Leading, Teaching Evidence-Based Practice

April 24-27, 2018
Duke EBM Workshop

• 2003: First National EBM Workshop
  • Sheri, Connie Schardt, Tom Owens, Grace Thrall

• 2018: Sweet 16
  • Sheri, Megan, Larry, Jamie, Tom, Laura
  • As of this year: over 1,000 learners!!
Who are we?

• 68 participants

• 49 members of the workshop team
  • 10 Librarians, 20 Tutors, and 9 Tutor-Trainees
  • Administrative team: Laura, Kristina, & Becky

• Sweet 16 Special Guests
  • Scott Richardson:
    • Associate Dean for Medical Education, Director, Evidence-based Clinical Decision Making Course, AU/UGA Medical Partnership Campus
  • Mark Wilson
    • Associate Dean for GME, Associate Hospital Director for GME, University of Iowa
Who are we?

- 35 institutions

- Institutions sending the most Participants:
  - Cincinnati Children's = 7
  - Duke = 6
  - Wake Forest Baptist = 5
  - Univ. of Miami = 4
  - Univ. of NC = 4

- Librarian
- Biostatistics
- Department of Medicine
- Emergency Medicine
- Family Medicine
- Geriatric Medicine
- Humanities Health and Society
- Internal Medicine
- Internal Medicine-Pediatrics
- Med / Pop Health Research
- Medicine - Cardiology
- OB/GYN
- Pediatric Emergency Medicine
- Pediatrics
- Pharmacy Practice
- Physician Assistant Studies
- Psychiatry
- Pulmonary & Critical Care Med
Participants from 17 States

<table>
<thead>
<tr>
<th>State</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Carolina</td>
<td>18</td>
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<tr>
<td>Ohio</td>
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<tr>
<td>Florida</td>
<td>8</td>
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<tr>
<td>New York</td>
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<td>Michigan</td>
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<td>Minnesota</td>
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<td>Virginia</td>
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<td>New Jersey</td>
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<td>South Carolina</td>
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<td>Iowa</td>
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<td>Indiana</td>
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<tr>
<td>Georgia</td>
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</tbody>
</table>
Interactive using your cell phone!

• Back to slido.com

• What are your objectives for the week? (choose all that apply)
  • Learn EBM content /principles to use in clinical care
  • Learn EBM content /principles for teaching
  • Bring home new / better ways to teach EBM
  • Practice teaching in a safe environment
  • I’m here for the food
Course Objectives

• Practice the evidence cycle
  • Assess patient’s dilemma
  • Ask well framed question
  • Acquire information
  • Appraise for validity
  • Apply based on values/preferences
Course Objectives

• Exposure to Core Curricular areas
  • Therapy (RCT)
  • Harm (Case-Control)
  • Prognosis (Cohort)
  • Diagnosis (Prospective Comparison to Reference Standard)
• Overview / Meta-analysis
Course Objectives

• Modeling interactive teaching
• Create opportunities for networking and interaction with educator colleagues
• Practice teaching and critical appraisal skills
Schedules

• Large Group Sessions
• Small Group Sessions
• Concurrent Sessions
• Self-Directed Study Period (during the day and after 5 pm)
• Social Events
The great end of life is not knowledge, but action.

T.H. Huxley
Small Groups: The Workshop Core

- Tutorial Team facilitate
- Small Group Members take responsibility for the majority of the group teaching / learning
- Encourage planning of the week to cover ‘core curriculum’
  - Therapy, Harm, Diagnosis, Prognosis, Systematic Review / Meta-analysis
Concurrent sessions

- Self Directed Independent Study OR Short Classes
- Preparation for small group
- Consultations with faculty tutors, tutor trainees and librarians
On-line Evaluations

• PLEASE…

• ….And Thank you!

