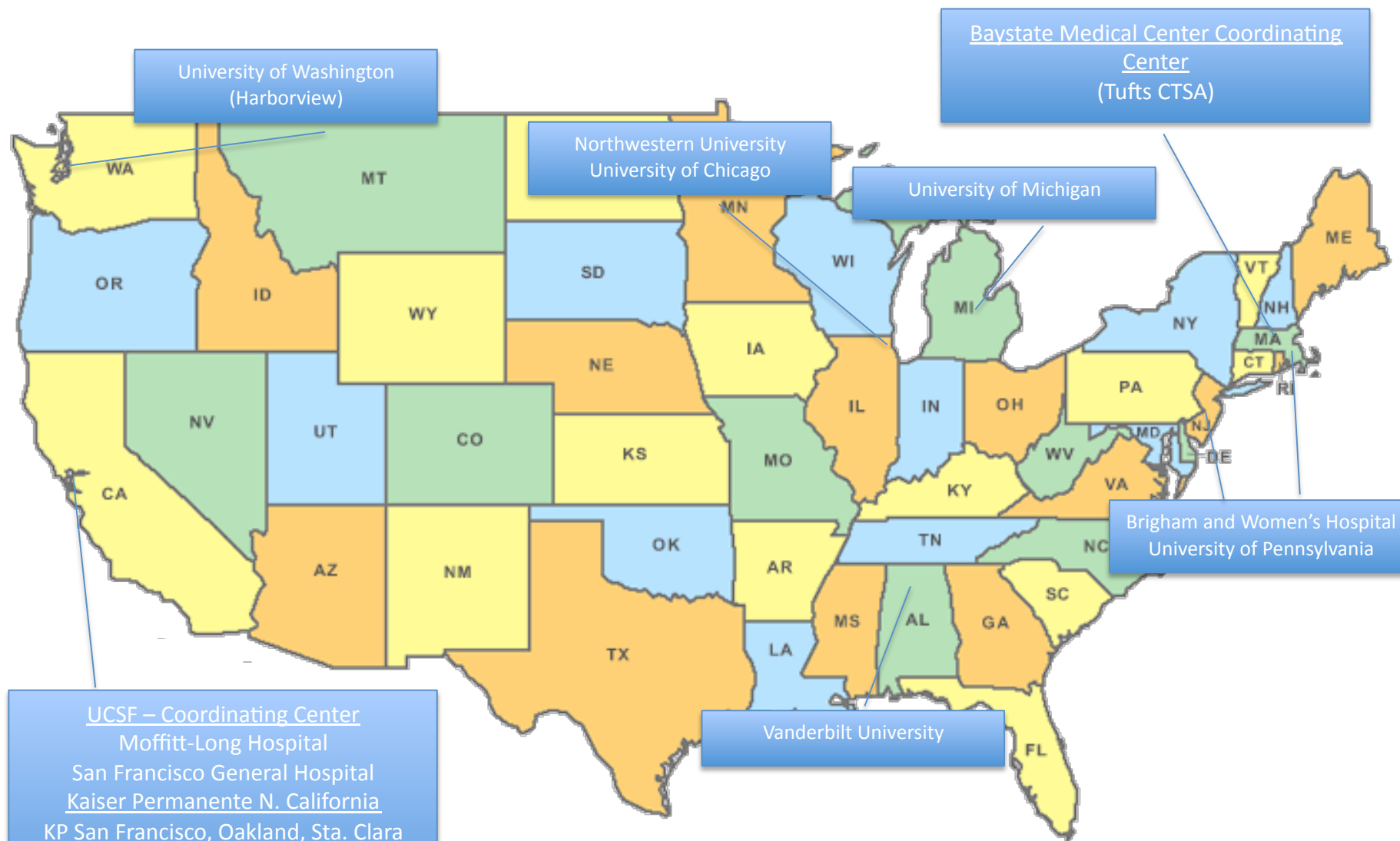
- At UCSF, 15 hospitalists have assumed care previously provided by > 100 physicians
  - Easier to get front line engagement, implement research protocols
- Hospitalists are a key ‘line item’ for hospitals
  - Hospitalists view systems reengineering as a key element of professional identity
- Hospitals have lots of data, with known strengths and weaknesses



