Systematic reviews of amputation healthcare

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(some material courtesy of CDR Ken S. Yew)
Evidence-based Practice Centers

- Created in 1997; 10 centers (now 13)
- Produce
  - “evidence reports”
  - systematic reviews
  - technology assessments
  - Methods manuals and articles
  - meta-analyses and cost analyses
  - analysis of large databases
- Work with public and private sector partners
Outline

- Evidence-based guidelines
- Systematic reviews
- The role of evidence-based resources in developing a research agenda across disciplines
What is evidence-based medicine?

“Evidence-based medicine is the integration of best research evidence with clinical expertise and patient values.”

David Sackett
What is a clinical practice guideline?

Clinical guidelines are systematically developed statements to assist practitioners and patients in choosing appropriate healthcare for specific conditions.

The Institute of Medicine
Evidence Based Guidelines

Traditional Paradigm

- Unsystematic Experience
  - Anecdote
  - Apprenticeship
  - Expert opinion
- Pathophysiologic Rationale
- Clinical Intuition
- Possible Benefit

Evidence-based Practice Paradigm

- Knowledge of
  - Evidence &
  - Strength of evidence
- Quantitative statement of benefit and risk
- Patients’ values & preferences
- Informed decision-making

System
Resources
An evidence-based guideline

- Makes use of an independent, systematic review of the evidence
Systematic literature reviews

- Are *systematic* to remove bias in finding and reviewing the literature.
Systematic literature reviews

- Are *systematic* to remove bias in finding and reviewing the literature.

- *Experts may underplay controversy or select only supportive evidence*
How sure are we?

Expert estimates of breast implant rupture rates

| Percentage | 0% | 0.2% | 0.5% | 1% | 1% | 1% | 1.5% | 2% | 3% | 3% | 4% | 5% | 5% | 5% | 5% | 5% | 5% | 6% | 6% | 6% | 8% | 10% | 10% | 10% | 10% | 13% | 13% | 15% | 15% | 18% | 20% | 20% | 20% | 25% | 25% | 25% | 30% | 30% | 40% | 50% | 50% | 50% | 62% | 70% | 73% | 75% | 75% | 75% | 75% | 80% | 80% | 80% | 80% | 80% | 80% | 100% |

Source: Dr. David Eddy
Experts estimates of the effect of colon cancer screening on chance of dying

Source: Dr. David Eddy
Experts’ estimates of probability of acute retention in men with BPH

Source: Dr. David Eddy
Cognitive Biases

- In fact we are not very good at converting facts into accurate beliefs and actions
  - Complexity of medical practice
  - Complexity of research
  - Limitations of the human mind
  - Personal & professional biases
Systematic literature reviews

- Are *systematic* to remove bias in finding and reviewing the literature.
  - *Experts may underplay controversy or select only supportive evidence*

- Emphasizes the best evidence
The best evidence

- addresses **health outcomes** rather than intermediate outcomes.
Direct vs Indirect evidence

Brain-injured patients

Cognitive Rehabilitation

PASAT, neuropsych battery

Intermediate or Surrogate Outcome

Health Outcomes

Function return to work, work maintenance, social function
The best evidence

- addresses health outcomes rather than intermediate outcomes.
- uses outcome measures important to the patients
  - “Issues of importance”
  - Recreational activities
The best evidence

- addresses health outcomes and not just intermediate outcomes
- Fits the circumstances
  - not just highly selected patients in research studies.
  - Uses a study design that matches the question
The best evidence

- addresses health outcomes and not just intermediate outcomes
- fits the circumstances
- considers the potential disadvantages as well as the advantages of the intervention being considered.
  - The most useful sources of information have both.
The best evidence

- addresses **health outcomes** and not just intermediate outcomes
- is from “real” patients like ours, not just highly selected patients in studies.
- considers the potential harms as well as the benefits of the intervention being considered.
- Fits the circumstances.
- Comes from well-designed studies.
We follow the *consequences*, not merely the fact, of study design “flaws.”

