Making Decisions Better: Information Mastery

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Professor of Family Medicine
Tufts University School of Medicine
According to traditional stories, how many antelopes did Noah take into the ark?
According to traditional stories, how many antelopes did Noah take into the ark?

Of every clean beast thou shalt take to thee by sevens, the male and his female: and of beasts that are not clean by two, the male and his female. Of fowls also of the air by sevens, the male and the female; to keep seed alive upon the face of all the earth.

Genesis. Ch 7; v2
How We Make Decisions

Where did you get the information to make that snap decision?

If you had time (and interest), what would you have done to make sure you had the right answer?
Evidence and Decision-Making

No one has time to appraise all of the evidence

Most decisions are based on what we think is the evidence, not what we know is the evidence

We use brief reading and talking to other people as our information sources
What is “Evidence-Based Medicine”? 
The patient is a 34-year-old woman with symptoms of mild depression. You consider pharmacologic treatment. She expresses a lot of doubt about the medicines you usually typically prescribe. So, rather than going to your usual first-line choice, you decide to do a quick search for information.
In your search, would you rather find a drug that:

A. Has been studied in 5 randomized trials with 817 patients taking it for 8 weeks

B. Since release has been taken by 40 million patients, though outcomes haven’t been tracked

C. Has almost exclusively been studied in men with more severe depression than this woman

D. Among other mechanisms, it blocks the effect of serotonin on the 5-HT_{2C} receptor

E. Has demonstrated effectiveness in mild depression.
TRUE OR FALSE
Health care professionals over- or under-implement high quality evidence in their own practice because they are:

- Unintelligent
- Lazy
- Uncaring
- Uncommitted
Evidence into Practice. . . there must be something more . . .

"I think you should be more explicit here in step two."

Reprinted with permission from Sidney Harris
The “Something More”... Clinical Decision-Making
Pencil and Paper Time

1.
2.
3.
4.
5.
6.
Question 1.

On a standard Boston fire truck, there are 2 drivers up front, 1 at the rear and 4 additional fire-fighters. What is the total personnel required for 5 standard trucks?
Question 2

How many turtle doves did my true love send me on the 2\textsuperscript{nd} day of Christmas?
Question 3

The average time required to paint a room is 4.5 hours; how much time should be allowed to paint 3 rooms?
Question 4

A bat and a ball cost $1.10 in total. The bat costs $1.00 more than the ball. How much does the ball cost?
Question 5

If it takes 5 machines 5 minutes to make 5 widgets, how much time does it take 100 machines to make 100 widgets?
Question 6

In a lake there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half the lake?
Answers

1. 35 firefighters
2. 2 turtledoves
3. 13.5 hours
4. $1.05
5. 5 minutes
6. 47 days
Q: What’s the current most important development in healthcare?

A: Decision making and dual process theory
Ave scores on q. 4-6

<table>
<thead>
<tr>
<th>Locations at which data were collected</th>
<th>Mean CRT score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Massachusetts Institute of Technology</td>
<td>2.18</td>
</tr>
<tr>
<td>Princeton University</td>
<td>1.63</td>
</tr>
<tr>
<td>Boston fireworks display</td>
<td>1.53</td>
</tr>
<tr>
<td>Carnegie Mellon University</td>
<td>1.51</td>
</tr>
<tr>
<td>Harvard University</td>
<td>1.43</td>
</tr>
<tr>
<td>University of Michigan: Ann Arbor</td>
<td>1.18</td>
</tr>
<tr>
<td>Web-based studies</td>
<td>1.10</td>
</tr>
<tr>
<td>Bowling Green University</td>
<td>0.87</td>
</tr>
<tr>
<td>University of Michigan: Dearborn</td>
<td>0.83</td>
</tr>
<tr>
<td>Michigan State University</td>
<td>0.79</td>
</tr>
<tr>
<td>University of Toledo</td>
<td>0.57</td>
</tr>
<tr>
<td><strong>Overall</strong></td>
<td><strong>1.24</strong></td>
</tr>
</tbody>
</table>
Say OUT LOUD what you see on the next slide
Say OUT LOUD what you see on the next slide
52 cognitive biases

