Medical Knowledge and its Limits

Spring 2024

**Professor:** Ted Poston  
**Email:** ted.poston@ua.edu  
**Time:** TR 2:00-3:15pm  
**Place:** Lloyd 307

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**Student Hours**

After class, or by appointment.

**Description**

Medical knowledge has made great strides over the last 150 years. The 19th century development of the germ theory of disease produced the first effective antibiotics and led to significant improvements to sanitation in medical settings. Through the progress of new imaging technology, better tools, and aseptic surgical techniques, surgery became much safer and more effective. Indeed, people began to have great confidence in medical interventions. Yet many claims about the effectiveness of medical interventions are not supported by the evidence. This course examines the rise of evidence-based medicine and its controversies, including debates about evidential hierarchies, the reliance on less-than-straightforward concepts such as placebo and masking, and the dismissal of mechanistic reasoning and medical expertise. The course also explores recent arguments from the ubiquity of small effect sizes in medicine, the extent of misleading evidence in medical research, the thin theoretical basis of many interventions, and the malleability of empirical methods to show that medical interventions are generally less effective than we are led to believe. The class will work through Howick’s (2011) *The Philosophy of Evidence-Based Medicine*, Jacob Stegenga’s (2018) *Medical Nihilism*, and Judea Pearl’s (2018) *The Book of Why*.

**Required Texts**

2. Jacob Stegenga, *Medical Nihilism*.
   - this introductory chapter: [https://causalai.net/r60.pdf](https://causalai.net/r60.pdf)
   - there are videos on our youtube channel: [https://www.youtube.com/causalai](https://www.youtube.com/causalai)

**Assignments**

1. Attendance (15%)
   - Each day you earn a point for attending. You have two allowed absences for the semester. These are best saved in case of sickness. The attendance calculation will drop the lowest two scores.

2. Reading quizzes (30%)
3. 6 short papers (30%)
   - 750 to 1000 words
4. Final paper (25%)
   - 2000 to 2500 words

**Grading Standard**

The final grades for the class will be calculated with the following ranges: A+ = 97-100  A = 93-96  A- = 90-92  B+ = 87-89  B = 83-86  B- = 80-82 (and so on...)
Statement on Academic Misconduct

Students are expected to be familiar with and adhere to the official Code of Academic Conduct provided in the Online Catalog.

Statement on Disability Accommodations

Contact the Office of Disability Services (ODS) as detailed in the Online Catalog.

Severe Weather Protocol

Please see the latest Severe Weather Guidelines in the Online Catalog.

Pregnant Student Accommodations

Title IX protects against discrimination related to pregnancy or parental status. If you are pregnant and will need accommodations for this class, please review the University’s FAQs on the UAct website.

Religious Observances

Under the Guidelines for Religious Holiday Observances, students should notify the instructor in writing or via email during the first two weeks of the semester of their intention to be absent from class for religious observance. The instructor will work to provide reasonable opportunity to complete academic responsibilities as long as that does not interfere with the academic integrity of the course. See full guidelines at Religious Holiday Observances Guidelines.

UAct Statement

The UAct website provides an overview of The University’s expectations regarding respect and civility
How to write a philosophy paper

Start your paper by stating your goal. Say what you are going to accomplish. Then do it! Here are my grading criteria and some helpful tips.

1. Intelligibility. Can I understand what you’re trying to say?
2. Clarity. Is your paper clear? Do you express your points with precision?
3. Understanding. Do you understand the writers and the issues well?
4. Support. Do you support what you say with reasons and arguments?
5. Depth. Do you get at the heart of the issues? Or does your paper show only a superficial understanding?

*Strunk and White's Rules*

- Use the active voice.
- Put statements in positive form.
- Use definite, specific, concrete language.
- Omit needless words.
- Avoid a succession of loose sentences.
- Keep related words together.
- Write in a way that comes naturally.
- Write with nouns and verbs.
- Revise and rewrite.
- Do not overwrite.
- Do not overstate.
- Avoid fancy words.
- Be clear.
- Do not take shortcuts at the cost of clarity.

*Pryor’s Rules*

- Use simple prose.
- If you wouldn't say it, don't write it.
- Make the structure of your paper obvious.
- Be concise but explain yourself fully.
- Say exactly what you mean.
- Pretend that your reader is lazy, stupid, and mean.
- Use examples and definitions.
- Present and assess the views of others critically, but with understanding.
- Anticipate objections.
- If something in a view you're examining is unclear to you, don't gloss it over. Call attention to the unclarity. Suggest several different ways of understanding the view.