# HOMERUN as a CER/HSI Research Network

- Core values:
  - Support the rigorous evaluation of clinical practices at our sites and identify opportunities for improvement
  - Support rigorous empirical evaluation of health systems innovations
    - Study ‘QI’ using experimental and quasiexperimental designs
  - Create feedback between CER and HSIR in our network





HOMERUN sites:  
16 hospitals, 6 states



# HOMERUN as a CER/HSI Research Network

- Plan for HOMERUN – 2009-2011
  - Share data from easily available hospital sources to:
    - Provide benchmarking data required to engage front line caregivers, site administrators, and payors
    - Provide preliminary data required to engage funders and develop a portfolio of CER/HSIR projects



# HOMERUN as a CER/HSI Research Network

- Vision – 2009-2010
  - Data sources:
    - Administrative data (Uniform Bill, 2004 Version)
      - Eclipsis (previously TSI)
    - Pharmacy Charge Data (including NDC identifiers)
      - From cost center lists in Eclipsis
    - Laboratory result data (CBC, Chem 10, Albumin, Micro results)
      - From GE Centricity lab system
    - Bed-tracking data (Admit-Discharge-Transfer)
      - From IDX bed tracking/patient census data systems
    - Ad Hoc data – required for specific projects



# HOMERUN 2009 work

- Finalizing IRB approvals at each site
  - Agreement on format for administrative data (UB04)
- Data use agreements under review
  - Limited datasets only
  - Reports in aggregate form only, no site identifiers included
- Plan to move beyond UB04 as funds/resources permit



