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CURRENT ISSUES

Misinformation as a Misunderstood Challenge to Public Health

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INTRODUCTION

The concept of misinformation as a problem appears prominently in recent academic literature and public discourse, as researchers have raised concerns about the spread of inaccurate information online, decision making based on problematic information, and even the acceptance of medical conspiracy theories.[1–4] Misinformation is false or inaccurate information regardless of intentional authorship, and yet much discussion about misinformation has focused on malicious acts to infect social media platforms with false information. Worries about blatantly "fake" information imply an active and strategic presentation of falsehoods that threaten to have dramatic effects on public health. Such popular emphasis on examples of explicitly fake content, however understandable, nonetheless subtly directs attention away from core systemic challenges that public health and medical professionals face in protecting and improving population health through the communication and dissemination of accurate information.

Despite popular construction of misinformation as a uniform and acute threat, misinformation is better understood as an umbrella category of symptoms, some of which might suggest information system dysfunctions and others that are relatively less problematic from a public health perspective. Some types of misinformation hold more consequence for public health behavior and outcomes than others. Misinformation is a notion comprising considerable variation.

Considering how health information can affect well-being helps to reframe concerns about misinformation and suggests a path forward. Rather than focusing solely on actions of specific agents external to conventional media systems, consider the vulnerabilities and inadequacies of the current health information system in setting the stage for diffusion and adoption of misinformation. Doing so could enable the development of systemic efforts to improve the information infrastructure available to all communities—the health information ecosystem—rather than focusing solely on how society might cleanse any current arena of specific infectious agents.

Researchers and practitioners recently gathered to consider cancer-related misinformation in the social media information environment as part of a National Cancer Institute workshop.[5] Deliberation focused on the conditions under which misinformation poses a serious concern—in other words, whether, when, and how it does—and resulted in a set of broad observations regarding how to understand misinformation as a phenomenon relevant to preventive medicine and public health. Those observations offer a foundation for future preventive medicine research and intervention, succinctly summarized in 5 main contentions described below.

MISINFORMATION IS NOT ALL EQUAL IN CONSEQUENCE FOR PUBLIC HEALTH

Behavioral theory and thinking about media effects suggest that all information is not equally relevant to predicting intention and performance of health-related behavior.[6–8] Some misinformation is noteworthy because it receives widespread attention. In fact, one might worry that problematic claims in advertising and elsewhere funded by commercial actors enjoy exposure that vastly outweighs what relatively limited public health media campaigns intended to counter such

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messages can accomplish. At the same time, some other misinformation also does not warrant intervention by public health institutions. This judgment rests on 2 primary reasons: First, some information is behaviorally unimportant, and, second, researcher or practitioner attention to some misinformation may inadvertently increase the dissemination, importance, or effect of that misinformation in a manner that draws attention away from other important public health efforts.

Beyond the observation that some inaccuracies (e.g., an adage that everyone needs to drink exactly 8 glasses of water a day or a doctor misattributing a screening guideline to the wrong federal agency) are likely inconsequential for patient decision making because of the nature of what is emphasized, misinformation also varies in the extent to which people see it or accept it. The existence of misinformation is not inherently the same as a large number of people being misinformed. Audience exposure matters. Large-scale advertising efforts, for example, are better positioned to have population-level effects than more isolated claims. Conversely, the simple existence of an outlandish claim on a rarely viewed Facebook page or blog post, in turn, does not guarantee consequence for population health. Moreover, even if exposure to a piece of misinformation grows over time, so too will prospects for fact-checking efforts to mitigate the effects of misinformation. Simply isolating claims to check for accuracy without also considering the scale of audience claim exposure and the availability of information countering claims is inadequate from a public health systems perspective.

Consider the questionable information urging consumers to consume lemon and cayenne pepper to "detox" and reduce the risk of cancer (despite a lack of evidence supporting this treatment for cancer control). If circulated only among a small network of people, that questionable information is likely limited both in terms of audience reach and whether consequentially unhealthy behavior is being promoted, per se. For misinformation to result in behavioral change for an individual that also matters for public health, it must, at least, be seen by that individual and must encourage actions that are problematic.

Any corrective intervention effort also carries ethical consequences. Individual item correction or fact-checking initiatives, for example, deserve caution before resource deployment: Pursuing every piece of misinformation, especially without any information on the potential behavioral consequences of the misinformation, and devising a factual correction and effective dissemination plan can be an intensive and time-consuming task. The amount of time spent doing that could hinder effort to monitor what is going on in the world generally, not only for patients but also for journalists tasked with hunting down and correcting misinformation. Item-by-item corrective effort could even distract from other seemingly unrelated conditions that misinformation purveyors may be trying to hide.[9]

NEW MEDIA PLATFORMS DIFFER FROM OLDER ONES IN AUTHORSHIP, OVERSIGHT, AND ALGORITHMS

The nature of new media platforms poses challenges for thinking about the effects of and remedies against misinformation, especially because online content can be ambiguous in terms of authorship, the site of exposure, and other factors.[10] What appears on screens now can reflect a wider range of authors than used to be the case, is less formally governed in many instances than broadcast mass media content was previously, and in many cases is tailored to individual audience members in historically new ways. Social media now exist in a space relatively less constrained than the broadcast spectrum used by television networks. In the U.S., newly emergent systems of information generation and transmission offer democratization through horizontal (and not only vertical, top-down) communication but also encounter relatively few regulatory controls over false, misleading, incomplete, and false-equivalence information. At the same time, challenges also lie in the very openness of Internet-based platforms to all sorts of content producers, each of whom can spread some types of misinformation that would be protected as free speech. The ability of new media platforms to change and adapt content algorithms and data privacy policies, which can modify patterns of individual exposure to information in opaque ways, also adds complexity shrouded in mystery, as not everyone sees or hears the same information in practice.

