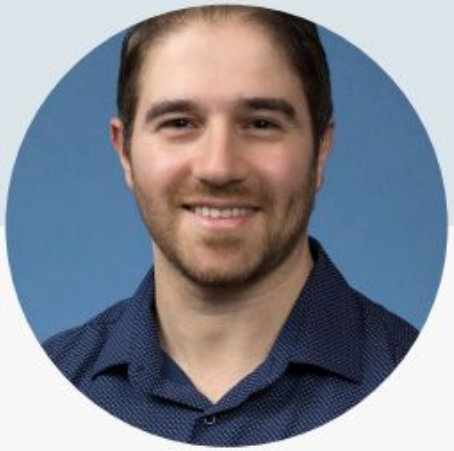
From Confusion to Clarity: Navigating Medical Misinformation with Critical Thinking

April 3, 2025

Presenters



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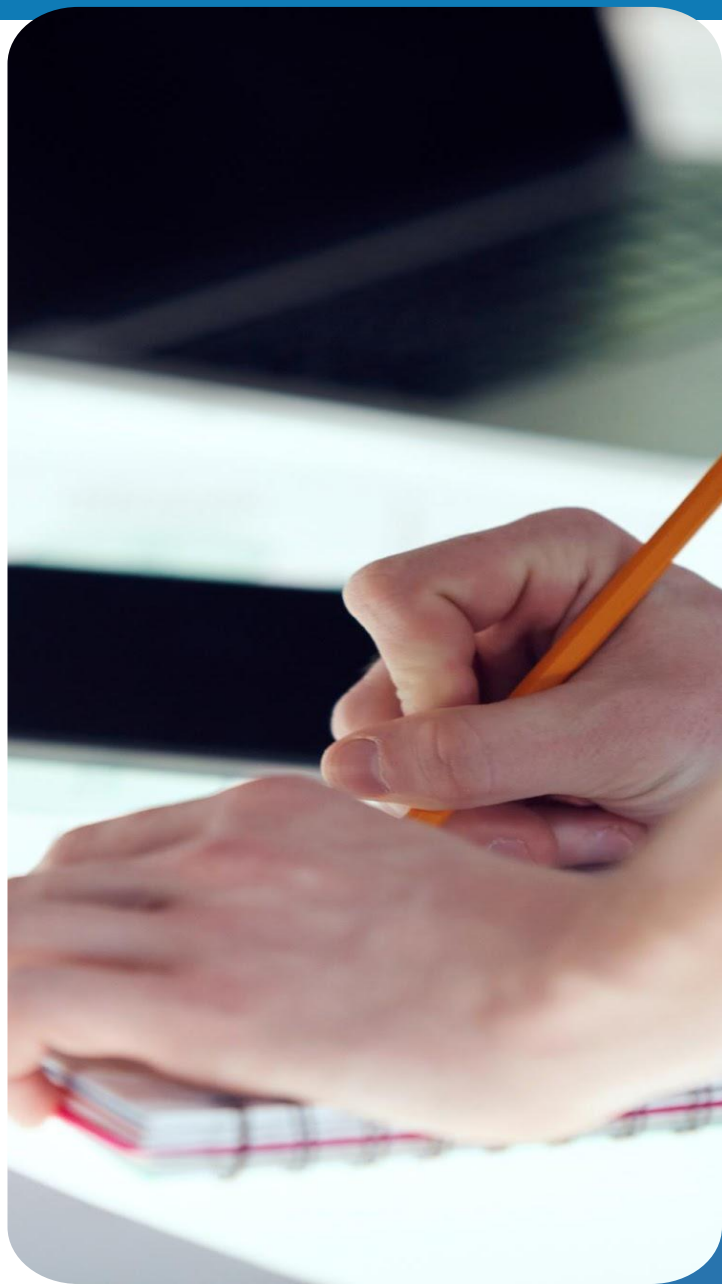
Disclosure Statement

Anyone in a position to influence the planning, review, or presentation of content in this activity, including Adonia Eskandari, Agafe Saguros, Harlan Husted, Dexter Wimer, and Christina Mnatzganian, has disclosed he/she has no relevant financial relationships with ineligible companies

