How to get the most out of your data in driving improvement
Challenge of overuse

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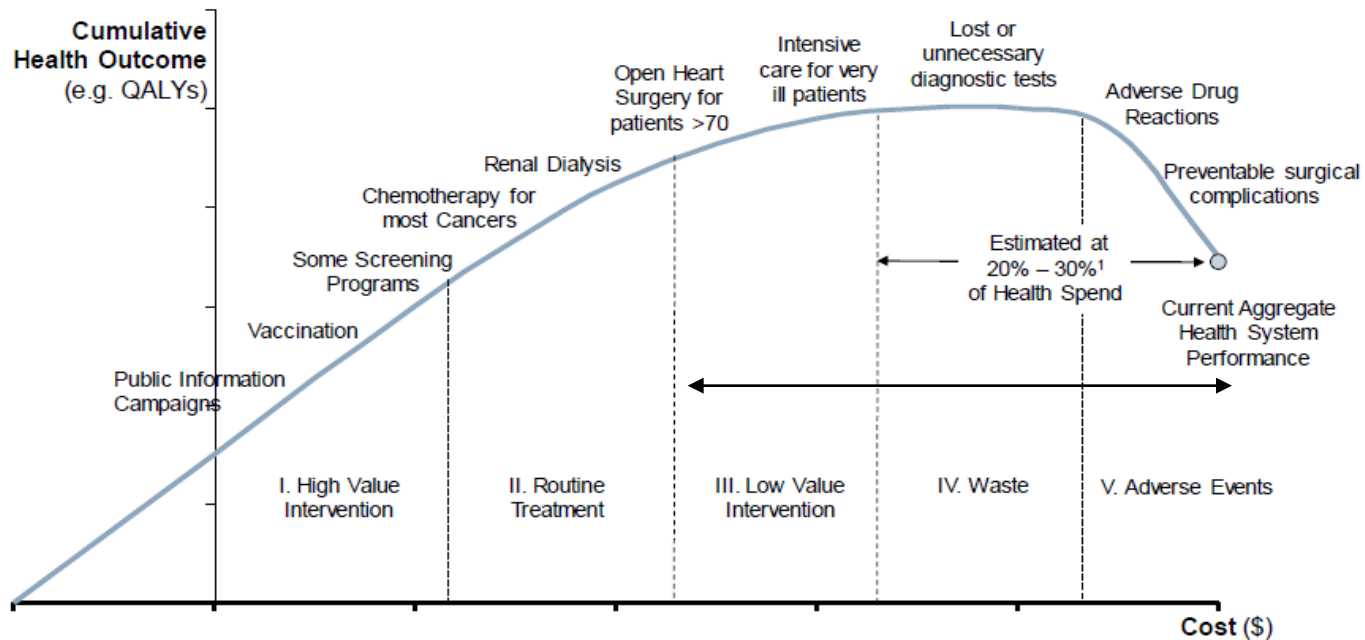
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Health care system imperative

Health System Performance

Cumulative Health Outcome (e.g. QALYs) vs Cost ($)

I. High Value Intervention · II. Routine Treatment · III. Low Value Intervention · IV. Waste · V. Adverse Events

Public Information Campaigns · Vaccination · Some Screening Programs · Chemotherapy for most Cancers · Renal Dialysis · Open Heart Surgery for patients >70 · Intensive care for very ill patients · Lost or unnecessary diagnostic tests · Adverse Drug Reactions · Preventable surgical complications

Estimated at 20% – 30%[1] of Health Spend

Current Aggregate Health System Performance

Science → Evidence → Care → Patient Experience

Insights poorly managed · Evidence poorly used · Experience poorly captured

Missed Opportunities, Waste, and Harm

Institute of Medicine 2012

Underuse, overuse, misuse

- Underuse
  - Omission of effective (high value) services in eligible patients
    - Much of the focus
      - CareTrack, ACS Snapshot
    - Valid evidence-based measures
      - But less than 40%

- Overuse
  - Provision of ineffective (low value) services in absence of extenuating circumstances
    - Drug and test utilisation audits
    - ?Valid evidence-based measures