- Anchoring bias – early salient feature
- Ascertainment bias – thinking shaped by prior expectation
- Availability bias – recent experience dominates evidence
- Bandwagon effect – we do it this way here
- Omission bias – natural disease progression preferred to those occurring due to action of physician
- Sutton’s slip – going for the obvious
- Gambler’s fallacy – I’ve seen 3 recently; this can’t be a fourth
- Search satisficing – found one thing, ignore others
- Vertical line failure – routine repetitive tasks leading to thinking in silo
- Blind spot bias – other people are susceptible to these biases but I am not
Steve is very shy and withdrawn, invariably helpful, but with little interest in people. He has a need for order and structure and a passion for detail.

It is most likely that Steve is a ……

1. Farmer
2. Pharmacist
3. Disc jockey
4. Librarian
5. Member of Congress

Denominator neglect bias
Teaching “Think as well as blink”?

Diagram:

- **Context**
  - Ambient conditions
  - Task difficulty
  - Task ambiguity
  - Affective state
  - Modular responsivity

- **System 1**
  - Recognized
  - Pattern Recognition
  - Repetition

- **System 2**
  - Intellectual ability
  - Education
  - Training
  - Critical thinking
  - Logical competence
  - Rationality
  - Feedback

- **Calibration**
  - Rational override
  - Dysrationalia override

- **Diagnosis**

Broken lines indicate significant interactions between System one and System two.

Source: Adapted from Croskerry (2003) with permission.
Better is possible

- Self-awareness (meta-cognition)
  - “the right system at the right time”
- Information management
- Teaching “Think as well as blink”?
System 2 Thinking and Information
Sorting Out Information
The Usefulness Equation

Usefulness = Relevance x Validity

of any source

Work

Relevance: Type of Evidence

• **DOE**: Disease-oriented evidence

Relevance: Type of Evidence

• Patient-Oriented Evidence

POEM

Patient-Oriented Evidence that Matters

matters to you, the clinician, because if valid, will require you to change your practice.
• Penicillin treatment of Strep. throat prevents rheumatic heart disease
  – Would a study showing this require a change?
Validity: Let someone else do it*

But, make sure you can tell if they’ve done it right
Work

“Just-in-case” sources: high work
“Just-in-case” sources: high work contrast, structural failure is relatively rare with these prostheses compared to bioprosthetic valves. Other major complications of prosthetic heart valves include endocarditis, paravalvular leak, and hemolysis. The complications as well as valve obstruction and valve thrombosis are discussed separately. (See "Complications of prosthetic heart valves").

There are five main issues the clinician must face in managing the patient with a prosthetic heart valve:

- Antithrombotic therapy to prevent valve thrombosis and thromboembolism
- Evaluation of valve function and durability
- Endocarditis prophylaxis
- Safety of exercise
- Pregnancy

This topic will review issues related to antithrombotic therapy and the cessation of such therapy for surgical procedures. Evaluation of valve function, endocarditis prophylaxis, the safety of exercise, and pregnancy in patients with prosthetic heart valves are discussed separately. (See "Management of patients with prosthetic heart valves" and "Management of pregnant women with prosthetic heart valves").

GENERAL CONSIDERATIONS — Warfarin (or other vitamin K antagonists) and/or aspirin is recommended in patients with prosthetic heart valves to prevent valve thrombosis and thromboembolic events. The intensity of therapy varies with the type of valve (the risk is much greater with mechanical valves), the site of valve replacement (the risk is greater with mitral than aortic valves), the presence or absence of underlying risk factors for thrombus formation, and certain clinical settings, such as pregnancy and surgical procedures.