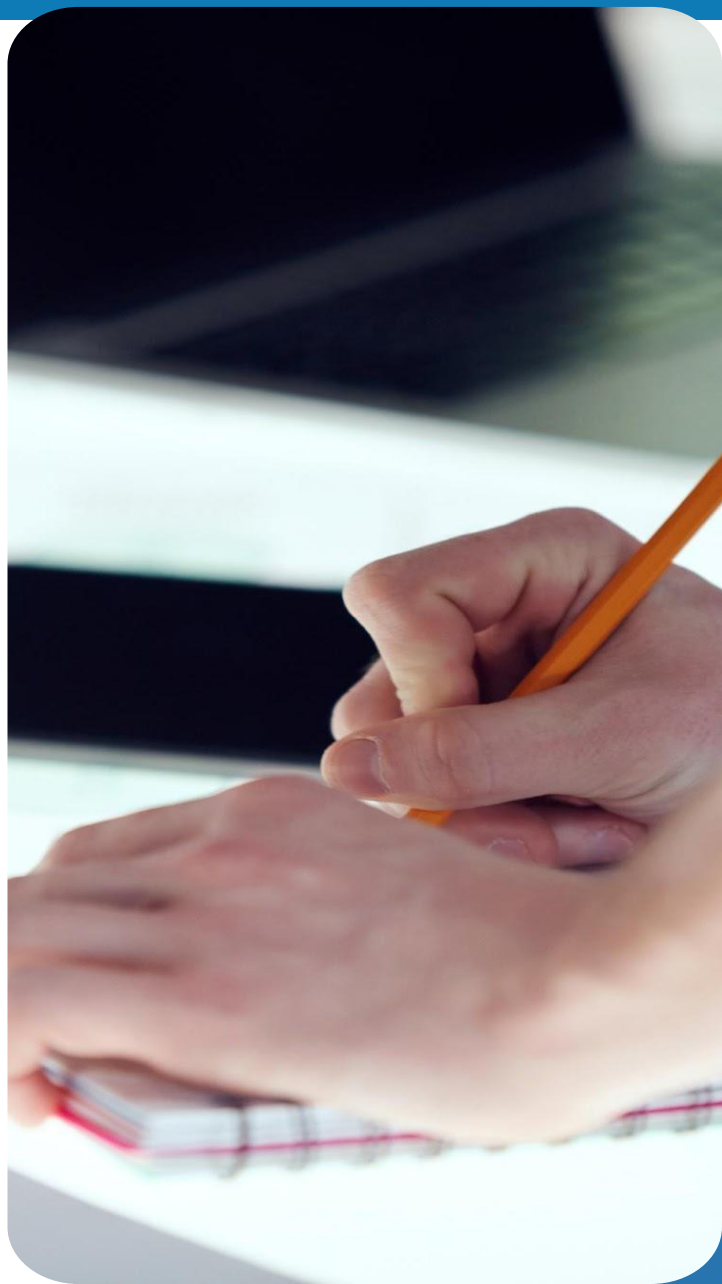
Session Objectives

1. Identify areas of improvement in current precepting practices
2. Articulate challenges related to precepting learners
3. Re-think approach to precepting using literature-based techniques
4. Modify precepting techniques using evidence-based approaches
5. Design learning experiences to further optimize precepting



Learning Objectives

1. Analyze real-world examples of medical misinformation to identify common cognitive biases and logical fallacies that contribute to its spread
2. Apply a critical thinking framework (e.g., CRAAP test) to evaluate the credibility and accuracy of health information sources
3. Develop communication strategies to teach patients how to critically evaluate medical information



The Prevalence of Medical Misinformation

What is Medical Misinformation?

- Defined:
  - "Information that is false, inaccurate, or misleading according to the *best available evidence* at the time"
    - Unintentional mistakes such as inaccurate dates, statistics, translations, or if satire is taken seriously.
  - Separate from '**disinformation**' by the intent behind the information being shared
    - Maliciously used to trick others into believing for financial gain or political advantage, or to support conspiracy theories and rumors

Vraga, E.K. & Bode, L. (2020). Defining misinformation and understanding its bounded nature: using expertise and evidence for describing misinformation. Political Communication 37(1): 136-144.

https://www.hhs.gov/surgeongeneral/reports-and-publications/health-misinformation/index.html

Misinformation versus Disinformation

- Misinformation:
  - (1950) Thalidomide, for the treatment of morning sickness in pregnant individuals, is both safe and effective.
- Disinformation:
  - (2018) Proliferating on social media platforms Facebook, WhatsApp, and X
    - *"There is no such thing as Ebola virus, it's a government lie"*
    - *"The United States has brought Ebola to West Africa"*
    - *"Immigrants and asylum-seekers are bringing Ebola into the U.S."*

Vargesson N. 2015. Thalidomide-induced teratogenesis: history and mechanisms. Birth Defects Res. C Embryo Today 105(2):140–56.
Swire-Thompson B, and Lazer D. Public health and online misinformation: Challenges and Recommendations. *Annual Review of Public Health (2019)*, 41: 433-451. https://www.annualreviews.org/content/journals/10.1146/annurev-publhealth-040119-094127.
Fidler DP. Disinformation and Disease: Social Media and the Ebola Epidemic in the Democratic Republic of the Congo. Council on Foreign Relations website. Published August 20, 2019. Accessed October 7, 2020. https://www.cfr.org/blog/disinformation-and-disease-social-media-and-ebola-epidemic-democratic-republic-congo
Bernard R, Bowsher G, Sullivan R, Gibson-Fall F. Disinformation and Epidemics: Anticipating the Next Phase of Biowarfare. Health Secur. 2021 Jan-Feb;19(1):3-12. doi: 10.1089/hs.2020.0038. Epub 2020 Oct 22. PMID: 33090030; PMCID: PMC9195489.

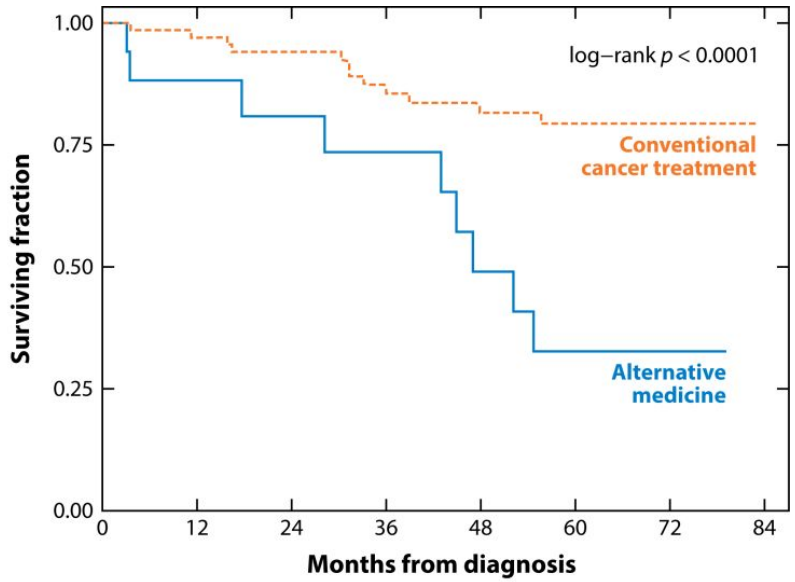
Pertinent Facts and Prevalence

- The 2019-2020 Ebola outbreak in the Democratic Republic of the Congo was the second deadliest since originally discovered in 1976, with 1400 confirmed cases and a record 27 cases confirmed in a single day.
- The spread of misinformation online contributed to:
  - 72% of respondents mistrustful of public health response
  - 15% of respondents would not comply with public health recommendations to isolate, quarantine at treatment centers, or safe burial for family member death
  - Doctors Without Borders reported 300 attacks against healthcare workers, including arson at an Ebola treatment center in Katwa.

Elliott V. Ebola responders in Congo confront fake news and social media chatter (02 May 2019). The New Humanitarian. https://www.thenewhumanitarian.org/news/2019/05/02/ebola-responders-congo-confront-fake-news-and-social-media-chatter
Vinck P, Pham P, Bindu K, Bedford J, Nilles E. Insti tutional trust and misinformation in the response to the 2018–19 Ebola outbreak in North Kivu, DR Congo: a population-based survey. Lancet Infect Dis. 2019;19(5):529 536.