*Pawl’s Principles*

- If you are going to evaluate an argument, be sure to formulate the argument as clearly as you can. Don’t ever say that an argument is good or bad, valid or invalid, convincing or not, unless you lay it out explicitly.
- Always say precisely what you mean. Reread to make sure that your wording isn’t unclear.
- Don’t use rhetorical questions.
- Argue for your claims.
• If you don’t need to make a contentious claim to make your point, don’t make the claim.
• If something you say isn’t necessary for proving your point, or helpful in elucidating what you mean, drop it.
• Don’t bite off more than you can chew. Given the choices of being broad and shallow or narrow and deep, go for narrow and deep.
• Never say an unkind word about any thinker or that thinker’s intentions.
• Be careful of amphiboly: it will invite your critics to poke fun at your expense.
• Do all of the thinking for your reader. Never leave any inference, no matter how obvious, to the (in)capable hands of your reader. The same goes for explaining quotations. Always tell the reader what she should take from the quotation, even if it is obvious to you.
• Use signposts. First tell me what you are going to do. Then tell me that you are doing it. Finally, tell me what you have done.
• Never employ a technical term before defining it unless you are confident that your reader knows exactly what it means from you.
• Proof-read!
Course Outline

PART I: THE PHILOSOPHY OF EVIDENCE-BASED MEDICINE

A. WHAT IS EVIDENCE-BASED MEDICINE

Lecture 1: The controversy over evidence-based medicine
Thursday, January 11
Reading
1. Howick Ch 1 pp. 3–9; Stegenga Ch 1 pp. 1–19

Lecture 2: EBM & good evidence for clinical decisions
Thursday, January 18
Reading
1. Howick Ch 2 & 3 pp. 10–30
Background reading:
1. “Evidence-based Medicine: A new approach to the practice of medicine”
Assessment
• Quiz 1

B. THE METHODOLOGY OF RANDOMIZED CONTROL TRIALS

Lecture 3: Rival hypotheses & the paradox of effectiveness
Tuesday, January 23
Reading
1. Howick Ch 4 & 5 pp. 33–62
Background reading:
1. Smith & Pell “Parachute use to prevent death and major trauma”
Assessment
• Short paper 1, due Monday by midnight

Lecture 4: Fisher significance tests & randomization
Thursday, January 25
Reading
1. Worrall “Evidence in Medicine and Evidence-Based Medicine”
Background reading
1. Fisher “The Design of Experiments” Chapters 1 & 2
Assessment

Lecture 5: Ideal RCTs & probabilistic causality
Tuesday, January 30
Reading
1. Cartwright “Are RCTs the Gold Standard?”
Background reading:
1. Cartwright “What Are Randomized Controlled Trials Good For?”
2. Deaton & Cartwright “Understanding and Misunderstanding Randomized Controlled Trials.”
Assessment
• Short paper 2
Lecture 6: The Science of causal inference
Thursday, February 1
Reading
1. Pearl *The Book of Why* Introduction & Chapter 1
Assessment
• Quiz 2

Lecture 7: A history of causal inference, the rise of statistics, and Bayesian inference
Thursday, February 8
Reading
1. Pearl *The Book of Why* Chapters 2 & 3
Assessment

Lecture 8: Confounding and Deconfounding
Tuesday, February 13
Reading
1. Pearl *The Book of Why* Chapter 4
Assessment

Lecture 9: Smoking & Simpson’s Paradox
Thursday, February 15
Reading
1. Pearl *The Book of Why* Chapters 5 & 6
Background reading
1. Cartwright “Causal Laws and Effective Strategies”
Assessment
• Short paper 3 (Application of Causal Diagrams)

Lecture 10: Pearl’s Big Idea
Tuesday, February 20
Reading
1. Pearl *The Book of Why* Chapters 7 & 8
Assessment
• Quiz 3

Lecture 11: Counterfactuals & Data [No class, paper 4 due]
Thursday, February 22
Reading
1. Pearl *The Book of Why* Chapters 9 & 10
2. DAG With Omitted Objects Displayed (DAGWOOD): a framework for revealing causal assumptions in DAGs
Assessment
• Short paper 4 (summary on chapters 9 & 10) – Sunday Feb 25th

