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Evidence Based Cybersecurity

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Outline

1. Define evidence based cybersecurity
2. Discuss research methodology
3. Examine the application of evidence based practice to cybersecurity

The need for change

Lack of evidentiary support in many cybersecurity standards and compliance regimes.

Black box approach to control set production.

“Because we said so” is not and should not be enough.

Cybersecurity evidence based practice

Evidence based cybersecurity is an approach to cybersecurity practice that prioritizes the use of rigorous research products, real world facts, and direct observation to drive decision-making.

Evidence Based Practice Research

What is evidence?

ev·i·dence

ˈevədəns/ *noun*

the available body of facts or information indicating whether a belief or proposition is true or valid.

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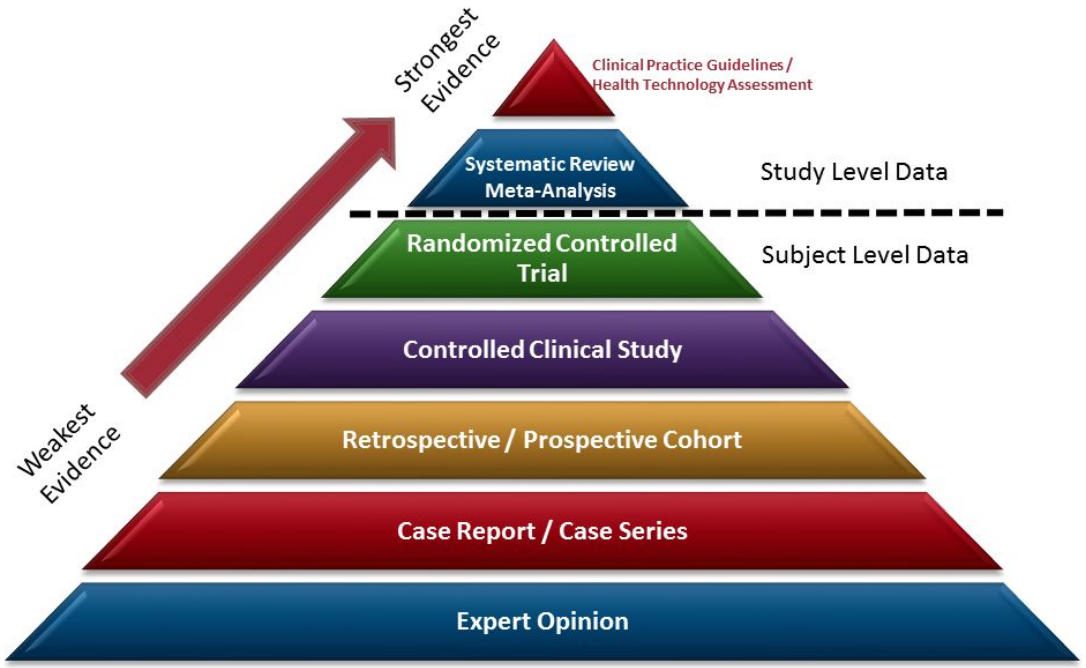
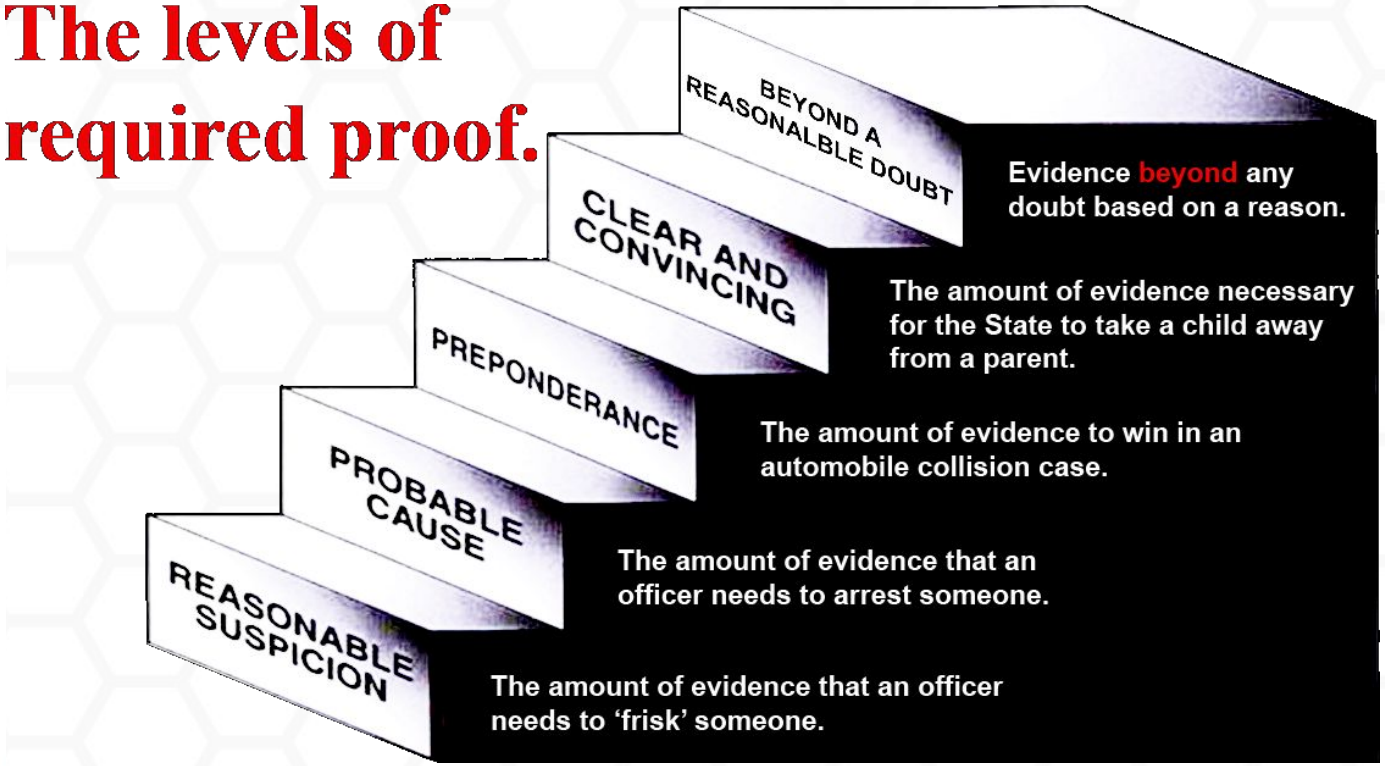
Source: Oxford English Dictionary (OED)