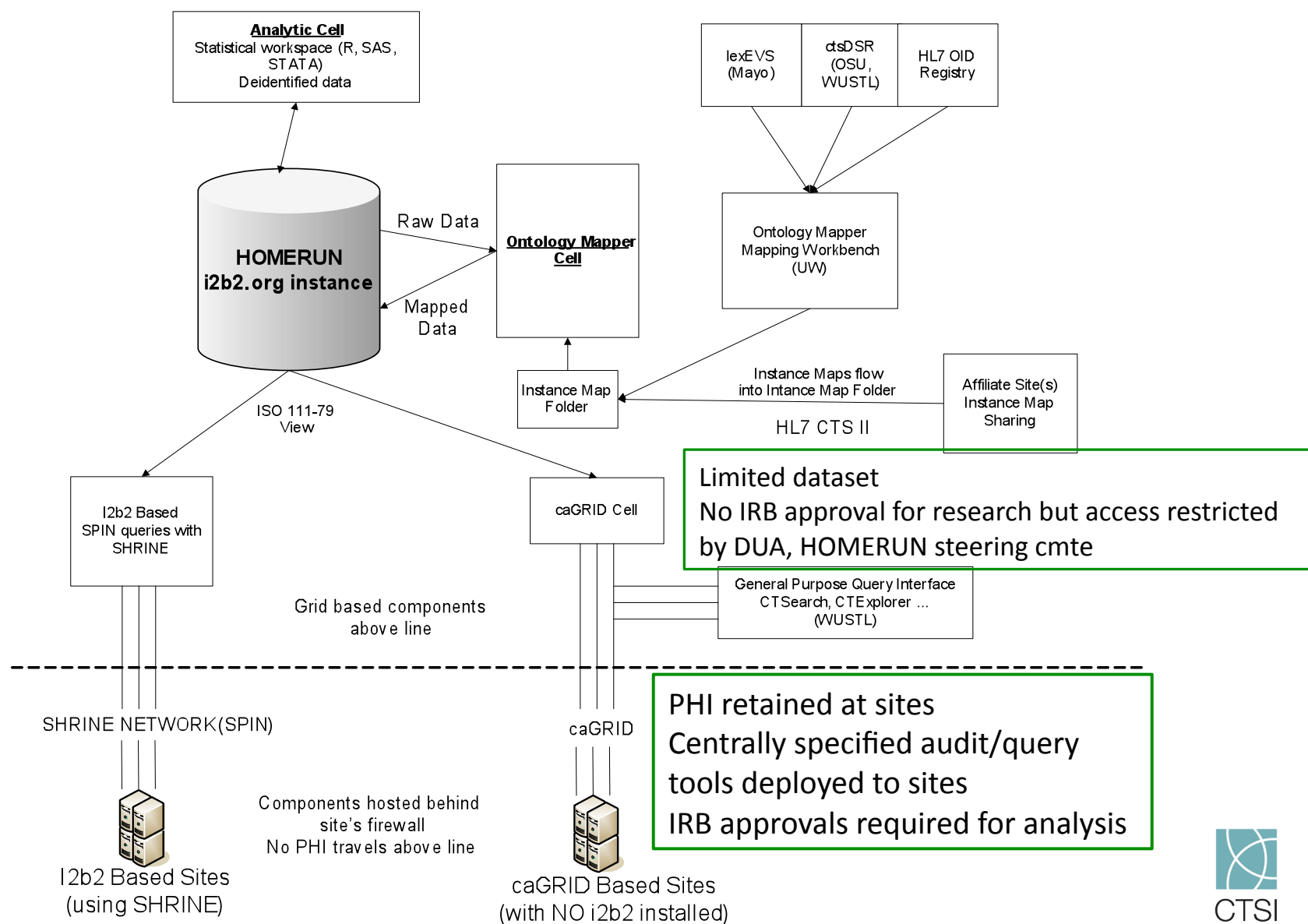
# HOMERUN 2009-10 work

- Defining HOMERUN ontology and architecture
  - Implementing a HOMERUN i2b2 instance at UCSF (Rob Wynden, Michael Kamberick pivotal)
  - Initially: FTP-based data transfers
  - Audit and ad hoc data collection (e.g. chart reviews) via RedHat tools deployed at sites
  - As soon as possible – Grid architecture
    - Strategy: Focus on sites with IDR or CDR, preferably i2b2 based, for short term



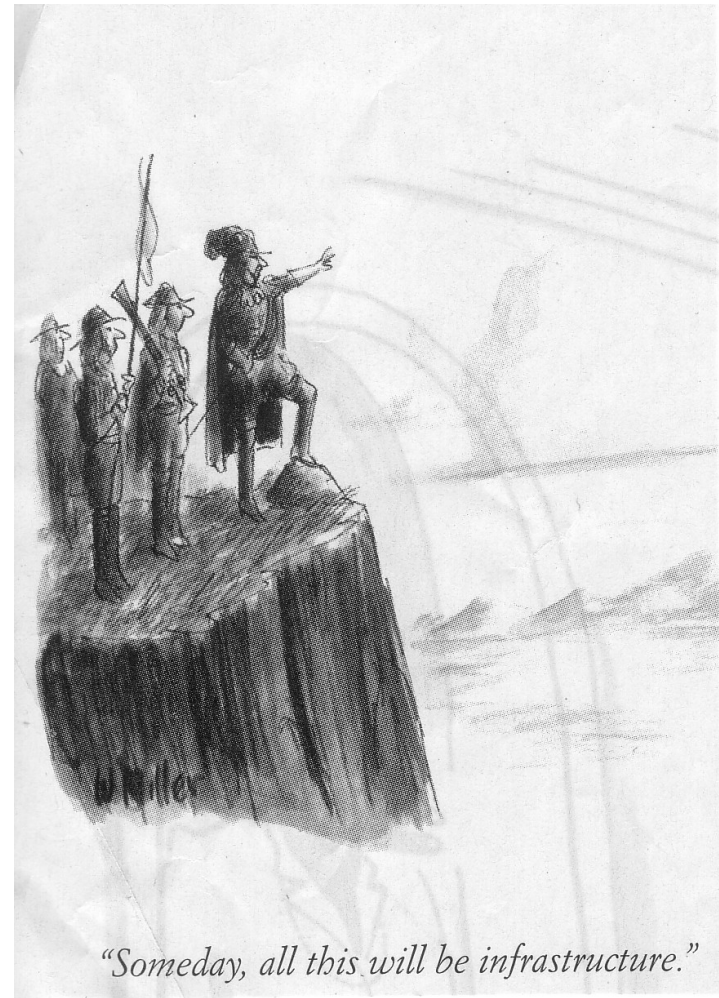


# Blueprint for HOMERUN beyond 2010



# Barrier 1: Infrastructure is hard to sell

- What is the ROI?
  - How can we build infrastructure to be faster, better, and cheaper than the current model?
  - Can it be more 'real time' and flexible?
- For HOMERUN
  - Each site is currently doing similar data collection for internal use
  - Leverage investments already made in IDR/CDR
  - Economies of scale
  - Opportunities to gain broader view of practices
  - Use cases critical