- Misuse
  - Provision of services that are potentially ineffective/harmful depending on patient circumstances

Dangers of overuse

- Inadequate assessment of efficacy, safety and comparative effectiveness of existing health care technologies

    - IOM in US: 50% current treatments not supported by evidence of superior benefit; 30% healthcare expenditure reflects care of uncertain value[1]

    - Majority of MBS items have never been comprehensively tested for comparative safety or effectiveness[2]
        - 156 high volume items are of low value - should not be funded[3]

1. IOM 2007 2. Elshaug et al. MJA 2009 3. Elshaug et al MJA 2012

Dangers of overuse

- Assessment of implantable devices is inadequate
  - Faulty metal-on-metal hip prostheses, pacemakers and ICDs, breast implants

- In studies which have tested an established clinical standard, more than half report evidence that contradicts the standard or is inconclusive[4]

- Numerous examples of listed treatments for which safety concerns have become evident over time
  - Rosiglitazone for diabetes
  - Tegaserod for irritable bowel syndrome
  - Rofecoxib for mild to moderate pain
  - ?Dabigatran for AF thromboprophylaxis

4. Prasad et al. Arch Intern Med 2011

Learning health care system

Executive 'upstream' decisions

Overuse
**Evidence of no benefit or harm
Uncertainty as to benefit and/or harm**
Underuse
Evidence of benefit and no harm
Misuse
Inappropriate targeting of care

- **Question evidentiary basis of protocols and models of care**
- **Challenge current professional mindsets**
- **Optimise clinical decision support**
- **Emphasise personal accountability re CPD**
- **Undertake experimentation**

Executional 'downstream' decisions

**Errors, slips, oversights, deviations, violations
Delivery system defects and hazards**

- **Standardisation processes, equipment**
- **Protocols and checklists**
- **Team training**
- **Communication optimisation**

Suboptimal outcomes

Maximising high-value, cost-conscious care

- Understand the weaknesses and shortcomings in our current services*

- Decrease or eliminate use of services that provide no benefit or are harmful

- Evaluate services for which there is uncertainty about benefits, harms and costs

- Standardise appropriate use of services that maximise benefits, minimise harms and reduce costs or waste

- Understand patient preferences and values and customise services accordingly

*Any clinical intervention, model of care or healthcare service

Awareness of service shortcomings

- Regularly appraise the evidence of benefit and harm for new and existing services
  - Push and pull strategies
  - Evidence information services

- Keep a look-out for 'less is more' innovations among peer organisations
  - ARCHI, CEC, HRT, AHRQ, NICE, NHS RD

- Listen to the experts
  - but don't place blind faith in them; beware of bias
    - Ask for the evidence (RCTs, high-quality registry studies)
    - Beware opinion/low quality evidence recommendations

- Identify weaknesses in current system of care
  - Quality indicators, patient surveys