Lecture 12: Statistical Prediction Rules
Tuesday, February 27
Reading
1. Bishop & Trout “The Amazing Success of Statistical Prediction Rules”
Assessment
PLACEBOS

Lecture 13: Double masking & Placebo Controls
Thursday, February 29
Reading
  1. Howick Ch 6 & 7 pp. 63–95
  2. Holman “Why Most Sugar Pills Are Not Placebos”
Background
  1. Howick “Sticks and Stones…and Words can hurt you: the Nocebo Effect” (YouTube)
Assessment

Lecture 14: More on Placebos
Tuesday, March 5
Reading
  1. Howick Ch 8 pp. 96–116
  2. Due “What are Side Effects?”
Background
  1. Miller and Brody Understanding and Harnessing the Placebo Effect: Clearing away the Underbrush.
Assessment

MECHANISTIC REASONING

Lecture 15: The role of mechanistic reasoning in EBM
Thursday, March 7
Reading
  1. Howick Ch 9 & 10 pp. 119–157
  2. Illari “Mechanistic Evidence: Disambiguating the Russo–Williamson Thesis”
Background reading
  1. Gillies, D “Mechanisms in Medicine”
Assessment
• Quiz 9

EXPERT JUDGMENT

Lecture 16: Trust & Expertise
Tuesday, March 19
Reading
  2. Wieten “Expertise in EBM”
Assessment
• Quiz 4

Lecture 17: Trust & Expertise
Thursday, March 21
Reading
  1. Howick Ch 11 & 12
Assessment
PART II: MEDICAL NIHILISM

EFFECTIVENESS

Lecture 18: Effectiveness & the nature of disease
Tuesday, March 26
Reading
1. Stegenga Ch 2 “Effectiveness of Medical Interventions”
2. R. Cooper “Disease”
Background reading
Assessment

Lecture 19: What is an effective medical intervention?
Thursday, March 28
Reading
1. Stegenga Ch 3 “Effectiveness & Medicalization”
2. Stegenga Ch 4 “Magic Bullets”
Background reading
Assessment
• Quiz 10

EVIDENCE

Lecture 20: Against evidential hierarchies
Tuesday, April 2
Reading
1. Stegenga Ch 5 “Down with the Hierarchies”
2. Watch this overview on the Cochrane meta-analysis: https://youtu.be/egllW4vkb1Y
Assessment

Lecture 21: The perils and promise of meta-analysis
Thursday, April 4
Reading
1. Stegenga Ch 6 “Malleability of Meta-Analysis”
2. Holman “In Defense of Meta-Analysis”
Assessment
• Short paper 6

Lecture 22: Assessing Medical Evidence
Tuesday, April 9
Reading
1. Stegenga Ch 7 “Assessing Medical Evidence”
2. AMSTAR 2
3. Hill “The Environment and Disease: Association or Causation?”
Background reading
1. Dammann, Poston, and Thagard “How do medical researchers make causal inferences?”
Assessment

Lecture 23: Measuring Effectiveness
Thursday, April 11
Reading
1. Stegenga Ch 8 “Measuring Effectiveness”
Background reading
Assessment
• Quiz 11

Lecture 24: Evaluating harm profiles
Tuesday, April 16
Reading
1. Stegenga Ch 9 “Hollow Hunt for Harms”
Assessment

Evidence and Values
Lecture 25: Bias & Fraud
Thursday, April 18
Reading
1. Stegenga Ch 10 “Bias & Fraud”
2. Fuller “Meta-Evidence Research for Evaluating Therapies”
Background reading:
1. John Ioannidis (2005) Why most published research findings are false

Lecture 26: Extrapolation & Absence of Evidence
Tuesday, April 23
Reading
1. Fuller “The myth and fallacy of simple extrapolation in medicine”
2. Elliott Sober “Absence of Evidence and Evidence of Absence”

Lecture 27: The Replication Crisis
Thursday, April 25
Reading
1. John Ioannidis (2005) Why most published research findings are false
2. Alex Bird (2020) Understanding the Replication Crisis as a Base Rate Fallacy

Lecture 28: Medical nihilism & gentle medicine
Reading
1. Stegenga Ch 11 “Medical Nihilism”
2. Stegenga Ch 12 “Conclusion”

Lecture 29: Reflections on Medical Nihilism
Reading
1. Book Forum on Medical Nihilism

Final paper: Due Wednesday May 1