*Because they lack the same protections, observational studies must meet higher, not lower standards of quality.*
Systematic Reviews in amputation medicine

- VATAP *Computerized lower limb prosthesis* (2000)
  - SACH vs. Flex Foot
Systematic Reviews in amputation medicine


“Analysis of 10 controlled studies supported only 4 of the 14 claims cited in uncontrolled, descriptive studies.”
Most common problems with observational studies

- Unclear goals
- No inception cohort
  - Identifying cases by presence of an outcome measure
- Biased sample
  - Patients who take a drug long-term are at lowest risk of problems
- Inadequate ascertainment
- Suggestibility
- Don’t report on harms (to examine trade-offs)
Systematic reviews

- Define the strengths and limits of the evidence.
- Clarify what is based on evidence and what is based on other grounds.
- Do not necessarily tell you what to do when the evidence is limited. Other factors, such as equity, judgment, values, and preferences play a role in using the evidence.
An evidence-based decision process

- Makes use of an independent, systematic review of the evidence
- Employs rules for linking evidence to recommendations
<table>
<thead>
<tr>
<th>Quality of Overall Evidence</th>
<th>Estimate of Net Benefit (Benefit Minus Harms)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Substantial</td>
</tr>
<tr>
<td>Good</td>
<td>A</td>
</tr>
<tr>
<td>Fair</td>
<td>B</td>
</tr>
<tr>
<td>Poor</td>
<td>I – Insufficient Evidence</td>
</tr>
</tbody>
</table>
An evidence-based decision process

- **Makes use of an independent, systematic review of the evidence**
- **Employs rules for linking evidence to recommendations**
- Produces explicit, defensible recommendations based on evidence and values
  - The evidence determines the conclusion, not vice versa
  - Not, the citation of papers supporting a preformed conclusion (and trashing of those that don’t)
  - Not, the use of evidence when it is ‘positive’ but judgement when it isn’t
Evidence-based decision-making

= Systematic Reviews + Rules for linking evidence to recommendations + local judgments and values
Research Issues

- Focuses on **clinical logic**
  - *Sometimes challenging conventional wisdom*
- Focuses of outcomes patients care about
- Identify **information gaps and gaps in logic**
  - *To develop a research agenda that directly takes on questions underlying controversy or uncertainty*
Questions about Patient care

Clinical research studies
Clinical research design
Epidemiology
Clinical logic
Biostatistics
Economics

Information gaps

Systematic Reviews Guidelines

Clinical Innovations
Biomedical
Bioinformatics
Structural biology
Molecular imaging

BASIC RESEARCH & NEW TECHNOLOGY

EVIDENCE-BASED MEDICINE

Clinical Innovations

Biomechanics
Bioinformatics
Structural biology
Molecular imaging
EPC Roles

- Conduct *independent*, systematic reviews to identify information gaps and research needs
  - Put focus on outcomes important to patients
  - Validity of measures
  - Effectiveness of alternative treatments/devices

- Assist with priority-setting
- Identify *practical trial designs* and stronger *observational study designs*
- Find relevant systematic reviews
- Provide consultation to investigators doing evidence syntheses
  - Short bulletins on methodologic topics and new resources
Steps in conducting a SR

- problem formulation (selecting questions)
- finding evidence
- selecting evidence
- synthesizing & presenting evidence
- Identify information gaps and future research agenda
- peer review and revision
- maintaining and updating reviews
Selecting questions

- *Important questions arise from experience.*

- “*Experts in practice*”—*clinicians and patients*--select the populations, interventions, and outcome measures of interest.
Screening for Skin Cancer
Analytic Framework

Adults or Elderly

Screening tests: total body exam (all patients) OR risk assessment

II-2: Fair

Number and stage of basal cell carcinoma and squamous cell carcinoma

Thickneses of malignant Melanoma at time of diagnosis

Improved patient knowledge and self-exam skills

III: Poor

Adverse effects: costs false positives Non-cancerous lesions

II-3: Poor

Remove lesion

Surgery & further treatment

II-1, III: Fair

Behavior change

Reduced morbidity and mortality
Medical Systems Do Not Support Answering Questions

- Practice environment not supportive
  - Reimbursement geared towards procedures and volume
  - Inadequate time
- Data sources inadequate
  - Not up to date
  - Too time-consuming to access
  - Not geared to questions docs have
- Education often inadequate
  - Many journal articles have significant biases
  - CME often interest-sponsored and didactic
Selecting questions

- We can learn from discrepancies between what decision-makers want to know and what researchers measure.