The Impact of Misinformation

- Harassment of and violence against public health-care workers, health professionals, airline staff, and other frontline workers tasked with communicating evolving public health measures
- Shown to reduce the willingness of people to seek effective treatments for cancer, heart disease, and other health conditions



Number at risk								
Standard of care	68	66	61	48	40	35	30	16
Alternative medicine	34	28	22	20	12	4	2	0

Swire-Thompson B, Lazer D. 2020. *Annu. Rev. Public Health.* 41:433–51

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Mello MM, Greene JA, and Sharfstein JM. Attacks on public health officials during COVID-19. *JAMA (2020)*, 324(8): 741. http://doi.org/10.1001/jama.2020.14423
Stone W. *Local public health workers report hostile threats and fears about contact tracing. (3 June 2020).* National Public Radio. https://www.npr.org/sections/health-shots/2020/06/03/868566600/
Swire-Thompson B, and Lazer D. Public health and online misinformation: Challenges and Recommendations. *Annual Review of Public Health (2019)*, 41: 433-451. https://www.annualreviews.org/content/journals/10.1146/annurev-publhealth-040119-094127

Why Does Medical Misinformation Spread?

Why do we believe the misinformation?

- Cognitive biases
  - Systematic errors in the thinking process
  - Mental shortcuts to make inferences without deliberation or further judgment
  - “Rule of thumb” to help users make sense of the world and reach quick, definitive decisions
  - Unintentional confirmation bias
    - Seeking information based on initial misinformation may lead to rabbit holes or exposure to selective evidence supporting prior beliefs

Psychologic Theories of Belief

- The Need for Closure Scale (Kruglanski)
  - Series of statements highlighting approach to decision-making
  - Lower tolerance for ambiguity, unpredictability, and randomness = higher need for closure
  - Conspiracy theory beliefs rooted in simple, causal mechanisms, not complex or multifactorial; provides quick closure
- Need for Cognition (Cacioppo and Petty, Sargent)
  - High Need for Cognition = enjoy thinking for the sake of thinking, require evidence-based arguments to be persuaded by info
  - Lower Need for Cognition = decisive, actionable, ongoing environmental threat analysis

1	I don't like situations that are uncertain.	1 2 3 4 5 6
2	I dislike questions which could be answered in many different ways.	1 2 3 4 5 6
3	I find that a well ordered life with regular hours suits my temperament.	1 2 3 4 5 6
4	I feel uncomfortable when I don't understand the reason why an event occurred in my life.	1 2 3 4 5 6
5	I feel irritated when one person disagrees with what everyone else in a group believes.	1 2 3 4 5 6
6	I don't like to go into a situation without knowing what I can expect from it.	1 2 3 4 5 6
7	When I have made a decision, I feel relieved	1 2 3 4 5 6
8	When I am confronted with a problem, I'm dying to reach a solution very quickly.	1 2 3 4 5 6
9	I would quickly become impatient and irritated if I would not find a solution to a problem immediately.	1 2 3 4 5 6
10	I don't like to be with people who are capable of unexpected actions.	1 2 3 4 5 6
11	I dislike it when a person's statement could mean many different things.	1 2 3 4 5 6
12	I find that establishing a consistent routine enables me to enjoy life more.	1 2 3 4 5 6
13	I enjoy having a clear and structured mode of life.	1 2 3 4 5 6
14	I do not usually consult many different opinions before forming my own view.	1 2 3 4 5 6
15	I dislike unpredictable situations.	1 2 3 4 5 6

Scoring Note
Scores up to 30 mean low NFC. Scores between 75-90 mean high NFC.

1 = Strongly disagree
2 = Moderately disagree
3 = Slightly disagree
4 = Slightly agree
5 = Moderately agree
6 = Strongly agree

Webster, D. M., & Kruglanski, A. W. (1994). Individual differences in need for cognitive closure. Journal of Personality and Social Psychology, 67(6), 1049–1062.

Roets, A., & Van Hiel, A. (2007). Separating ability from need: Clarifying the dimensional structure of the need for closure scale. Personality and Social Psychology Bulletin, 33(2), 266-280

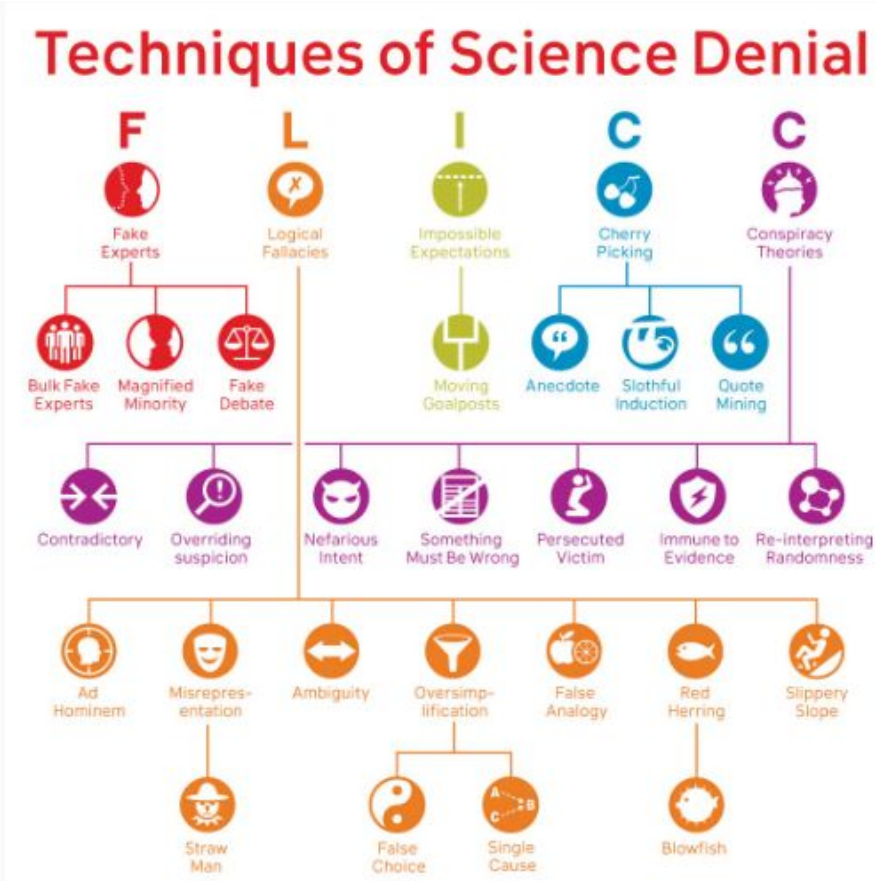
The Need for Cognition, by John T. Cacioppo and Richard E. Petty, *Journal of Personality and Social Psychology*, 1982.