Services of no benefit or harmful

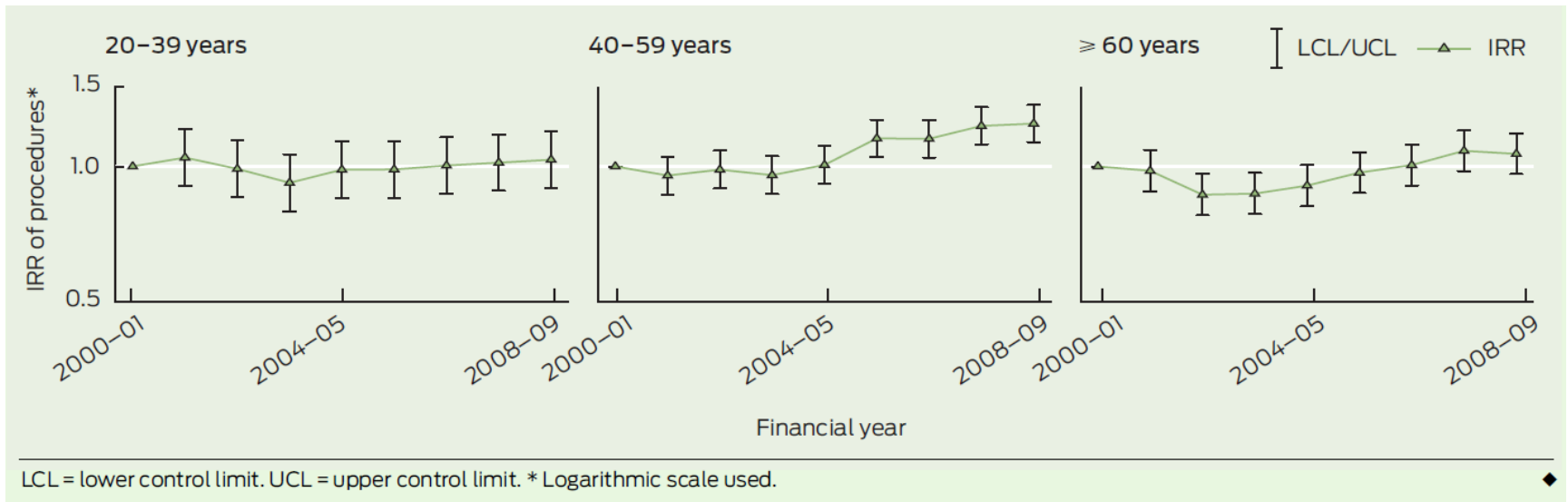No universally accepted methodology that defines low value service

- Arthroscopic lavage or debridement for knee osteoarthritis
- Vertebroplasty for painful osteoporotic vertebral fractures
- Radical prostatectomy for early stage localised prostrate cancer
- Endovascular repair of infrarenal AAA in medically fit patients
- Upper airway surgery for obstructive sleep apnoea syndrome
- Routine episiotomy in spontaneous vaginal delivery
- Neurosurgical clipping in aneurysmal subarachnoid haemorrhage
- Whole brain radiotherapy for multiple brain metastases
- Screening for hepatic/skeletal muscle injury in patients receiving statins
- Frequent monitoring of HbA1c levels in adults with stable diabetes
- Routine daily chest X-rays versus on-demand films in intensive care patients
- Imaging for uncomplicated lower back pain
- CT or ultrasound scans to diagnose appendicitis
- Monitoring of bone mineral density within first 3 years of commencement of bisphosphonate treatment
- Cardiac stress testing in low risk patients before major non-cardiac surgery
- Routinely resited IV cannula
- Repeat screening colonoscopy within 10 yrs after initial negative colonoscopy in average risk patients

Elshaug et al Med J Aust 2012

Services of no benefit or harmful

| Therapy	Condition	Evidence and comment	Translation to practice
Thiazide diuretics	Hypertension	Cheap effective drug based on large RCTs supplanted by costlier, less effective RAS antagonists and calcium blockers	No change
Arthroscopic lavage	Osteoarthritis	Popular but randomized trial against sham arthroscopy found no effect	No change
Corticosteroids	Acute head injury	Corticosteroids are often given in brain injury with the hope of reducing swelling but large randomised trial showed increased mortality.	Gradual change
Vertebroplasty	Osteoporotic fractures	Wide uptake in 2000's but 2 randomized trials against sham procedure found no effect	No change
Tight glucose control	Diabetes	Guidelines had suggested progressively tighter HbA1c limits until 3 recent large randomized trials showed harms or no benefit.	Gradual change
PCI	Stable CAD	High usage of PCI in stable exertional angina and non-critical CAD challenged by large trial showing no benefit vs optimal medical therapy	Little or no change
Early dialysis	ESRF	Belief that early initiation of dialysis improved patient outcomes but RCT showed no benefit	Some change
Strict rate control	Chronic AF	Guidelines recommended strict rate control but randomised trial showed lenient control was as effective and easier to achieve	Little or no change

Scott, Glasziou Med J Aust 2012

Overuse

- Arthroscopic debridement and lavage for knee osteoarthritis

- Robust evidence of no benefit
    - Moseley et al N Engl J Med 2002
    - Kirkley et al N Engl J Med 2008
    - Laupattarakasem et al Cochrane Database Syst Rev 2008

LCL = lower control limit. UCL = upper control limit. * Logarithmic scale used.