Models of evidence



Source: USF Shimberg Health Sciences Library Guides, *Levels of Evidence*

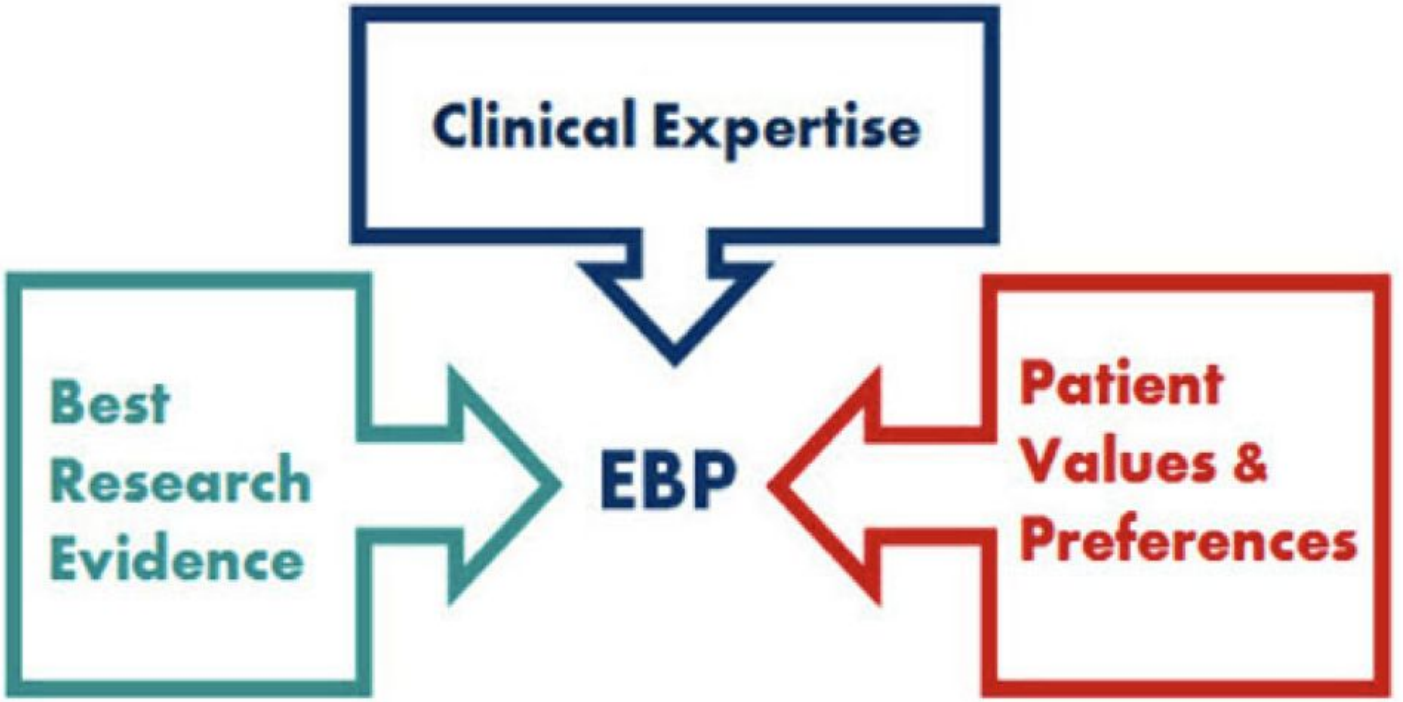


Source: Scott Key, *Georgia Criminal Appellate Law Blog*

What is Evidence Based Practice?