Why do we believe the misinformation? (continued)

- Logical Fallacies
  - Common pattern of reasoning that oversimplifies a complex process, leaving out critical details, to lead to an inaccurate conclusion
  - Adequate evidence has not been provided to connect these ‘dots’

The FLICC Techniques for Scientific Denial

- Rhetorical tactics used to sow confusion
- Developed and applied to refute climate misinformation but has been applied to health care issues as well.



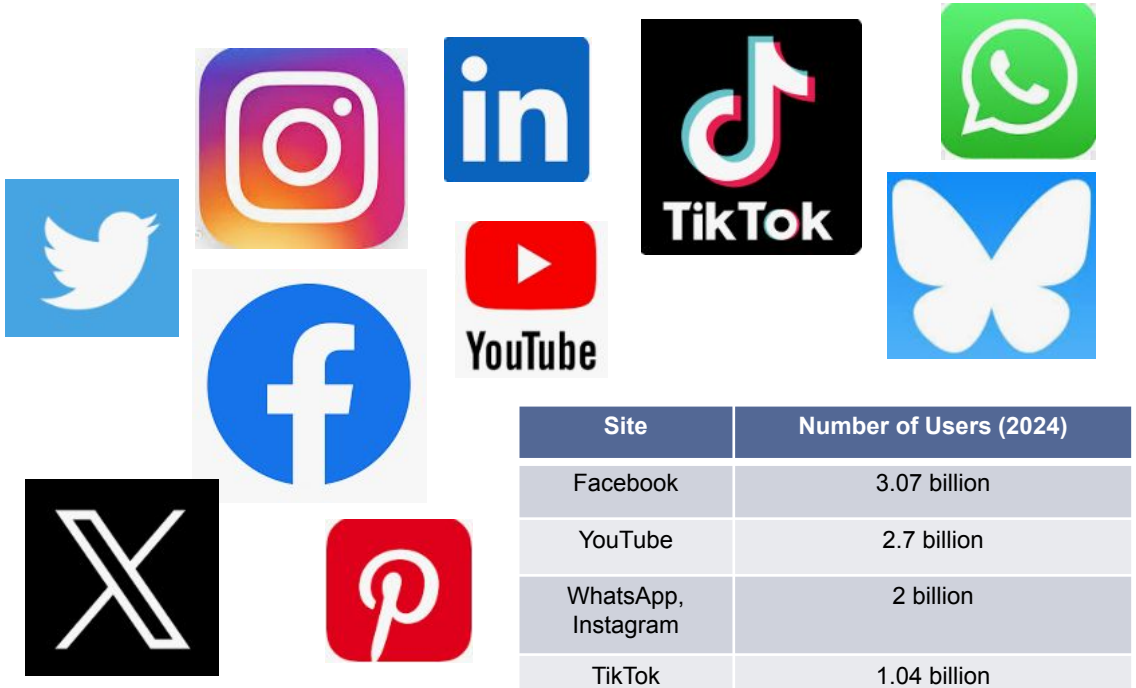
Developed in part by climate scientist John Cook, Senior Research Fellow with the Melbourne Centre for Behaviour Change at the University of Melbourne

Why is Medical Misinformation Shared?

- Social Media Engagement
  - Rewards users for shares, likes, views
  - Sensational news and emotional testimonies create a sense of urgency for viewers to react and share
  - Connects and informs users but little does not guarantee accuracy
- Web Traffic and Algorithm
  - Search engine terms can prioritize content based on popularity or previously-seen information thus reinforcing and re-exposing users to similar misinformation
  - Sites, such as WebMD, geared towards laypeople may have accurate info but allow embedded news feeds, ads, and user comments
- Polarization
  - Misinformation thrives in environments of significant societal division, animosity and distrust
  - More research needed to better understand how people are exposed to misinformation based on race, ethnicity, education, age, gender identify, etc.

The Role of Social Media

- Provides co-production and consumption of medical information by users
  - Of 800 vaccine-related Pinterest posts, 74% were anti-vax in sentiment
  - Videos on YouTube marketing unproven stem-cell treatments consisted of patients discussing health improvements (91%), praising providers (54%), and recommending the treatment (29%)
  - Content on WebMD refuting apricot pits (kernels) for cancer treatment [‘likely unsafe’ ‘could cause serious harm, including death’] contained numerous unverified testimonials giving a composite effectiveness rating of 4.60 out of 5 by user comments
    - Also seen on Amazon with similar positive testimonials by users



Site	Number of Users (2024)
Facebook	3.07 billion
YouTube	2.7 billion
WhatsApp, Instagram	2 billion
TikTok	1.04 billion
LinkedIn	771 million
Twitter / X	601 million
Pinterest	459 million
BlueSky	20 million

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Guidry JP, Carlyle K, Messner M, Jin Y. 2015. On pins and needles: how vaccines are portrayed on Pinterest. Vaccine 33(39):5051–56
Hawke B,Przybylo AR,Paciulli D, Caulfield T, Zarzeczny A, Master Z. 2019. How to peddle hope: an analysis of YouTube patient testimonials of unproven stem cell treatments. Stem Cell Rep. 12(6):1186–89
WebMD. 2019. User reviews & ratings – apricot kernel. *WebMD*. https://www.webmd.com/vitamins-supplements/ingredientreview-1190-APRICOT+KERNEL

What is the Real World Impact of Medical Misinformation?