Bohensky et al Med J Aust 2012

Potential overuse

- Computerised tomography coronary angiography (CTCA)

- Systematic reviews: no high-quality studies on the clinical utility of CTCA

- CTCA approved for MBS listing in Australia in 2011 and for Medicare reimbursement in US since 2006
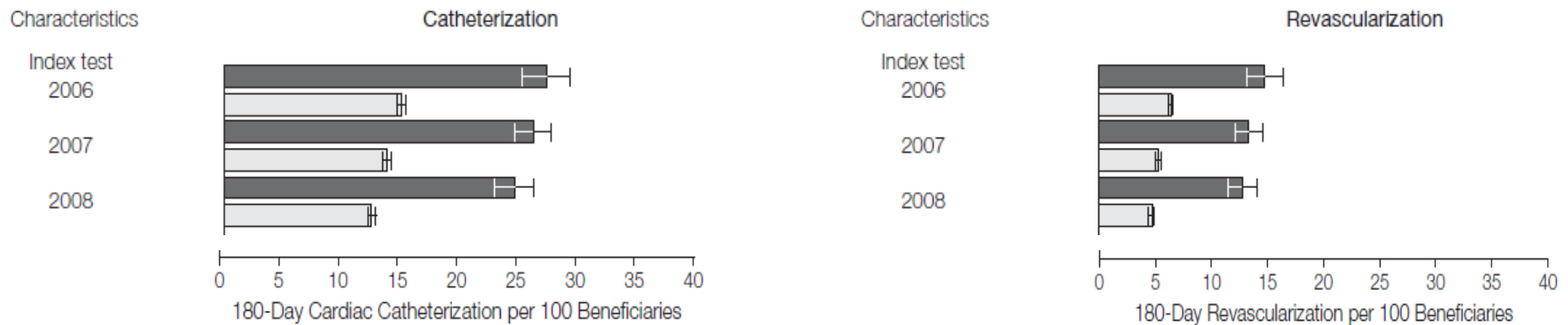
Outcome @ 6 mo.	CTCA (n=8820)	Stress MPS (n=132343)	p
Catheterisation	250/1000	150/1000	<0.001
Revascularisation	130/1000	60/1000	<0.001
Acute MI	2/1000	4/1000	0.04
All-cause mortality	10/1000	13/1000	NS

Schrebati et al JAMA 2011

Care of uncertain value

- Lumbar discectomy for lumbar disc herniation versus no operation
- Radiofrequency facet joint denervation for low back pain
- Carotid artery stenting for occlusive carotid artery disease in surgically fit patients
- Intracavity lavage in potentially contaminated surgery versus antibiotic prophylaxis
- Vena caval filters for prevention of PTE versus anticoagulation
- Hypothermia for traumatic head injury
- Chest physiotherapy for pneumonia in adults versus no physiotherapy
- Cystoscopy in men with uncomplicated lower urinary tract symptoms
- Exercise electrocardiogram in patients with suspected, or at risk of, CAD
- Sentinel lymph node biopsy in patients with ductal carcinoma in situ
- Urodynamic studies at initial assessment in men with LUTS
- Hospitalisation for bed rest in late term multiple pregnancy
- Falls and memory clinics
- PSA testing; robotic surgery for prostrate surgery

Drivers for overuse

- Cognitive
  - Cognitive dissonance
  - Pro-intervention bias
  - Pro-technology bias
  - Sensitivity to societal grievance with care omissions resulting in poor outcomes
  - Professional norms and culture

- Non-cognitive
  - Financial incentives
  - Patient expectations
  - Supply driven demand
  - Clinical practice guidelines
  - Performance measures

Scott, Elshaug Intern Med J 2013 (in press)