## Barrier 2: Doesn't someone do this already?

- CER/HSI networks seem similar to other benchmarking organizations
  - UHC, PREMIER
- Why CER/HSIR networks have a key role
  - For most benchmarking organizations, CER is not a core function
    - External reporting (e.g. core measures reporting) and benchmarking for purchasing remain primary
  - Limited front-line provider engagement
  - Often support collaboration, but no specific interest or expertise in HSIR



# Barrier 3: Why grid computing? Which grid type?

- Seems different (and scary) to those holding data
  - What are the true resources required to implement a 20 hospital grid? 200? Why not just do things the old fashioned way
  - Do costs for implementing/installing fall quickly enough as you get experience?
- ....are there other technologies, systems to consider
  - HOMERUN
    - Start small w/ i2b2, aim for grid which is open source, customizable to local IT needs



# Barrier 4: Can grids support complex analyses needed for CER/HIS research?

- Can grids support longitudinal analyses?
  - Can I follow repeated patient visits for 1, 5, 10 years after study entry?
- Can grids support complex multivariable models?
  - Hierarchical models (e.g. generalized estimating equations, generalized linear models, etc)
  - Can these analyses run ‘in the background’ fast enough to be near ‘real time’
  - HOMERUN
    - Installing R in its grid environment as a first step.



# Barrier 5: Can we thread the needle?

- Can we link CER and HSI in a way that aligns all stakeholders' needs?
  - NIH – Can knowledge be advanced in a generalizable way?
  - Payors – Can costs be constrained?
  - Health system executives – Can costs (and increasingly, outcomes) be improved?
  - Physicians – Can you help me take care of my patients?
  - Patients – Can you save my life? Make my care cheaper, better, faster?



Community-based participatory research focusing on shared goal:  
Improving outcomes and value of healthcare



# Barrier 6: IRB's, DUA's and sharing

- IRB's inconsistent on how to deal with grid computing architecture, and QI
  - A project which does both is more challenging
  - HOMERUN: Using UCSF IRB as a stepping off place
  - Based our DUA on that used for other QI/ benchmarking collaboratives (but seek approval after IRB approval).



# Resources required

- Support\* for the work required to move from FTP to grid computing
  - Early definition of resource requirements and return on investment for our base data platform for sites with and without IDR's or CDR's
- Support to implement audit and query mechanisms required for project specific needs
- Support to develop approaches for carrying out complex statistical modeling in near-real time



\*Support = financial support, but at least as importantly: Vision support





# Resources required

- Support to develop the intra-CTSA collaborative teams needed to carry out CER and HSI work.
- Support to crystallize inter-CTSA collaborative teams focusing on CER and HSIR
  - Can NIH help catalyze a CER/HSIR standard for IRB's (reciprocity, as in the UC system)?
  - Ditto DUA's



# HOMERUN use cases/Short term payoff

- CER: What is the optimal treatment duration for community-acquired pneumonia?
  - Which approach (short or long duration, cheap or expensive antibiotics) improves outcomes and produces the least antimicrobial resistance?
    - Saving even 1/3 of a hospital day, spread over 100,000 admissions is a lot of savings
    - Reducing hospital acquired resistant organisms a major NIH goal



# HOMERUN use cases/short term payoff

- CER: What are the factors associated with unplanned ICU transfer in medical patients?
  - How do varying monitoring strategies influence ICU transfer?
  - The majority of hospital costs are accrued in ICU's
  - More importantly, unplanned ICU transfers are likely a marker for less safe care



# HOMERUN use cases/short term payoff

- HSI: Can a patient-focused discharge checklist reduce risk for readmission?
  - Cluster-randomized trial of a patient-facing discharge protocol vs. usual care
  - Reducing readmissions a primary goal of CMS, potential savings in the hundreds of millions/year.