Examples in Recent Context

- AIDS Denialism in South Africa
  - False belief denying HIV causes AIDS was adopted at the highest levels of the national government
  - Reduced access to effective treatment
  - Contributed to over 330,000 deaths between 2000 to 2005
- Wakefield study on MMR + Autism
  - Poorly-designed study later retracted made a false link between vaccine and causing autism
  - Despite retraction, largely attributed to lower immunization rates over next 20 years

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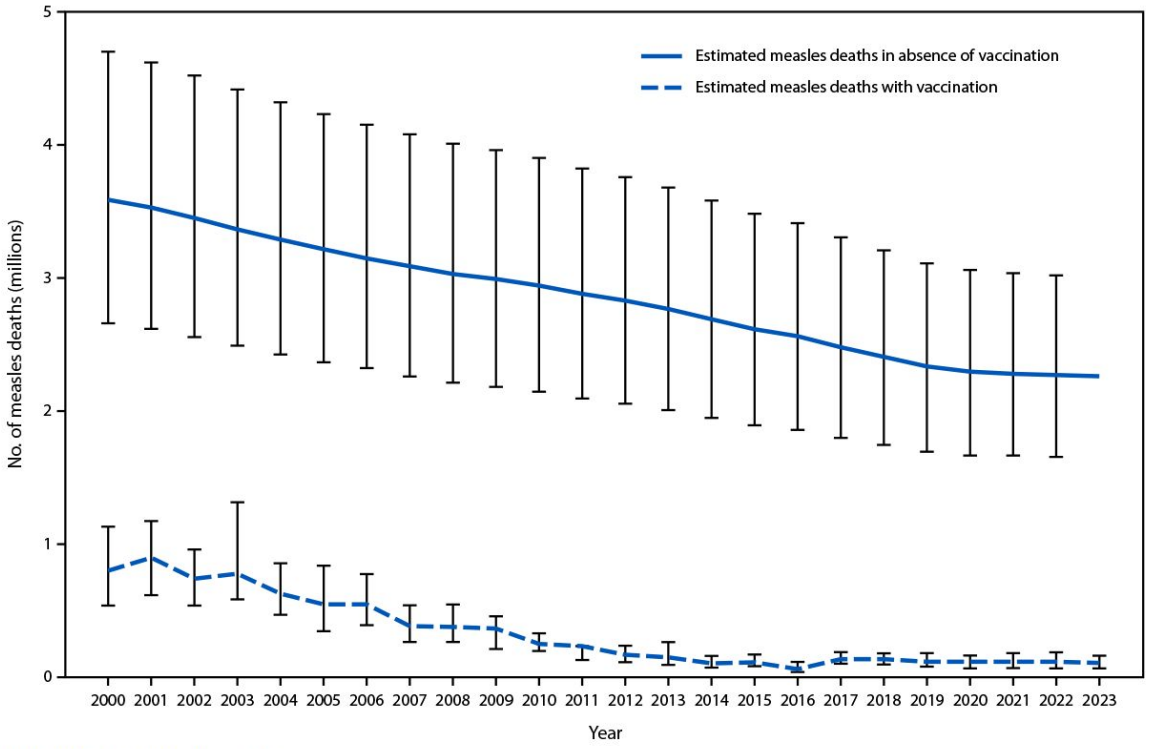
Chigwedere, P., Seage, G. R., Gruskin, S., Lee, T. H., & Essex, M. (2008). Estimating the Lost Benefits of Antiretroviral Drug Use in South Africa. JAIDS Journal of Acquired Immune Deficiency Syndromes, 49(4), 410–415. https://doi.org/10.1097/qai.0b013e31818a6cd5
Rao, T. S., & Andrade, C. (2011). The MMR vaccine and autism: Sensation, refutation, retraction, and fraud. Indian journal of psychiatry, 53(2), 95–96. http://doi.org/10.4103/0019-5545.82529
Hussain, A., Ali, S., Ahmed, M., & Hussain, S. (2018). The anti-vaccination movement: A regression in modern medicine. Cureus, 10(7), e2919. http://doi.org/10.7759/cureus.2919
Minta AA, Ferrari M, Antoni S, et al. Progress Toward Measles Elimination — Worldwide, 2000–2023. MMWR Morb Mortal Wkly Rep 2024;73:1036–1042.

Progress Toward Measles Elimination Worldwide 2000 - 2023

- Measles vaccination is highly effective at preventing morbidity and mortality associated with measles.
- Requires high population immunity to interrupt transmission.
- From 2000 to 2023, vaccines saved an estimated 60 million lives worldwide.
- Coverage during this period with 1st dose vaccine was 83%, estimated cases increased 20%, and number of countries affected by outbreaks increased from 36 to 57.
  - Lower coverage rates and increased measles incidence seen in countries with lower income and in areas with fragile, conflict-affected settings.

FIGURE. Estimated number of annual measles deaths with measles vaccination and in the absence of measles vaccination — worldwide, 2000–2023*,†



* With 95% CIs indicated by error bars.

† Deaths prevented by vaccination are estimated by the area between estimated deaths with vaccination and those without vaccination. A cumulative total of 60.3 million deaths were estimated to have been prevented by measles vaccination during 2000–2023.