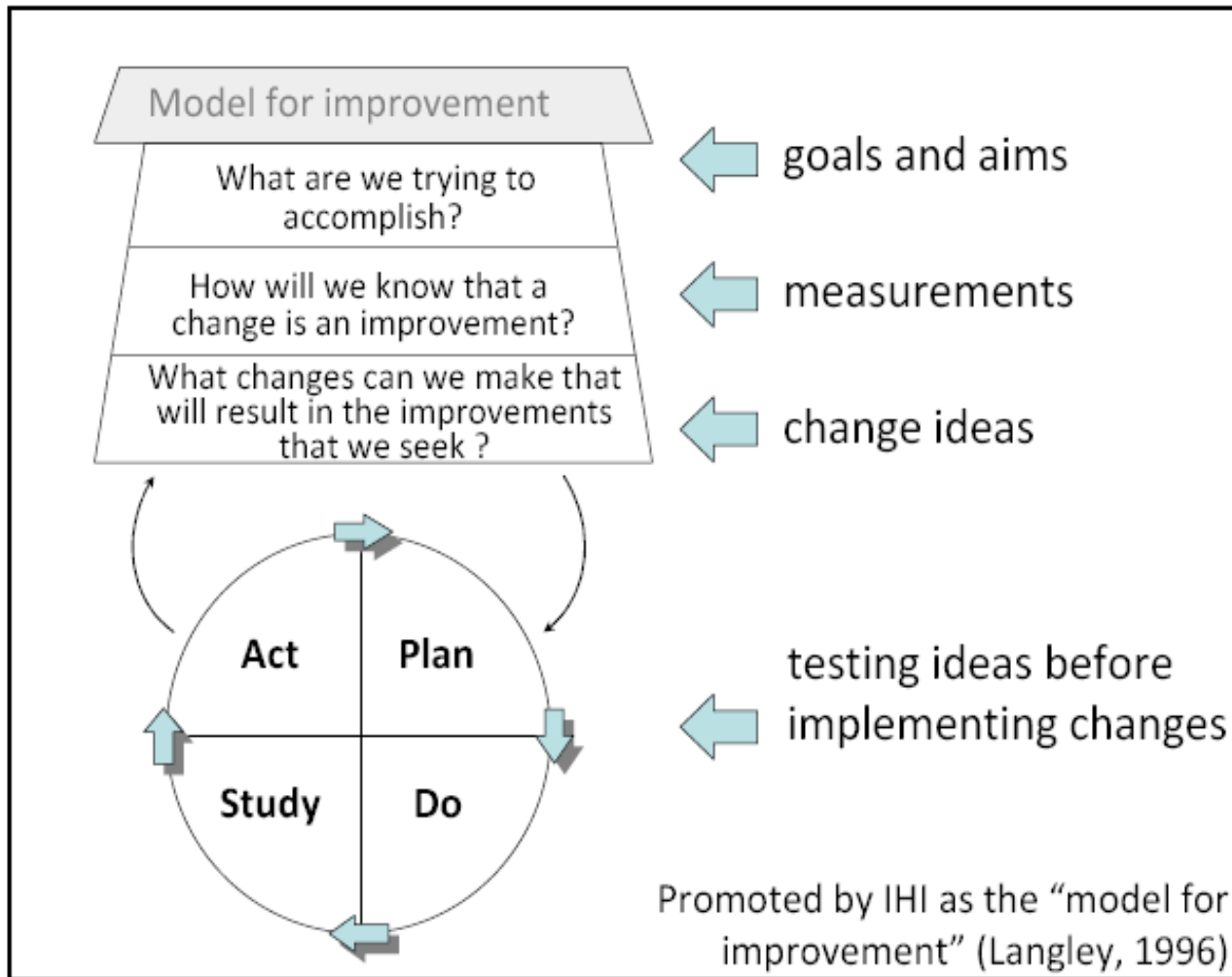# Tailoring decisions to individual patient needs

