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# Vaccine

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## Editorial

# Improving COVID-19 vaccine acceptance: Including insights from human decision-making under conditions of uncertainty and human-centered design



“We form our beliefs for a variety of subjective, emotional and psychological reasons in the context of environments created by family, friends, colleagues, culture and society at large. After forming our beliefs, we then defend, justify and rationalize them with a host of intellectual reasons, cogent arguments and rational explanations. Beliefs come first; explanations for beliefs follow.” [1]

## 1. Introduction

As of the time of this writing, more Americans have died due to COVID-19 in the last 11 months than all the Americans who died in WWI and the Vietnam, Korean, and Middle East conflicts combined. More than 135,000 Americans are currently hospitalized with COVID-19, and one out of every 744 Americans has now died of this disease. Worldwide, over 2 million people have died, and many more millions sickened and hospitalized. Despite daily news reports providing witness to this tragedy, many deny the reality of the pandemic and its severity; they reject wearing masks, maintaining physical distancing, and other non-pharmaceutical interventions. Critically, the definitive answer to the management of this pandemic lies in safe and effective vaccines widely used among the population. Despite this, vaccines are likely to be rejected by a significant minority of Americans, based on recent polls.

Rejection of evidence-based recommendations has been observed across nations, governments, and institutions—despite ongoing evidence of the continuing carnage due to the SARS-CoV-2 virus and definitive evidence of the value of masking and distancing and of vaccines. Why? What motivates some people to take precautions for themselves, their families, and their communities, and others to reject such evidence-based measures?

In attempting to understand what leads to acceptance or rejection of a health measure (in this case, the COVID-19 vaccine), it's critical that healthcare providers (HCPs) understand the beliefs of their patients, while understanding that a common attribute of humans is a determination to defend and hold to their beliefs; to do this, they often reject data and arguments that don't fit with their previously determined beliefs (i.e., belief-dependent realism). Additionally, it is important to understand the context under which an individual is making decisions. Likely, due to the nature

of this ongoing global pandemic (and understanding the context of how the brain makes decisions within conditions of uncertainty and within the context of traumatic events, which this pandemic qualifies as), there will be individuals who are in survival mode, focused on only what is necessary for immediate survival, or engaging in more emotion-based decision-making. This will be different for each individual and understanding this context may be helpful when progressing through the decision-making process with the patient.

In the healthcare realm, success in healthcare decision-making by patients is often founded on the HCPs ability and skill in adapting information-sharing and educational efforts to the particular needs of the patient—based on how the patient thinks, synthesizes information, and makes decisions. In a previous set of articles, one of us (CMP) outlined the major tenets of the Preferred Cognitive Style and Decision-Making Model (PCSDM), which has great value for HCPs in improving communication and success in achieving the desired goal of improving vaccine uptake [2–5]. In one of these articles, we noted that “current vaccine educational efforts, particularly those developed by governmental and public health authorities, invariably adopt a unimodal fact-based, left-brain cognitive style. This reflects the preferential cognitive style used by the developers and approvers of such materials—a style that may not be favored by the intended recipients—and quite obviously not a style that has changed vaccine acceptance behavior in the population. Instead, we believe it is worthwhile to identify preferred cognitive decision-making styles at the individual and group level and adopt educational strategies and message framing specific to each style. Critical to our approach is the idea that an individual's preferred cognitive style, emotional baseline, and subsequent behavior, are all intertwined” [2].

The PCSDM outlines six representative and common cognitive styles that individuals employ to make decisions (see [Table 1](#)); in this case, decisions surrounding whether to accept or reject a COVID-19 vaccine. It is critical for HCPs to accurately determine the preferred cognitive style of the patient, adapt this style in regard to educational efforts and conversations, and present information in a style that is within the primary and secondary preferred cognitive styles of the patient. If an HCP communicates facts and data in line with his/her own cognitive style, but that is not the preferred cognitive style of the patient, the healthcare pro-

vider has missed communicating in a style that facilitates information processing as they engage in decision-making processes. It is a missed opportunity to educate effectively.

Patients will likely have heard a wide variety of information (both accurate and inaccurate) regarding the COVID-19 vaccine over the course of this pandemic, and acceptance or rejection of this information will likely be impacted by belief-dependent realism (i.e., what their initial belief is, which leads to acceptance of and rejection of specific data), as well as how they process information through the lens of their preferred cognitive style. Understanding the intersection of these processes of thinking and decision-making is critical to the ability of the HCP to effectively build trust in information-sharing and decision-making in regard to protecting health.

The standard medical approach, observed in our studies, has been to provide patients with a flood of information, evidence, and socially responsible rationale, confined to a particular cognitive style (almost always an analytical style). When these efforts are not successful in leading toward vaccine acceptance, HCPs often react by providing more information. This is reminiscent of someone yelling louder, rather than slowing down and changing communication methods, when they realize the other does not speak the same language. On the contrary, the evidence points to the need to change our approach toward vaccine education, and to respectfully seek to understand how individual patients make decisions.