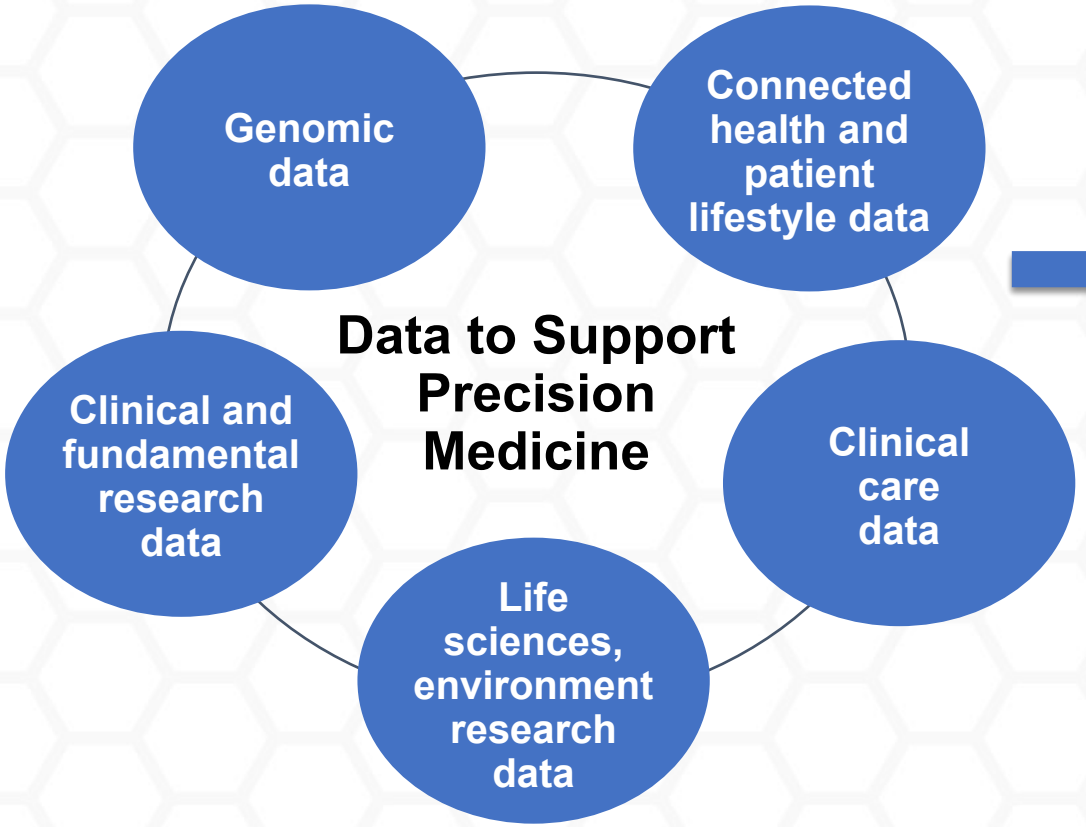
"the conscientious, explicit and judicious use of current best evidence in making decisions about the care of the individual patient. It means integrating individual clinical expertise with the best available external clinical evidence from systematic research." (Sackett D, 1996)

1996 model



Source: Duke Library Guides, *Introduction to Evidence Based Practice*

Precision medicine will leverage large volumes and varieties of data to improve insight & outcomes.



Many data sources and types…

- Connected health and wearables data
- Real World Evidence (RWE) leveraging UDIs (medical device Unique Device Identifiers)
- Clinical care data and observations – image, text, numerical, video, audio, holograms?, etc.
- Clinical and fundamental research data
- Genomic data