Minta AA, Ferrari M, Antoni S, et al. Progress Toward Measles Elimination — Worldwide, 2000–2023. MMWR Morb Mortal Wkly Rep 2024;73:1036–1042. DOI: http://dx.doi.org/10.15585/mmwr.mm7345a4

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Battling Misinformation through Health Messaging

- Being fully convinced and committed is not always necessary for people to take action.
  - *"It's harder and harder to find a place to smoke nowadays."*
  - *"I didn't want to be the last one in my workplace to get the vaccine."*
  - *"I really don't think the masks work…..but I'll wear one anyway to keep my grandmother safe."*

Litt D, and Walters S. Battling Misinformation Through Health Messaging (21 March 2021). https://www.nih.gov/about-nih/what-we-do/science-health-public-trust/perspectives/battling-misinformation-through-health-messaging

Fundamentals of Critical Thinking

Critical Thinking - Definition

The ability to analyze information objectively, evaluate evidence, and make well-reasoned decisions by questioning assumptions and identifying biases

In Healthcare

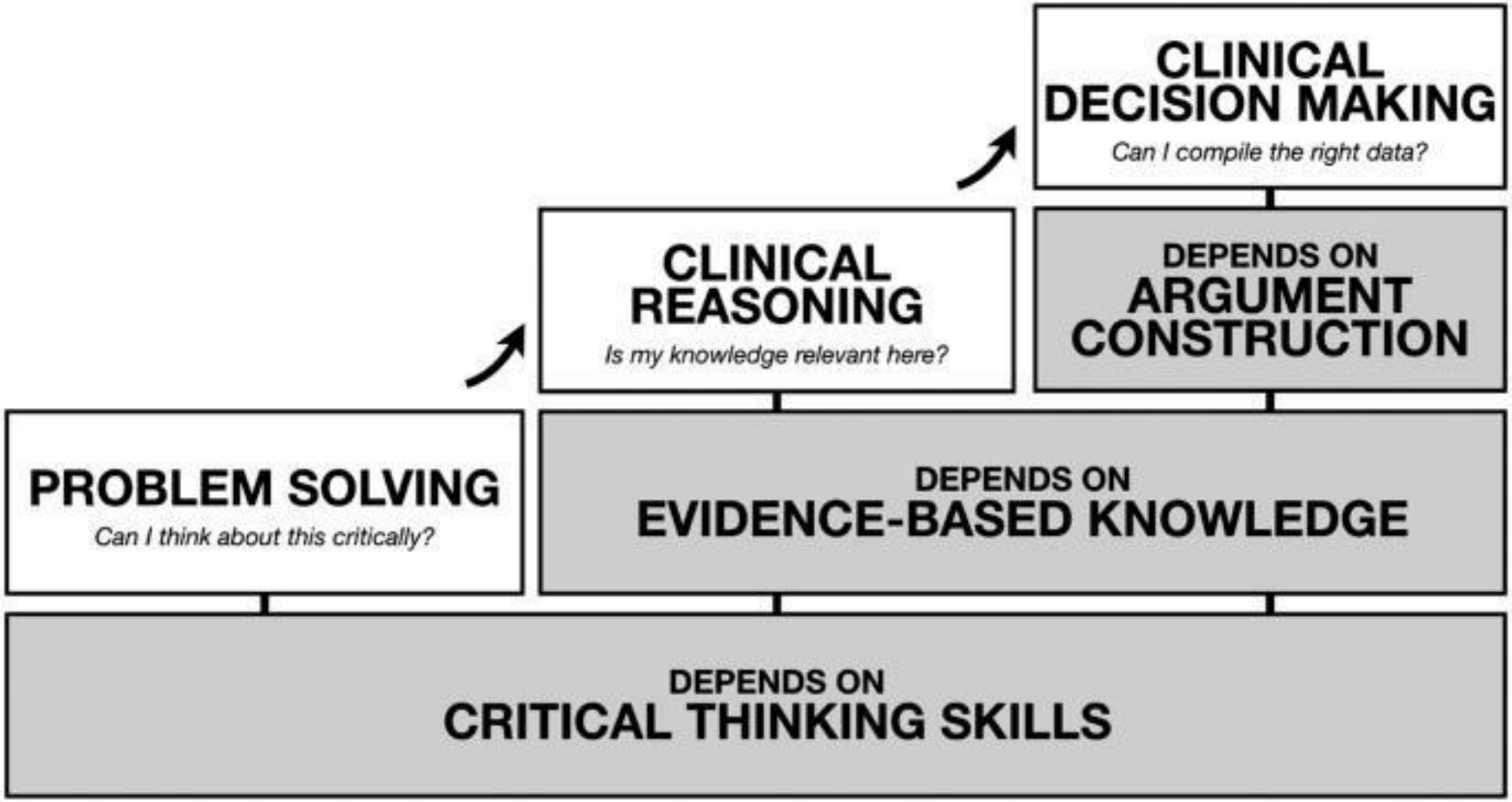
- Critical thinking involves the application of knowledge and experience to identify patient problems and to direct clinical judgments and actions that result in positive patient outcomes

1. Benner P et al. Patient Safety and Quality: An Evidence-Based Handbook for Nurses 2008
2. “The Thinker.” Encyclopædia Britannica, Encyclopædia Britannica, Inc., 25 Feb. 2025

Importance of Critical Thinking for Pharmacists

Analyzing patient information, medication interactions, and clinical data to make informed, evidence-based decisions about drug therapy—essentially "thinking like a detective" to optimize patient care.

Differentiating Critical Thinking



1. Persky AM et al. Am J Pharm Educ. 2019

Core Components of Critical Thinking

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A. Analysis

-Identifying claims, sources, and evidence

-Differentiating between facts, opinions, and assumptions

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-Considering conflicts of interest & bias

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-Using clinical judgment to assess the validity of claims

Core Components of Critical Thinking

UCLA Health

A. Analysis

-Identifying claims, sources, and evidence

-Differentiating between facts, opinions, and assumptions

D. Explanation

-Communicating findings

-Utilizing frameworks such as SBAR (Situation, Background, Assessment, Recommendation)

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UCLA Health

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B. Evaluation

-Evaluating sources (e.g., peer-reviewed studies vs. anecdotal)

-Considering conflicts of interest & bias

E. Self-Reflecting

-Being open to new evidence and perspectives

-Recognizing personal biases

C. Inference

-Recognizing logical fallacies and cognitive biases

-Using clinical judgment to assess the validity of claims

Establishing Frameworks for Evaluating Medical Misinformation

The 5 W's Framework

The 5 W's Framework

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Who?

- Identifying the source of information; assessing credibility

The 5 W's Framework

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Who?

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What?