HCPs have been increasingly moving toward less paternalistic communication styles with patients but have not yet adjusted their understanding of human motivation and decision making under conditions of fear or uncertainty to incorporate new methods like shared decision-making and consumer-centric communication. A fundamental and further challenge is that accepting COVID-19 vaccine requires individuals to make decisions based on the interest of the greater good, while much of our culture is based on the promotion of the individual interest. To this end, it is important to explore the patient’s narrative and “stories they tell themselves” about receiving or rejecting the COVID-19 vaccine, along with their fears and/or motivations behind acceptance or rejection of the vaccine (e.g., is the patient more fearful of risking a SAR-CoV-2 infection or of getting the vaccine and risking side effects)? To what extent is the patient individually minded versus community-minded regarding health decision-making processes? Are there cognitive distortions, biases, or misinformation, whereby the usual issues about vaccines become magnified with COVID vaccines? Are there core fears and motivations that can be usefully identified and discussed? The HCP can interdigitate this understanding with knowledge of the individual’s preferred cognitive style to engage in a productive conversation regarding acceptance of the COVID vaccine, undergirded in an empathic communication style.

To address these issues, one method that has been increasingly utilized in healthcare and other sectors is human-centered design (HCD). HCD is an approach that seeks to develop user-oriented solutions to complex problems, especially those that are rapidly changing and emotionally laden—such as novel vaccinations for a global pandemic. The method seeks to empathize with and understand peoples’ unspoken and often unrealized motivations and develop novel solutions.

HCD begins by attempting to empathize with the individual or group in order to first understand how to frame a question that targets the root-cause motivation for that individual or group. Rather than immediately propose solutions to a perceived problem, the design approach seeks to first understand the primary issue at hand, and then create a framework for further decision making that maintains its relevance in a dynamic and rapidly changing environment. Among the insights from HCD and psychology are that root-cause issues are not solved by merely providing more

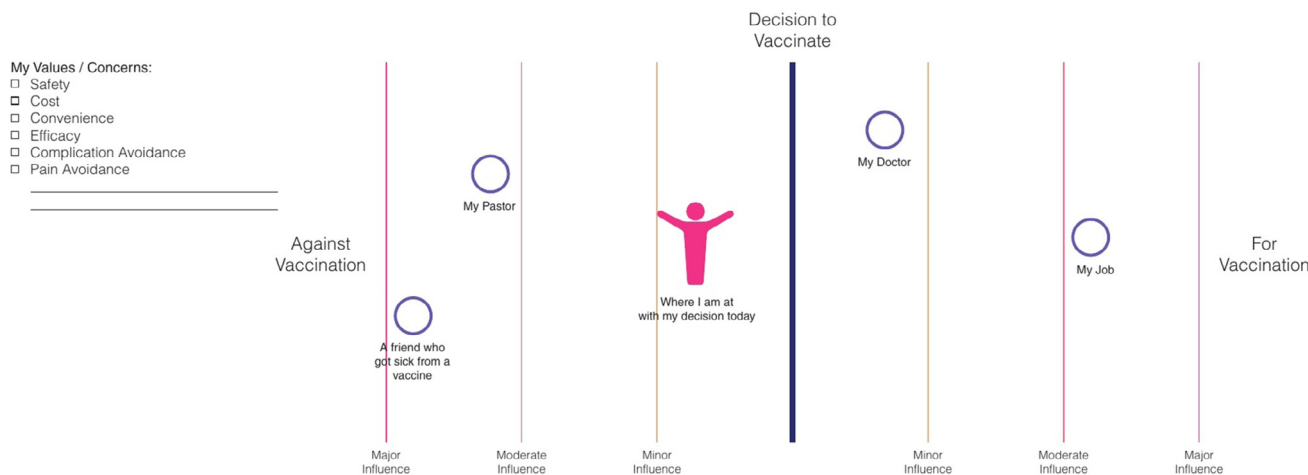
Table 1

Cognitive Style	Main Effect	Verbal Expression	Approach
Denialist	Disbelieves accepted scientific facts, despite overwhelming evidence. Prone to believe conspiracy theories	“I don’t care what the data show, I don’t believe the vaccine is safe”	Provide consistent messaging repeatedly over time from trustworthy sources, provide educational materials, solicit questions, avoid “hard sell” approach, use motivational interviewing approaches
Innumerate	Cannot understand or has difficulty manipulating numbers, probabilities, or risks	“One in a million risk sounds high, for sure I’ll be the 1 in a million that has a side effect, I’ll avoid the vaccine”	Provide nonmathematical information, analogies, or comparators using a more holistic “right brain” or emotive approach
Fear-based	Decision making based on fears	“I heard vaccines are harmful and I’m not going to get them”	Understand source of fear, provide consistent positive approach, show risks in comparison to other daily risks, demonstrate risks of not receiving vaccines, use social norming approaches
Heuristic	Often appeals to availability heuristic (what I can recall equates with how commonly it occurs)	“I remember GBS happened in 1977 after flu vaccines, that must be common, and therefore I’m not getting a flu vaccine”	Point out inconsistencies and fallacy of heuristic thinking, provide educational materials, appeal to other heuristics
Bandwagoning	Primarily influenced by what others are doing or saying	“If others are refusing the vaccine there must be something to it, I’m going to skip getting the vaccine”	Understand primary influencers, point out logical inconsistencies, use social norming and self-efficacy approaches
Analytical	Left brain thinking, facts are paramount	“I want to see the data so I can make a decision”	Provide data requested, review analytically with patient