• New this year! We are doing the evaluations in real time and on-line. At the end of each session you can give us feedback session by session.
Materials

• Web-based content
• User’s Guide to the Medical Literature Ed. 3
• Duke Workshop Manual
• Slides from large groups posted by the end of the week (*not pre-printed on purpose…)
• McMaster University modules
Logistics…

• Copying
  • Use pdf and print!
  • Articles or handouts for small groups --> print in the computer lab
  • Hand in to Laura before large group or during concurrent session
Logistics...

• Be Respectful of our learning environment
  • Pagers and cell phones off or on silent
  • We are in clinical space, so be mindful
• Team Rooms: Duke Medicine Pavilion and the Library
• Team rooms are ours (mostly) but would not leave things in them overnight
• Rest Rooms all around!
The devil has put a penalty on all things we enjoy in life. Either we suffer in health or we suffer in soul or we get fat

Albert Einstein
Food

• Continental breakfast at Duke/ Lunch/ Snacks

• Tuesday: Reception at Hilton Garden Inn

• Wednesday:
  • Participants - dinner on your own
  • Tutor Trainee working dinner with faculty

• Thursday: The Pit in Downtown Durham (we will have busses to transport folks)
Begin at the Beginning…. The Foundations
Two Fundamental Principles of EBM

• Not all evidence is created equal
  A Hierarchy of evidence helps us differentiate information more likely to be valid or true

• Evidence alone is never enough
  Decisions are informed and guided by patient values and preferences.
Ask

Acquire

Appraise

Patient dilemma

Act & Assess

Apply
Ask

Acquire

Appraise

Hierarchy of Evidence

Apply

Evidence-based medicine cycle

Patient dilemma

Act & Assess

Values & Preferences
Coach and Horses Pub, London
Getting at the “truth”
What are we looking for?

• Do we achieve similar results with each throw?

• Do we achieve results near the center?
Getting at the “truth”

Zero
Getting at the “truth”

Zero (Pints of Beer)
Getting at the “truth”

Two Beers
Getting at the “truth”

Three Beers
Getting at the “truth”

Five Beers
Getting at the “truth”

Five Beers
Matching: Random vs. Systematic Error

- Two Beers
- Random

- Five Beers
- Systematic
Case-Control

Observational Studies

RCT

Prospective

Retrospective

Case-Series

Nonsystematic Clinical Experience

Meta-analysis

Summary Methodology

Experimental Design

Comparison

Uncontrolled

Less systematic error

Less systematic error

Less systematic error
How to approach critical appraisal?

• The Users’ Guides to the Medical Literature

• A series of systematic questions to help you identify whether results of a paper are likely to be valid

• Based upon issues in study design that can introduce sources of bias
Examples: Random vs. Systematic Error

• Ask yourself why this matters

• Ask yourself why choices are made
  • Study design
  • Clinical choices

• Go to document reader
Examples: Random vs. Systematic Error

- Paper #1: Opioids
- Paper #2: Anticoagulation
And Now…

A day in Sheri’s GIM Clinic
Thunderclap
Disclosures

• Paid Editorial Role JAMA’s The Rational Clinical Examination

• No other disclosures or conflicts of interest
Objectives

• By attending the session, participants will be able to:
  • Apply the 5 elements of the evidence cycle
  • Differentiate between foreground and background questions and match information resources for each
  • Identify search terms to find evidence for a prognosis question
  • Apply communication techniques for engaging patients in discussion about prognosis
Evidence-based medicine cycle

Ask

Acquire

Appraise

Hierarchy of Evidence

Apply

Patient dilemma

Assess

Values & Preferences
Written informed consent was obtained to share this story…
Go to Audio…

- Listen to the audiotape.
- Please decide what is the most important question being posed in this case…
Interactive using your cell phone!

• Back to slido.com

• What is the most important question being posed in this case? (answer in words or short phrases, may answer multiple times)
Slido: What is AA’s Prognosis?

• “…on a scale of these things that I’ve seen you seem to be on the good end of things”

• From the patient’s perspective, what level of confidence do you have in this estimate?
Everyone in the audience has just had a Thunderclap headache. Your fate is linked to the index card that you have been given.