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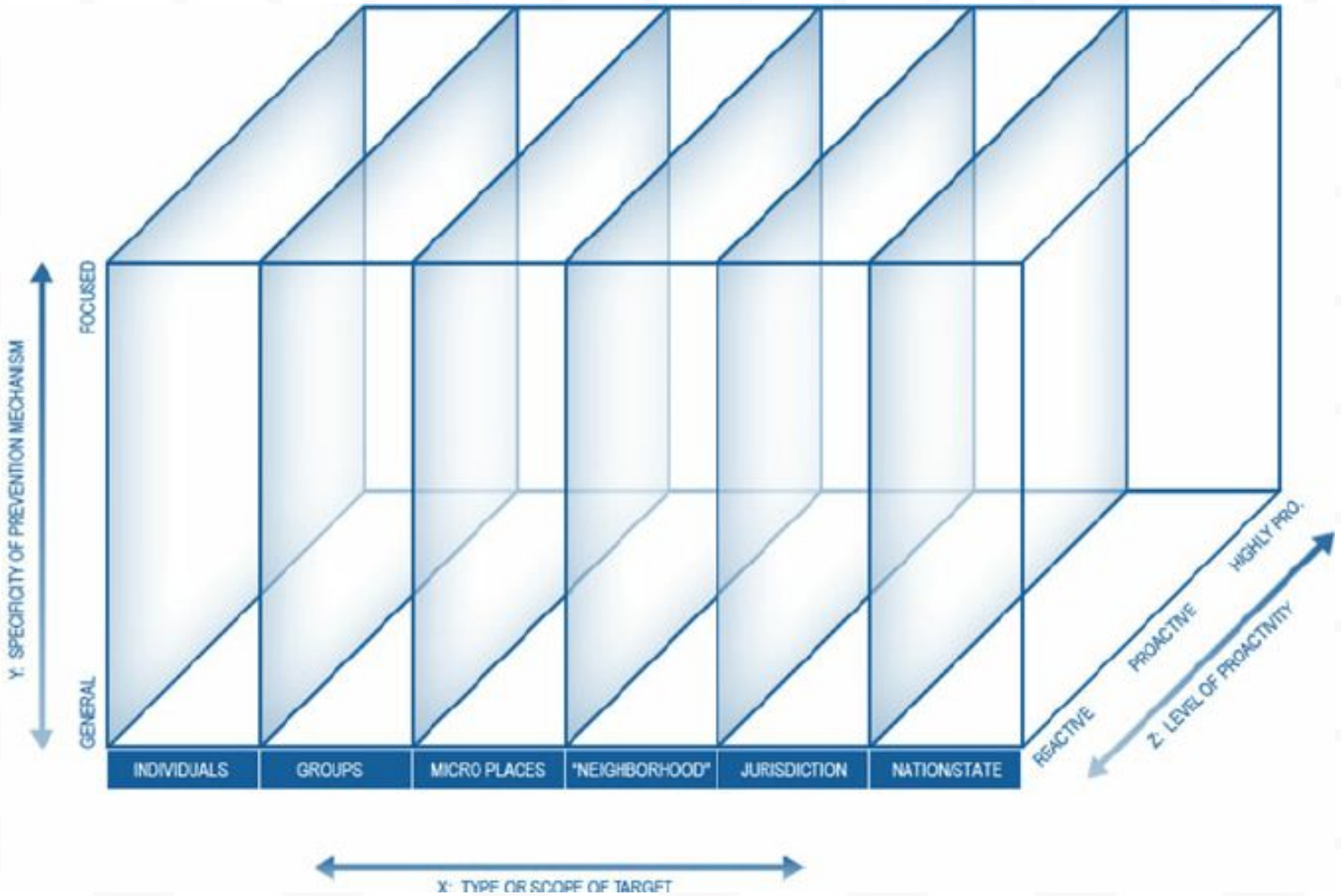
Source: Florence D. Hudson

*Source: NIH 2015; *The New England Journal of Medicine, Vol. 378, No. 7, February 15, 2018 "Medical Devices in the Real World"*

Evidence based policing



- Reactive vs. Proactive
- Different levels of jurisdiction
- Specificity of targeting

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Source: Lum, Cynthia *The Evidence-Based Policing Matrix,* J Exp Criminol (2011) 7:3–26.

Evidence based education

- Robust research and development enterprise
- Government policies demanding solid evidence of effectiveness
- Genuine, generational progress instead of the usual pendulum swings of opinion and fashion

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Source: Robert E. Slavin, *Evidence-Based Education Policies: Transforming Educational Practice and Research* Educational Researcher, Vol. 31, No. 7, pp. 15–21

Evidence Based Cybersecurity

Evidence based cybersecurity definition

Evidence based cybersecurity is an approach to cybersecurity practice that prioritizes the use of rigorous research products, real world facts, and direct observation to drive decision-making.

What evidence based cybersecurity is NOT

1. Making decisions based on generalized information
2. Failing to know thyself (e.g., inventory) and the environment (e.g., monitoring)
3. Applying controls without considering the value added
4. Blindly accepting external opinion

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Weigh the evidence

- variety of evidence available
- type of evidence isn’t as imperative as its use in decision making
- practitioner has to:
  - weigh the evidence
  - use the best stuff she can find

Future Sources of Evidence

- Central database
- Increased auditability
  - Auditing tools on a user level
- Peer review of rigorous applied research
- Research published with accessibility in mind
- Cybersecurity treated as a public health issue

What can the community demand now?

1. Proactively search for weighty evidence.
2. When not available, signal demand better evidence.
3. Be a voice for the practice side -- tell the research side what scholarship is needed.
4. Ask policymakers to back up decisions with evidence, or ask why they cannot.

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