- Reversing the risk-treatment paradox
- Consider risk-benefit equations
  - Colorectal cancer screening in patients over 80 yrs
  - Oral anticoagulation in AF with CHADS2 = 0
  - Chest pain with low NHFA risk and TIMI=0
- Consider competing disease-treatment risks and interactions
- Formalise inter-specialty collaboration and guideline development
- Apply RAND methodology and Delphi techniques
  - Agreement and sensitivity higher for underuse vs overuse
    Shekelle et al N Eng J Med 1998; J Clin Epidemiol 2001
    Lawson et al J Clin Epidemiol 2012

Candidate areas
- Polypharmacy in older populations with multi-system disease
- Over-investigated presentations
  - Chest pain, syncope, cancer of unknown primary
- Over-treated conditions
  - Advanced end-stage organ disease, dementia, CAD
- Elective investigative and surgical procedures

The basic QSI cycle
Inappropriate overuse as the topic

Model for improvement

What are we trying to accomplish? ← goals and aims

How will we know that a change is an improvement? ← measurements

What changes can we make that will result in the improvements that we seek ? ← change ideas

Act | Plan
Study | Do

← testing ideas before implementing changes

Promoted by IHI as the "model for improvement" (Langley, 1996)

Characterising an overuse problem

- **Identify it**
  - Screen ICD codes for ineffective technologies
  - Marked variations in technology use between peer groups
  - Utilisation audits
  - Clinical registries

- **Define it**
  - Pathophysiology
    - Define current practice
      - process mapping, focus groups, audits
    - Identify strategically important participants
    - Understand underlying cultures, attitudes, beliefs
    - Identify leverage points and other important contextual factors

- **Quantify it**
  - Numbers!!! - incidence, rates, proportions

- **Contextualise it**
  - Comparisons with peers
  - Local factors and nuances

Choosing overuse performance measures

- **Direct measures**
  - Specific clinical criteria and reliable data source relating to all candidate individual patients
  - Proportions receiving inappropriate service
    - Clinical audits with well-defined quality indicators
    - Overuse where treatment risk outweighs benefit
      - in AF, CHADS2 score = 0/1 in presence of anticoagulation
      - in CAD, PCI in patients with stable exertional angina

- **Indirect measures**
  - Utilisation rates: high versus low rates
    - No specific criteria or data source that allows direct measures
    - Normative approach of comparing utilisation rates among peers
  - Challenges
    - Wide variations in use of services among demographically similar populations with no association with outcomes
    - Diagnostic test utilisation depends on prior disease likelihood

Choosing overuse performance measures

- **Improving indirect measures**
  - Examine rates of negative results for diagnostic investigations
    - Higher than expected rates of utilisation
    - Higher than normal rates of negative tests

  - Quarter of patients with suspected PTE have negative CTPA predicted by Well's criteria/D-dimer and PERC
    Crichlow et al Acad Emerg Med 2012

  - Only 9% of cardiac investigations performed on patients presenting to ED with indeterminate acute chest pain were positive for CAD
    Sander et al Med J Aust 2013 (under review)

  - Only 1/3 patients undergoing diagnostic coronary angiography had obstructive CAD
    Patel et al N Engl J Med 2010

  - Recurrent testing for ischaemia within 24 mo in 61% PCI and 51% CABG pts – but only 11% and 5% underwent repeat coronary angiography and revascularisation respectively
    Shah et al J Am Coll Cardiol 2010

Choosing performance measures

- Is the measure valid and reliable?
  - face validity; supported by evidence or consensus
  - risk for selection bias
  - risk for measurement bias

- Is the measure timely?

- Is the measure actionable?