- Analyzing the content of the claim; evaluate supporting evidence

The 5 W's Framework

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Who?
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Where?
- Considering the platform and context of dissemination

The 5 W's Framework

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Who? • Identifying the source of information; assessing credibility

What? • Analyzing the content of the claim; evaluate supporting evidence

Where? • Considering the platform and context of dissemination

When? • Checking the timeline of the information

The 5 W's Framework

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Who? • Identifying the source of information; assessing credibility

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Where? • Considering the platform and context of dissemination

When? • Checking the timeline of the information

Why? • Understanding the motivation behind the information

CRAAP Test

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Currency

- Is the information up to date?

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Relevance

- Does it meet your needs and fit the audience?

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Authority
- Is the source credible and qualified?

CRAAP Test

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Currency	• Is the information up to date?
Relevance	• Does it meet your needs and fit the audience?
Authority	• Is the source credible and qualified?
Accuracy	• Is the information evidence-based and error-free?

CRAAP Test

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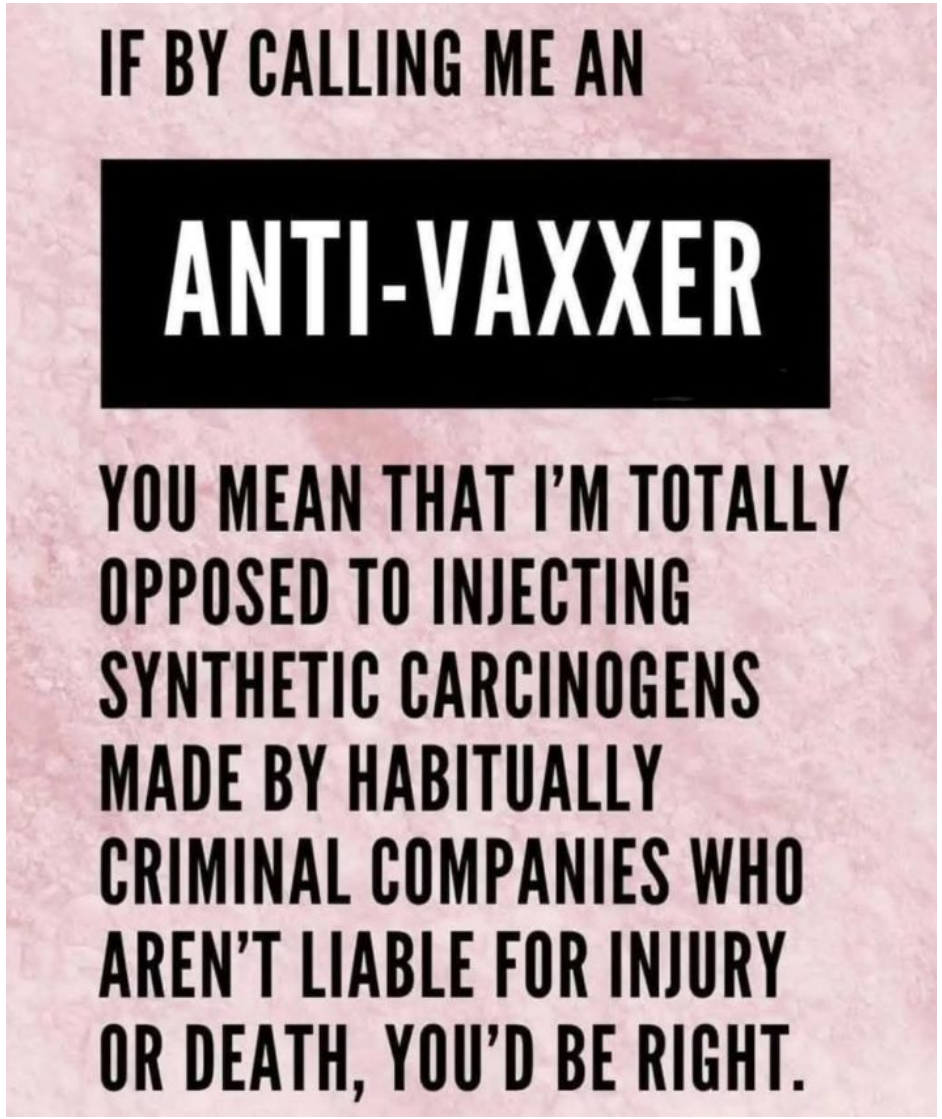
Currency	• Is the information up to date?
Relevance	• Does it meet your needs and fit the audience?
Authority	• Is the source credible and qualified?
Accuracy	• Is the information evidence-based and error-free?
Purpose	• What is the motive behind the information?

Example Scenario



A concerned mother approaches a pharmacist with worries about this social media post. She expresses concerns about vaccinating her child now that her social media "algorithm" has been full of posts about risks of vaccination.

CRAAP Test

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Currency

- Pharmacist: "When was this post published? Vaccine information evolves quickly, so it's important to ensure it is current and aligns with the latest guidelines from trusted sources like the CDC or WHO."

- Example: If the post is outdated, it might not reflect current vaccine safety standards and research. (not the case for this particular example)

CRAAP Test

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Relevance

- Pharmacist: "Does this information apply to your child's specific situation? Misinformation often uses broad, alarming statements that don't provide specific evidence related to individual health needs."

- Example: Instead of general claims, look for evidence that discusses vaccines relevant to your child's age and health status.

CRAAP Test

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Authority

- Pharmacist: "What is the credibility of the source? An Instagram page may not have the same authority as peer-reviewed medical journals or public health organizations."

- Example: Encourage looking for vaccine information from reputable sources like the American Academy of Pediatrics or Immunize.org.

CRAAP Test

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Accuracy

- Pharmacist: "Are these claims supported by scientific evidence? Statements like 'synthetic carcinogens' in vaccines are not backed by credible research. Vaccines undergo rigorous testing to ensure safety and efficacy."

- Example: Explain how vaccine ingredients are thoroughly evaluated and how regulatory agencies like the FDA monitor safety.

CRAAP Test

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Purpose

- Pharmacist: "What is the intent behind this post? Is it to inform, sell a product, or push a particular agenda? Posts with inflammatory language like 'habitually criminal companies' often aim to provoke fear rather than provide factual information."

- Example: Highlight how credible sources focus on evidence and transparency, not scare tactics.