Please Raise Cards as I name your file card color
- WHITE
- BLUE
Everyone in the audience has just had a Thunderclap headache. Your prognosis is linked to the sticker in the upper right hand corner of the file card you have been given.

Please Raise Cards as I name your sticker color
- Pink
- Yellow
- Orange
- Green

We will return to this.
AA’s Prognosis: Go to Audio...
Audience Participation

• Everyone please stand

• I’m sorry. People with the following cards have a cerebral aneurysm.
  • WHITE CARDS Please Sit Down

• Dodged a bullet. NOT a Cerebral Aneurysm
  • BLUE CARDS

• Go to Slido
Slido.com What is AA’s Prognosis?

• “... 19 out of 20 times when there is bleeding in your brain, it’s an aneurysm. We think you might be the 1 out of 20 times where a vein bled.”

• From the patient’s perspective, what level of confidence do you have in this estimate? (single answer)

• Describe what you think the patient is feeling (words or short phrases); you may provide multiple answers.
RCVS: Go to Audio...
AA: I want to see another Neurologist for another opinion…

SK: Why?

AA: So many questions…What is RCVS? What will happen? I don’t understand what this means or what I am supposed to do.

SK: (inside voice: Ugh…)
Now what?

• AA’s questions…
  • What is RCVS?
  • What will happen?
  • I don’t understand what this means or what I am supposed to do.
• Background vs. Foreground question?
• Go to Slido
What is RCVS: Background

- Go to UpToDate
### Summary of critical elements for the diagnosis of reversible cerebral vasoconstriction syndromes

1. Recurrent acute, severe headaches, with or without additional neurologic signs and symptoms.
2. Transfemoral angiography or indirect (CT or MR) angiography documenting segmental cerebral artery vasoconstriction.
3. No evidence for aneurysmal subarachnoid hemorrhage.
4. Normal or near-normal cerebrospinal fluid analysis results (total protein content <80 mg/dL, white blood cell count <10/mm³, normal glucose content).
5. The diagnosis cannot be confirmed until reversibility of the angiographic abnormalities is documented within 12 weeks after onset or, if death occurs before the follow-up studies are completed, autopsy rules out conditions such as vasculitis, intracranial atherosclerosis, and aneurysmal subarachnoid hemorrhage, which can also manifest as headache and stroke.

---

RCVS: reversible cerebral vasoconstriction syndromes; CT: computed tomography; MR: magnetic resonance.

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**RCVS:** reversible cerebral vasoconstriction syndromes; **CT:** computed tomography; **MR:** magnetic resonance.

Evidence-based medicine cycle

Ask

Acquire

Appraise

Patient dilemma

Hierarchy of Evidence

Values & Preferences

Apply
Your Clinical Questions

- **P**: Patient, population, problem
- **I**: Intervention, exposure, prognostic factor
- **C**: Comparison
- **O**: Outcome
- **T**: Type of question
- **T**: Type of study design
My Clinical Question

- **P**: Headache and intracranial vasospasm
- **I**: Followed over time
- **C**: --
- **O**: Rebleed, headaches, mortality
- **T**: Prognosis
- **T**: Cohort or Follow up Study (Prospective)
Ask

Acquire

Appraise

Evidence-based medicine cycle

Apply

Patient dilemma

Hierarchy of Evidence

Values & Preferences
My Clinical Question

- **P**: Headache and intracranical vasospasm
- **I**: Followed over time
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- **O**: Rebleed, headaches, mortality
- **T**: Prognosis
- **T**: Cohort or Follow up Study (Prospective)
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<tr>
<th>#</th>
<th>Search Term</th>
<th>Count</th>
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<tbody>
<tr>
<td>#1</td>
<td>Headache</td>
<td>71,156</td>
</tr>
<tr>
<td>#2</td>
<td>Intracranial vasospasm</td>
<td>4,385</td>
</tr>
<tr>
<td>#3</td>
<td>#1 AND #2</td>
<td>250</td>
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<tr>
<td>#4</td>
<td>Cohort Study</td>
<td>1,604,949</td>
</tr>
<tr>
<td>#5</td>
<td>#3 AND #4</td>
<td>27</td>
</tr>
</tbody>
</table>
Another Search