Table from Poland CM, Poland GA. Vaccine education spectrum disorder: the importance of incorporating psychological and cognitive models into vaccine education. *Vaccine*. 2011 Aug 26;29(37):6145–8.

information but by listening to people and by understanding that the information they encounter changes and shifts over time (often in a way that is directly related to their understanding of self). In turn, this calls for an ongoing dialogue and not a one-time campaign or plea. In this regard, HCD methods may better support patients in their decision-making process by providing tools and frameworks—founded in their own values and self-interest—to guide their decision. This approach provides care teams with a methodology that considers the nuance of patient decision making for a collaborative informed conversation that may be more likely to compel behavior change. Thus, we can use HCD principles to

# VACCINATION DECISION MAKING EMPATHY TOOL



In order to understand individuals and their choices, it is critical to understand their values relating to the choice, the hierarchy of information and influences they are encountering, and how they make sense of the diversity of perspectives.

Begin by inquiring about the patients' values and concerns, what are the factors that are influencing this decision? Mark this on the left of the tool.

As the patients describe the influences on their decision, ask, *does this influence suggest that you do or do not get the vaccine?* and *how impactful is this influence on your decision?* plot it together on

the tool as a major, moderate, or minor influence. Those against vaccination go to the left, while those for vaccination go to the right.

Move on to openly and non-judgmentally ask the patients the following questions: *How do these influences make you feel?* and, *How do these influence your choices?* It is critical at this point to avoid attempting to change the patients' minds.

Finally, ask the patients to articulate where they are on the continuum of for or against vaccination and mark that on the tool.

With a clearer understanding of the influences patients wrestle with and the way they are processing this information, providers can begin a conversation that embraces their thought process rather than dismisses it.

Importantly, like the constant flow of information from nearly every other source, this must be an ongoing discussion, not a one-time encounter to change patient behavior. Referring to previous versions of the tool created in a collaborative manner allows both the patient and provider to understand the nuances of how perceptions change over time.

Fig. 1. Vaccination decision making tool.

develop tools to enhance conversations and restore health care as a meaningful authority when it comes to information-sharing and education.

For many patients, HCPs are no longer considered to be the exclusive expert in health decisions. In the spirit of seeking the root-cause issue, we need to stop asking why people don't understand what we are telling them and consider and ask why we don't understand them. What is it about our convictions that are limiting our ability to empathize with those who we are trying to help? Everyone has some basis upon which they make decisions about a vaccine, whether or not we, as HCPs, agree with the decision. The point is not to abandon science nor the benefits of our science, but rather to consider how, by our efforts to fully understand the information or style they use to make a decision, HCPs can help people make evidence-based decisions.

Despite the desire for a panacea that may entice the entire population into vaccination, the reality is that nuanced and thoughtful conversations between patient and HCPs are among the most effective tools [6]. To that end, we have developed a tool (Fig. 1) aimed at supporting these conversations. This empathy tool, which is modeled after tools used in behavior change and wellness, is designed to aid the HCP in understanding the variety of influences and their impact on the patient's decision making. By acknowledging not only the existence of these influences but also their constantly evolving nature, the HCP can gain a unique and nuanced

window into the patient's decision-making rationale. With the constant stream of information patients are exposed to, using this tool serially over several interactions can aid in developing a deeper and more trusting relationship between the HCP and patient. This simple tool provides a framework for nuanced and reflective conversations on the topic of vaccination.

## 2. Conclusions

Ending this pandemic and resuming some normalcy to life will require comprehensive and clear policy on the national and global level. Basic precautions like masking, distancing, and hand hygiene are incredibly effective. Vaccines have now been developed that are safe and effective—in fact, they are highly effective. Three choices seem apparent: (1) we follow evidence-based recommendations and save lives and economies; (2) we continue to allow others to needlessly endanger others by rejecting such maneuvers leading to countless more illnesses, hospitalizations, deaths, and economic loss; or (3) some middle way.

Herein, we propose that among the solutions must be the design of policies and programs cognizant of known human behaviors, an understanding of preferred cognitive styles and motivations, and human-centered design. This will require that HCPs seek to understand how their patients make decisions, what their motivations and perceptions of risk are, and who their trusted

sources of information are. The alternative is to continue doing what we have traditionally done, resulting in mistrust, suboptimal population-level vaccine coverage rates, and in the case of COVID-19; a needless continuation of the pandemic with the result of more lives lost and damaged. Perhaps George Bernard Shaw was right after all when he penned the saying that “the one thing we learn from history is that men never learn anything from history.” Doing what we have always done has historically led to suboptimal success. It is time to consider a new and better way that draws patient and provider mutually toward optimal health discussions, choices, and behaviors.

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