Evidence-Based Medicine: Relevance to Cyber Public Health?

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Setting the Stage

- Goal:
  - Spur dialogue and discussion

- Caveats:
  - This is a presentation of early-stage thinking on the topic
  - The author is not an expert in EBM

- Acknowledgements:
  - Thanks to the Cyber Public Health team for the opportunity!

Agenda

- What is EBM?

- Benefits

- Challenges

- Key Findings

- Discussion

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What is EBM?

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EBM Definition

- According to the U.S. National Library of Medicine:
  - "Evidence-based medicine (EBM) is the conscientious, explicit, judicious and reasonable use of modern, best evidence in making decisions about the care of individual patients. EBM integrates clinical experience and patient values with the best available research information."

Pedigree of Research-Driven Medical Information

- **Level IA**: evidence obtained from a meta-analysis of multiple, well-conducted, and well-designed randomized trials.

- **Level IB**: evidence obtained from a single well-conducted and well-designed randomized controlled trial.

- **Level IIA**: evidence from at least one well-designed and executed non-randomized controlled study. When randomization does not occur, there may be more bias introduced into the study.

- **Level IIB**: evidence from at least one well-designed case-control or cohort study. Not all clinical questions can be effectively or ethically studied with a randomized controlled study.

- **Level III**: evidence from at least one non-experimental study. Typically, level III evidence would include case series as well as case-control or cohort studies that are not well-designed.

- **Level IV**: expert opinions from respected authorities based on their clinical experience.

Benefits of Using EBM

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EBM Improves Patient Care And Outcomes

- EMB standardizes evidence-based protocols, providing physicians a way to quickly find the best treatment options
  - Trying to keep up on latest research findings/best practices is overwhelming (need to read 17 articles per day)
- Without use of EBM, there can be significant discrepancies between best practices and practitioner decisions based on personal experience
- Practitioners are subject to many biases/heuristics without a countervailing check on their views. EBM can provide that check
- EMB creates greater transparency and accountability. Can trace rationale for decisions. Useful for discussions with patients, CXOs, Boards, and insurers

Risks and Costs of Using EBM

Challenges Developing Guidelines Based on "Best Available Evidence"

- Statistical significance

- Weak signals and long tails

- Heterogeneity of patient populations in different studies

- Publication bias

- Biased data

- Lack of data

Challenges Implementing Guidelines in Practice

- Clinicians lack of understanding of stats—can't judge validity of guidelines

- Knowing when to use EBM guidelines and when not to
  - Treatments shown to be inferior, on average, in randomized controlled trials are assumed by many to be inferior for all patients.

- Tyranny of guidelines can limit clinician flexibility
  - Gov't and industry reimbursements may be tied to guidelines
  - Variations from guidelines may not be supported

Key Findings

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Comparison of CPH and EBM

Cyber Public Health

Adopting a public health-style perspective that embraces data-driven investigation, population thinking, and preventative approaches to shared risks would be transformative for the practice of cybersecurity. Experts could systematically test associations between risk factors and cyber threats, measure and compare the effectiveness of interventions, and adopt preventative measures that reduce both local and systemic risks to make the internet more secure and resilient for all.

Evidence-Based Medicine

Evidence-based medicine is the conscientious, explicit, judicious and reasonable use of modern, best evidence in making decisions about the care of individual patients. EBM integrates clinical experience and patient values with the best available research information.

EBM is no Silver Bullet—Need to Weigh Tradeoffs

- EBM is based on "best evidence"—how do we gather that evidence in cyber?
  - Is that where Cyber Public Health comes in?

- What is one's utility function?
  - Focus on improving performance on average across the community but sub-optimizing for specific cases or aim to optimize care by letting clinicians determine when to use EBM and when not to, which risks bias and use of sub-optimal practices?

- Quality metrics are useful tool and can "harm" some populations
  - Some treatments are disallowed because they don't conform to guidelines that apply to "most"

- Maximizing benefits of EBM requires mix of art and science
  - "The successful application of EBM is an art that requires an awareness of the evidence and an ability to determine how well the evidence applies to any given patient." (Jena)

Food for Thought: Is EBM the "ZTA" of the Medical Field?

- Huge thrust within medical community

  - Google search of term "evidence-based medicine" yields 2B hits

  - Lots of scholarly articles, etc.

- Actual use within practitioner community is mixed

  - Only 14% use it directly with patients daily

  - More than 80% reference EBM-related clinical guidelines at least monthly

Key Questions

- Should EBM serve as a model for the application of cyber public health "evidence" at the enterprise level?

- Are there lessons from EBM that can be applied to the concept of applying cyber "best practices"?

  - If so, which ones are most relevant?

- What's next?

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References

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DISCUSSION

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