#1  "reversible cerebral vasoconstriction syndrome"  379
#2   Cohort Study  1,604,949
#3  #1 AND #2  30
#4  Prospective Study  496,275
#5  #3 AND #4  7

Chen et al. Neurology 2015; 84(15):1552-8
My Paper’s MeSH Terms

- Follow up studies
- Headache
- Recurrence
- Vasospasm

MeSH Terms
- Adult
- Female
- Follow-Up Studies
- Headache/diagnosis
- Headache/epidemiology*
- Headache/etiology
- Humans
- Male
- Middle Aged
- Recurrence
- Sexual Behavior
- Syndrome
- Taiwan/epidemiology
- Time Factors
- Vasospasm, Intracranial/complications
- Vasospasm, Intracranial/diagnosis
- Vasospasm, Intracranial/epidemiology*
Searching for Cohort Studies

• Cohort Study
  • Follow-up Studies
  • Longitudinal Studies
  • Prospective Studies
  • Retrospective Studies
Evidence-based medicine cycle

- Ask
- Acquire
- Appraise
- Assess
- Values & Preferences

Hierarchy of Evidence

Patient dilemma

Apply
Critical Appraisal Framework

I. How serious is the risk of bias? (*used to be called are the results valid?)

II. What are the results?
   • Magnitude of effect
   • Confidence / precision of estimate

III. How can I apply to patient care
Risk of Bias: Chen 2015

• Representative?
  • Prospective cohort of 210 RCVS patients from Tai Pei Veteran’s Clinic: initial thunderclap between 2000-12
  • Tertiary care referral filter
• Prognostically homogeneous? Yes. All with first thunderclap (early and uniform)
• Objective and unbiased outcomes?
### Table 2: Diagnostic evaluations for patients with suspected RCVS in our headache center

<table>
<thead>
<tr>
<th>Investigations for patients with suspected RCVS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comprehensive history-taking and headache intake form</td>
</tr>
<tr>
<td>Neurologic examination</td>
</tr>
<tr>
<td>LLL, surgical, headache, medication, and personal history</td>
</tr>
<tr>
<td>Neuromedics and meningeal signs</td>
</tr>
<tr>
<td>Blood testing</td>
</tr>
<tr>
<td>Complete blood counts, biochemical panels, thyroid function, autoimmune profiles</td>
</tr>
<tr>
<td>MRIs</td>
</tr>
<tr>
<td>Sequences include T1, T2, FLAIR, CUBE FLAIR, T1 with contrast, T1-FLAIR with contrast,</td>
</tr>
<tr>
<td>T2* gradient echo and/or SWI, DWI, ADC, MRA, and magnetic resonance venography</td>
</tr>
<tr>
<td>Extracranial and transcranial duplex sonography</td>
</tr>
<tr>
<td>Extra- and Trans-cranial Duplex</td>
</tr>
<tr>
<td>CSF studies</td>
</tr>
<tr>
<td>Xanthochromia, cell counts, glucose, protein, cultures</td>
</tr>
</tbody>
</table>

Abbreviations: ADC = apparent diffusion coefficient; DWI = diffusion weighted image; FLAIR = fluid-attenuated inversion recovery; MRA = magnetic resonance angiography; RCVS = reversible cerebral vasoconstriction syndrome; SWI = susceptibility weighted image.