A word on process vs outcome measures

- **Process indicators**
  - *Care processes, interventions, work practices, service delivery*
  - Small samples
  - Immediate, but difficult to measure
    - Rely on source documents
    - Process eligibility may not be documented
    - Presupposes consensus in eligibility criteria
  - Able to be influenced by clinicians

- **Outcome indicators**
  - *Mortality, adverse events, readmissions, LOS, patient experience*
  - Larger samples for events (but ?not for symptoms)
  - Discrete events more remote, but easier to measure
  - Not under direct control
  - Need for risk adjustment
  - Important to patients

Choosing data sources

Data Source	Access	Accuracy	Reliability	Credibility
Routinely collected hospital episode data	++++	++	++/?	-/+
Clinical registry data	+	+++	+++	+++++
Targeted audit data (chart reviews)	++	++	+/?	+++
Observation	+	+/?	+/?	++
Survey data	+	+/?	+/?	+
Voluntary IRS reporting systems	++	-	?	-

Final points

- **Take time at the beginning**

  - **Really think about what the overuse problem is and how you will measure improvement**

  - **Check to see what others have done and how**
    - **Don't waste time and resources re-inventing the wheel or repeating others' mistakes**

  - **Involve both key clinicians and methodologists**

  - **Consult early with data custodians who are strategically important**

- **Keep it as simple as possible**

- **Keep at it and don't give up**

- **Disseminate your results (both good and not so good)**

- **Publish it!**
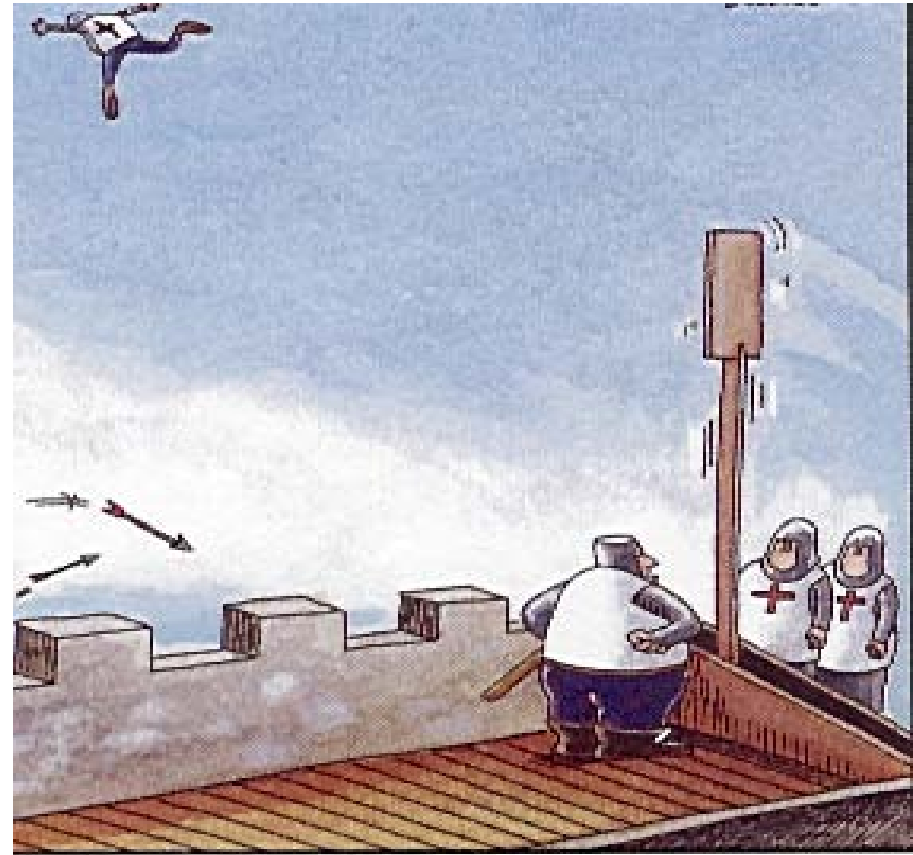
"I told you guys to slow down and take it easy or something like this would happen."

Learning health care system

A rapid-learning health system is one in which science, informatics, incentives, and culture are aligned for continuous improvement and innovation, with best practices seamlessly embedded in the delivery process and new knowledge captured as an integral by-product of service delivery….

The 'rapid-learning health system' is transformative in that it requires a close partnership between research and clinical operations and a shared desire to leverage scientific knowledge and information technology for rapid, point-of-care improvements.

Participatory action research

Green et al Ann Intern Med 2012