- Often, clinical reasoning is based on hidden assumptions.
Oregon EPC “partners”

- Institute of Medicine
  - skin cancer prevention
  - screening for thyroid cancer

- National Institutes of Health
  - rehabilitation for brain injury
  - tests for osteoporosis
  - interventions to prevent youth violence

- Medicare
  - treatment for actinic keratosis
  - telemedicine
Oregon EPC “partners”

- Private Foundations
  - RWJ Foundation (self-care manuals, counseling to change health behaviors)
  - Susan Komen Foundation (which methods of promoting mammography are most effective?)

- Professional societies
  - American Academy of Neurology (stroke)
  - Brain Injury Association (rehabilitation)
Oregon EPC “partners”

- AHRQ
  - Patient safety and the healthcare workplace
  - Hyperbaric oxygen therapy for brain injury
- U.S. Preventive Services Task Force
- Multistate Drug Evaluation Project
Evidence Based Practice

Traditional Paradigm

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EBP Paradigm

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System
Resources
Hierarchy of Guidelines

- Explicit evidence-based guidelines
  - Based on outcomes and patient preference
  - Projects / weighs benefits and harms
- Evidence-based without extrapolation of impacts
  - Do not look at impacts of guideline implementation on the healthcare outcomes of the population
- Consensus based or global subjective judgment
  - May also be “evidence-sprinkled”
- No development process evident
Attributes of Good Guidelines

- Provide genuine guidance
- Population defined clearly
- **Evidence-based**
- Clear
- Flexible
- Exceptions described
- Measurable
- Implementable
- Current
Level 1: “Would you have this done for yourself or for someone else in your immediate family?”

Influenced by one’s personal experience with the disease and capacity to deal with risk.
Affects few people.

Level II: “What would I recommend to my patient/client?”

Physician making a recommendation for his/her patients. Influenced by prior experience, but the scientific evidence may play a greater role.
Affects possibly hundreds of people.

Level III: “What would I recommend to the nation, the world?”

Across-the-board recommendations for a population.
Must be based on rigorous assessment of the scientific evidence.
Affects hundreds of thousands, even millions of people.
Screening for Hepatitis C: Analytic framework

1. Risk Factor Screening (intravenous drug use, high-risk sexual behaviors, transfusion before 1990, or others)
   - Asymptomatic adults, excluding pregnant women, HIV positive persons, transplant recipients, and patients with renal failure

2. Low risk
   - Hep. C Antibody Screening
   - Hep. C Positive
     - Risk Assessment Workup
     - Eligible for Antiviral Treatment
     - Response to treatment (Remission, normalized transaminases, biopsy changes)
     - Reduced premature death and disability due to hepatitis C virus infection, or reduced spread of disease
   - Adverse Effects

3. Hep. C Negative
   - Risk Assessment Workup
   - Not Eligible for Antiviral Treatment
   - Adverse Effects

4. High risk
   - Hepatitis C Antibody Screening
   - Risk Assessment Workup
   - Eligible for Antiviral Treatment
     - Response to treatment (Remission, normalized transaminases, biopsy changes)
     - Reduced premature death and disability due to hepatitis C virus infection, or reduced spread of disease
   - Adverse Effects

5. 5 a, b
   - Adverse Effects

6. 6
   - Adverse Effects

7a. Eligible for Antiviral Treatment
   - 7b. Treatment with Interferon and Ribavirin
   - 7c. Counseling and immunizations

8. Not Eligible for Antiviral Treatment
   - Adverse Effects

9. Reduced premature death and disability due to hepatitis C virus infection, or reduced spread of disease
Pitfalls

- Overstating the evidence about evidence
- Unreachable evidence
- Applicability (generalizability) and adverse events tend to get insufficient attention
- Operator-dependent