*The severity of vasoconstrictions on MRA was graded on a 5-point scale: 0 (0% to <10%), 1 (10% to <25%), 2 (25% to <50%), 3 (50% to <75%), and 4 (≥75%), and designated the “vasoconstriction score” of each arterial segments for computations. The vasoconstriction scores of both sides were averaged to derive a mean score. The mean scores of different arterial segments were averaged to derive a combined score.*

*\( V_{MCA} \) = mean flow velocity of middle cerebral artery; \( V_{ICA} \) = mean flow velocity of the distal extracranial internal carotid artery; Lindegaard index = \( V_{MCA} / V_{ICA} \).
What are the Results: Chen 2015

- How likely are outcomes?
  - 12 year study
  - Mean follow up 37.5 +/- 24.4 months
  - Thunderclap headaches:
    - New thunderclap: 18/168 (~10%)
    - Probable RCVS: 9/168 (~5%)
  - Re-bleed: 0
  - Dead from Neurologic Complication: 0
Death: 0
Re-bleed: 0
What are the Results: Chen 2015

• How precise are the estimates?
  • No 95% CI anywhere in the paper
    • New thunderclap: 18/168 (~10%)
    • Probable RCVS: 9/168 (~5%)
  • Re-bleed / death: 0; might be as high as 1.8%*
  • What about lost to follow up? 40 patients—contributes uncertainty 40/210 = ~20%

*rule of 3’s for extreme results- Table 20-1
And One More…

- Second Prospective trial (Ducros Brain 2007; 130:3091)
- Paris Headache Center 67 consecutive patients
- 24/67 (35%) mild persistent headache, 2 (3%) depressive symptoms (compared to?)
- No death, no relapse, no re-bleeds in 16 +/- 12.4 months of follow up
Application: Back to AA

- Curbside a neurology colleague
- Sheri says:
  - RCVS prognosis looks good!
  - Does she have RCVS?
  - Have a look?
- Neurologist verdict: Vein bleed…
- Sheri (inside voice: Ugh….)
Vein Bleed Prognosis

- Vein Bleed: Perimesencephalic SAH
- Multiple cohorts (differing quality) but all show good prognosis
- Look at Greebe et al
Life expectancy after perimesencephalic subarachnoid hemorrhage

Greebe et al. Stroke 2007; 38:1222-4
• Retrospective analysis of prospectively collected data (Netherlands)

• 160 patients with vein bleed followed for 1213 patient years (1983 to 2005)

• Mean follow up 7.5 years (1 to 23 years)
• 11 patients died
  • MI, cardiac failure, cerebral infarction, cancers, infection in old age
• Standardized mortality ratio that was age and sex adjusted 0.61 (95% CI, 0.34 to 1.1)
• Worst case scenario (2 patients abroad counted as dead) 0.72 (95% CI, 0.42-1.24)
• No new SAH - 0% with 95% CI (0 -0.3%)
Medical Literature: Go to Audio…
Audience Participation: Luck of the Draw

What about functional Status?
Raise your card when I call out the STICKER colors

- **White Cards**
  - Aneurysm: Pink sticker = Dead 41
  - Aneurysm: Yellow sticker = Stroke 41
  - Aneurysm: Green sticker = Alive and Well 21

- **Blue Cards**
  - RCVS or VEIN bleed: Orange sticker = Headache 1
  - RCVS or VEIN bleed: Green sticker = Alive & Well 5

- **What about AA concerns? Exercise? 35 lbs?**
What did I tell her?

- Go to document camera
Putting it all together

- Demonstrated tools and strategies
  - Evidence cycle, PICO, critical appraisal questions
- Modeled interactive teaching methods
  - Patient audiotape, live polling, luck of the draw cards
- Reinforce principles
  - Not all evidence is created equal (hierarchy of evidence)
  - Evidence alone is never enough (values and preferences)
Putting it all together

• Why could I help her?
  • Not afraid of what I don’t know and know how to find out
  • Numbers
  • See past the labels to the person

• Approach this week
  • Unafraid
  • Step out of your comfort zone
  • Never lose sight of the humanity