An important concern with anticoagulation therapy is bleeding, particularly intracranial bleeding. Those issues are discussed elsewhere. (See "Therapeutic use of warfarin", section on "Bleeding" and "Correcting excess anticoagulation after warfarin" and "Management of warfarin-associated intracerebral hemorrhage").
Work

“Just-in-time” sources: low work
Work

“Just-in-time” sources: low work
Why? Because Not All New Information Should Change Clinical Practice

<table>
<thead>
<tr>
<th>Disease-Oriented Outcome</th>
<th>Patient-Oriented Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intensive glucose lowering can decrease A1c</td>
<td>Intensive glucose lowering <strong>does not</strong> decrease mortality</td>
</tr>
<tr>
<td>Beta-carotene, Vit E are good antioxidants</td>
<td>Neither prevents cancer or CV disease</td>
</tr>
<tr>
<td>Varenicline is effective for helping patients quit smoking</td>
<td>Varenicline <strong>increases</strong> the risk of adverse CV events</td>
</tr>
</tbody>
</table>
Determining whether information is relevant and does it matter?

1. Does it address an outcome people care about (Patient-oriented evidence)?
2. Is the intervention feasible?
3. If it is true, will it require you to change your practice?

Yes to all three –

*Patient-Oriented Evidence that Matters*
Information Mastery

• Get a **FORAGING** service
  – 2 or 3 times a week, key new research, summarised for you and set in the context of the rest of the evidence
  – Daily POEMs, Dynamed Updates, Others

• **HUNT** when you’re stuck – requires reversion to system 2
  • Information Mastery pyramid
Drilling for the Best Information

- Cochrane Library
- EB Practice Guideline
- Clinical Evidence
- Clinical Inquiries
- Specialty-specific POEMs
- Best Evidence
- Textbooks, Up-to-Date, 5-Minute Clinical Consult
- Medline

Usefulness arrow pointing downwards through each level of information sources.
Information Mastery

• **RETRACE** through information you already know
  - Trusted sources
  - ONLY about conditions YOU see commonly
  - American Family Physician reviews

• Read the primary literature for **SPORT**
  - *If* the primary literature is fun to read
From System 2 to System 1: The Information Mastery Traffic Light

Red: Don’t for most people most of the time

Yellow: Benefit/harm uncertain

Green: Most of the time for most people
Improving Medical Decisions Involves

– Learning the scripts (system 1)
– Knowing when to go off-script (system 2)
– Finding good information at the point of care
– Using the information to make decisions better
– Feeling good about not knowing everything. . . Avoiding furrowed-brow EBM
Information Mastery: A Practical Approach to Evidence-Based Care

Hilton Boston Back Bay
40 Dalton Street
Boston, MA

Applied Skills Course for Clinicians and Teachers:
Thursday, November 10 & Friday, November 11, 2011

Special Workshop on Teaching and Leading Evidence-Based Practice:
Saturday, November 12, 2011

Conference Overview

Faced with a torrent of clinical information, practitioners must develop effective and

www.thci.org
Information Mastery

Information Mastery is the application of the principles of evidence-based medicine concepts and techniques to the day-to-day practice of medical care. The concepts were developed in the early 1990s by Allen F. Shaughnessy, PharmD, MMEd of Tufts University and David Slawson, MD, of the University of Virginia.

There are two main principles of Information Mastery (More About Information Mastery). The first principle is that some information sources are more useful to practicing clinicians than other information sources. Conceptually, the usefulness of any information source depends on the relevance of the information in the source, the validity of this information, and the time, effort, and money required to access the information. These three characteristics can be related in this way:

Usefulness = Relevance X Validity

Work

More About Information Mastery
Information Mastery at Tufts University School of Medicine
Teaching Materials
Core Readings in Information Mastery
Worksheets for Determining Relevance and Validity
Additional Resources for Evidence-Based Medicine and Information Mastery
Useful Links

http://familymedicine.tufts.edu/information-mastery.htm
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