Importantly, social media platforms could develop new technologies that prevent and respond to the presence of misinformation. Some platforms, for example, now allow users to flag potentially problematic content and to shape what appears over time—a move consistent with research on user response to immediate correction technologies.[11]

MISINFORMATION ACTIVITY CAN HAVE INDIRECT EFFECTS ASIDE FROM ACUTE, SHORT-TERM ONES

An acute impact on behavior may not be the only or the most important effect of information of any sort. Misinformation can have indirect and often unanticipated

effects, including promotion of mistrust in science or credible medical sources of health information. Some misinformation, in fact, is sowed to instill political and social mischief at a minimum and political and institutional mistrust in its worst manifestations. Recent work by Broniatowski et al.[12] provides an example of this. Such misinformation exposure might foster mistrust in science itself, when even overwhelming scientific consensus may be met with the rallying cry of "I just don't believe it." The specific claim presented in a problematic message might also indirectly affect long-term individual judgment about a health topic or recommended behavior by implying a false model of how scientific research works. For example, exposure to a claim about a homeopathic product that promotes "one old, weird trick to lose weight" or something "doctors don't want you to know about" might not convince a person to buy the product, but repeated exposure to the logic that ancient folk wisdom is more valuable than contemporary medicine nonetheless might open an affordance for an equivalence between folk wisdom and peer-reviewed evidence.

MISINFORMATION CORRECTION MAY HAVE UNINTENDED CONSEQUENCES

Corrective responses may have many immediate and long-term consequences unforeseen at the time of response. The history of efforts to counter tobacco use in the U.S. offers an example. Early tobacco control efforts attempted to counter inaccurate information and beliefs about tobacco use by declaring smoking to be socially unacceptable and harmful (while the tobacco industry also tended to place responsibility for decision making on smokers). Decades of such public communication, intended to correct earlier tobacco advertising, encouraged a stigma internalized by smokers. People tend to blame those with lung cancer more often for their own disease (when compared with what people believe about other cancers), and people are less likely to endorse funding for lung cancer research than for other cancer research—perceptions that in turn can encourage hopelessness among lung cancer patients.[13–15]

Prospects for automated correction of misinformation also invite important questions. For an algorithm to identify, flag, and correct a piece of misinformation still requires a series of human-initiated tasks. Who can best identify and choose the types of misinformation to be corrected and the appropriate response? Patient preferences and needs reflect experience, cultural values, and existing knowledge; whether an automated response can or will address all of those factors is uncertain. The iterative nature of scientific knowledge itself also poses a challenge. Even with regular algorithm updates, evidence related to a given topic may change more quickly than can be acknowledged by search tools. What is scientifically accurate today can sometimes change tomorrow in a way that nonetheless involves rigorous science. A computer trained to look for yesterday's inaccuracies may not respond to important changes in a way that best captures current diffusion of currently problematic misinformation.

SYSTEM-LEVEL CHALLENGES WARRANT SYSTEM-LEVEL, FUTURE-ORIENTED REMEDIES

The most pressing problem of misinformation is not found in the pieces of misinformation that appear in various channels but in the alterations of what information systems are (or have become) relative to ideals. Optimally serving populations will certainly involve dealing with bits and pieces of misinformation but more importantly will require that audiences are assisted in their navigation of information systems. Simply admonishing a person who promotes false information might fail to address the initial circumstances that led to that promotion, as moral judgments can vary among individuals and cultures.[16] Interventions that prepare people to navigate future encounters with flawed information might be as important as direct corrective responses to singular pieces of misinformation. Consider inoculation interventions preparing people to encounter false claims or media literacy efforts enhancing people's ability to discern credible health information.[17–19] On a different plane, efforts to encourage a collective sense of shared interests among individuals, groups, and scientific institutions as a means of increasing trust also might provide an important foundation for future communication efforts to reduce the influence of any individual unit of misinformation.[20]

CONCLUSIONS

The U.S. has a multifaceted health information system that allows misinformation to appear and to spread. That alone is not cause for panic, however. Efforts to address that challenge should acknowledge systemic conditions that foster the diffusion and adoption of misinformation rather than simply focusing on the elimination of problematic pieces of misinformation, per se. Allowing room for mistakes and changes in evidence over time is important for science, disagreement being at least 1 driver of future innovation. Rather than focusing solely on policing actions of agents external to conventional media systems, preventive medicine researchers and practitioners should consider how to address vulnerabilities and inadequacies

of the health information system, including patient (mis) trust of public health and medical institutions, and initiate new efforts to best serve populations as they make decisions about health and well-being.

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