Empowering Others

Empowering Others

Guide through real-life examples

- Utilize 5W or CRAAP method to evaluate a social media post on health information

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Engage in role-playing scenarios

- Practice a scenario with others

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- Advocate for applying critical thinking skills to everyday life situations (advertisements, non-medical claims, etc.)

Engage in role-playing scenarios

- Practice a scenario with others

Promote trusted resources

- Provide reputable resource for fact-checking medical information (e.g. MedlinePlus, CDC, etc.)

Compassionately Communicating Critical Thinking

Encouraging Critical Thinking

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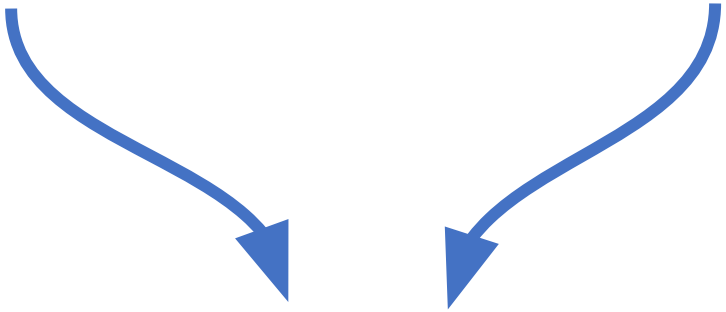
Shared Decision Making

Clinician and patient work together to come to an informed decision on what's best for the patient

Nonviolent Communication

A process incorporating compassionate discussion that moves towards a solution for all



Building Trust & Improving Care

Patients reach choices that are consistent with their values allowing them to be more inclined to participate with evidence-based treatment

- Agency for Healthcare Research and Quality. (n.d.). *Conversation starters for shared decision making*.
- Rosenberg, M. B. (2003). *Nonviolent communication: A language of life* (2nd ed.). PuddleDancer Press.

Shared Decision Making

- Pharmacists and patients work together to acknowledge medical misinformation
- Pharmacists can direct the patient to apply critical thinking and make healthcare decisions based on the pharmacist's knowledge and the patient's goals
- Pharmacists can utilize cues to continually engage with patient while addressing medical misinformation

- Agency for Healthcare Research and Quality. (n.d.). *Conversation starters for shared decision making*.

Shared Decision Making

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Example Phrasing Cues

- I know you want to make the best decision for you and your family
- I want to get your input about what you feel is right for you
- I would like to understand more about what's important to you
- … what fits best with your goals that you have shared
- Is there anyone else that you would like to be involved in making this decision?
- Are there other people that you want to talk to in order to make this decision?

- Adapted from: Agency for Healthcare Research and Quality. (n.d.). *Conversation starters for shared decision making*.

Nonviolent Communication (NVC)

Observations	What you see, hear, remember (free from evaluation)
Feelings	Emotion and sensations (versus thoughts)
Needs	Values that invoke feelings
Requests	Clear actions taken that are not demanding

- Rosenberg, M. B. (2003). *Nonviolent communication: A language of life* (2nd ed.). PuddleDancer Press.

NVC Example Phrases

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Observations

- I noticed that you shared a post that says [specific claim]
- I saw the information you provided, and it seems different from what I've come across

Feelings

- I feel concerned when I see information like this being shared.
- I feel uneasy because the information doesn't seem to align with what I know

- Adapted from: Rosenberg, M. B. (2003). *Nonviolent communication: A language of life* (2nd ed.). PuddleDancer Press.

NVC Example Phrases

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Needs

- I value having accurate and reliable information, and I want to make sure we are all on the same page
- I need clarity and truth in the information I come across, so I can make informed decisions

Requests

- Would you be open to checking the source of that information together?
- Could we take a moment to look at more reliable sources for this?
- I would appreciate it if we could verify the details before sharing them further

- Adapted from: Rosenberg, M. B. (2003). *Nonviolent communication: A language of life* (2nd ed.). PuddleDancer Press.

Example Phrases for Different Scenarios

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Initial response to misinformation

- I noticed that you shared a post about [topic]. I'm wondering if we could take a look at the source together?
- I saw the article you shared, and it seems like some details might be unclear. Would you be open to discussing it?

Explore Inaccuracy of Misinformation

- I came across some conflicting information on this topic. Can we look into it together to see what's most reliable?
- I feel a bit uncertain about the details in this post. Would you be willing to check the sources with me?

Address Misinformation but Avoid Conflict

- I understand that this information might be coming from a good place. I'd like to talk about some things I've read that seem different.
- I agree that this might seem accurate, but I found some other sources that suggest otherwise. Could we look at them together?

Example Phrases for Different Scenarios

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Expressing Concern for Impact of Misinformation	Misinformation Unintentionally Shared	Acknowledging Misinformation w/ Learning
• I'm feeling worried because this information might cause some confusion. How do you feel about double-checking it together? • I care a lot about making sure we're all informed correctly. Do you think it might be worth a few moments to look into this?	• I understand that the information may have been shared with good intentions, and I feel it's important to clarify the facts to ensure we're all sharing accurate information. • I think there might have been a misunderstanding about this topic. I'd love to explore it with you if you're open to it.	• I've been looking into this topic a bit more, and I found some sources that might help us both understand it better. Would you like me to share them? • I've heard different perspectives on this. Would you be open to discussing it further to make sure we have accurate information?

Conclusions

- **Medical misinformation spreads easily as it can provide simple solutions to complex health issues**
- **Critical thinking can take time to develop, but there are practical tools (CRAAP Test & 5W) available to strengthen this valuable skill**
- **Encouraging critical thinking in others, particularly patients, begins with actively listening to their concerns and respectfully asking for permission to share your knowledge**

Test Your Knowledge

Case Practice

A 67-year-old patient, is recovering from a mild ischemic stroke. Concerned about his memory and future stroke risk, he asks the hospital pharmacist, about a TikTok video promoting **"NeuroShield Ultra"** a supplement claiming to reverse memory loss and prevent strokes. The video's creator, a self-proclaimed "brain optimization expert," insists that "Big Pharma doesn't want you to know about this" and pressures viewers to buy before it sells out.

Utilize the 5W's or CRAAP test to help navigate this patient through this misinformation

Thank you!

What Questions Do You Have?


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