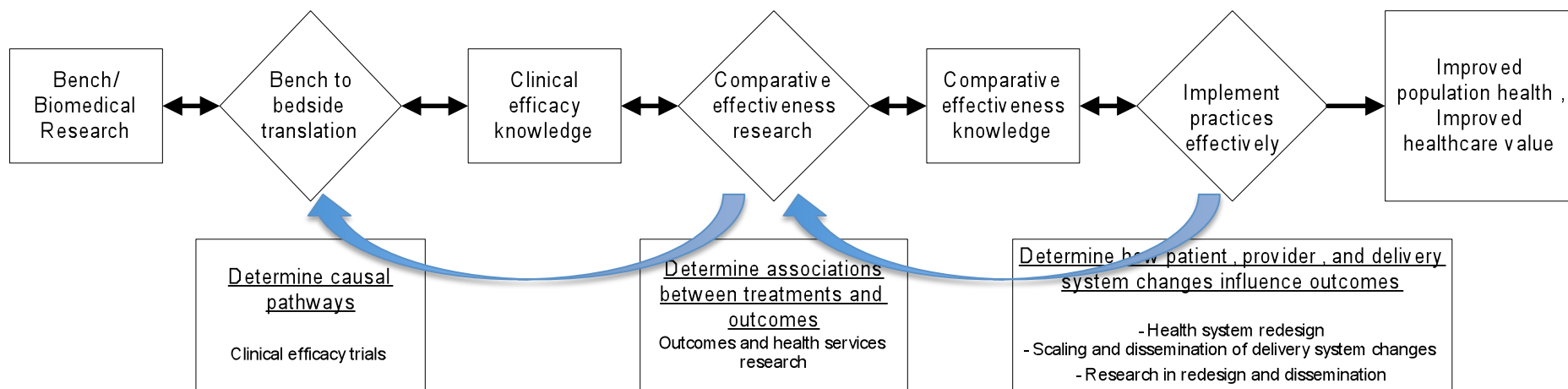


# HOMERUN use cases/short term payoff

- HSI: How do hospitals differ in the costs and outcomes of care after hospitalization?
  - Linking HOMERUN data to Medicare outpatient charge data accrued 180 after index admission
  - Identifying commonly repeated tests or procedures may represent opportunities to improve



# The 21st century opportunity – Research to support health system innovation



- Investment in CER/HSI research can provide substantial ROI :
  - 100K spent on our CABG study. HOMERUN could lower costs further
  - Empirically evaluate QI ‘mandates’ at low cost relative to ongoing costs borne by hospitals
  - What is more expensive? Knowing or doing?
- Back translation from HSI to CER to Bench-to-Bedside research is an untapped resource
  - Aspirin in VTE has prompted new RCTs
  - Resource such as HOMERUN could define new translational opportunities (failures, or unexpected successes) at low costs



# CTSA's and the NIH can be an engine for CER/System innovations research

- ✓ Availability of key methodologic resources
- ✓ Investment in IT
- ✓ Availability of patients and sites
- ✓ Community engagement focus
- ✓ Engagement of sites' leadership
- ✓ Recognition that spread of knowledge is a key public good



SOUNDING BOARD

**The Tension between Needing to Improve Care  
and Knowing How to Do It**

Andrew D. Auerbach, M.D. M.P.H., C. Seth Landefeld, M.D., and Kaveh G. Shojania, M.D.

- NIH support for CER/HSIR networks can be an engine for research which resolves this tension
  - HOMERUN is a CER/HSIR model which provides a strong test-case for this approach





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- University of Washington
  - Joanne Elmore MD MPH



- For more information on HOMERUN or this slideshow, call or email:

Andrew D. Auerbach MD MPH

UCSF Division of Hospital Medicine

415-502-1412 (Office)

415-514-1414 (Administrative Assistant)

[ada@medicine.ucsf.edu](mailto:ada@medicine.ucsf.edu)

