**Human biology is a matter of life or death: Effective science communication for COVID-19 research**

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In times of upheaval, clear information dissemination is more important than ever. During the COVID-19 pandemic, the world has seen ad hoc messaging lead to public and policy reactions with largely negative consequences (Everett et al., 2020; Funk, 2017; Garrett, 2020). The late George Armelagos and colleagues repeatedly highlighted the resurgence of infectious disease mortality many consider to be the third epidemiological transition—the emergence and rapid spread of old and new infectious diseases due to globalization (Armelagos et al., 2005; Barrett et al., 1998; Harper and Armelagos, 2010; Zuckerman et al., 2014). Due to a wealth of evidence supporting this position over the past few decades, the current pandemic surprises few human biologists. Furthermore, the integrated nature of the field of human biology means that many of our colleagues are among those uniquely situated to address this and future crises. Human biology provides a perspective on human interaction in ecological contexts—a perspective the broader public needs.

Since the late twentieth century, the world has been in the Information Age, with unprecedented global access to information (Castells, 2011). Though this access has theoretically provided more power through knowledge, the sea of “raw studies” lacking context or perspective add more confusion than clarity. The curation of information for the “public,” previously a scholarly or journalistic specialization, is now the domain of everyone with internet. To overcome problems associated with information overload, conspiracy theories, and the amplification of pseudoscience, human biologists need to drown out the noise with evidence-based information and theories of change (Caulfield, 2020). It is clear from the commentaries in this issue that human biologists can provide accessible and actionable resources for addressing fear, transmission, diagnosis and testing, long-term consequences, behavioral and cultural change, and more. As AJHB editorial board members responsible for public relations, we provide practical suggestions on how to hone science communication skills to reach experts and non-experts with human biology perspectives.

**Know the Audiences and Goals**

Before writing anything for publication, it is crucial to have in mind (1) intended audience and (2) goals for that audience. Knowing one’s intended audience is key to tailoring a message. Audiences for human biologists range from experts in a specialized research area to individuals with no background save an interest in science. For instance, many of the commentaries in this issue target a public health audience and are written with the goals of influencing change in policies affecting population-level behaviors. Many scholars have experience writing for academic audiences but are less comfortable outside that niche.

Human biologists should develop a habit of writing for multiple audiences. One way is to write a synopsis in lay terms for any scholarly article one publishes so it will be accessible to policy experts or other interested consumers of popular science. This additional step enables scholars to nurture outside audiences that seek information from human biologists. This is not easy, as the general public is not a monolith but an aggregate of diverse experiences and beliefs shaping science attitudes (Gauchat, 2011).

Defining goals should similarly start with certain questions: (1) Why target a given audience? (2) What are 1-2 points audiences should come away with? (3) How should a given audience be changed by those points, whether it be increased understanding or engaging in public action. It is important to keep goals simple and practical. For example, Alexandra Brewis and Amber Wutich (this issue; 2018; 2019a; 2019b) note how counterproductive shaming has been in public health initiatives. Furthermore, additional stress stigmatization is likely to lead to low birthweight and further deleterious outcomes (Bogin and Varela-Silva, this issue; Scheffler et al., 2020). Through audience- and goal-oriented writing, human biologists can create platforms for reliable two-way channels of communication with a variety of audiences.

**Create Two-Way Channels**

Pew Research Center finds that more than 75% of US adults consider scientists to be intelligent and focused on fixing real world problems, though these positive views are mostly relegated to medical researchers (Funk, 2020). That’s the good news; the bad news is that nearly half of those same adults think scientists are poor communicators (Funk et al., 2019). These findings suggest people react better to science they can most easily relate to (i.e., medical research). However, mode of communication matters. Recent work indicates that people don’t learn from having facts talked *at* them—they need to be communicated *with* in accessible and interactive ways (Hawley and Sinatra, 2019; Ocobock and Hawley, 2020). Non-linear communication techniques, such as applied improvisational theater, have been effective in improving doctor-patient dialogues among pediatric medicine residents and for medical educators teaching communication concepts (Hobson et al., 2019; Hoffmann-Longtin et al., 2018).

Making science relatable involves using real-world examples and emotional appeal (Martinez-Conde and Macknik, 2017). Cognitive sciences research suggests that human minds are adapted for learning more easily from a story than from, say, a report (Gottschall, 2012). The emotional upheaval of the pandemic is one of the most dominant themes of this crisis, making the emotional salience of the science of COVID-19 an easy way to reach people as well as an important one. Developing a narrative of human biology research as it pertains to COVID-19 provides a compelling story and relatable examples—two key components for effective science communication.

It is also critical to address uncertainty when sharing science stories. A common concern among non-scientists is a lack of comfort with uncertainty (Funk, 2017). Uncertainty drives scientists to conduct research, but for non-scientists uncertain situations are generally negative (e.g., waiting on medical results or worrying about job security or ability to pay bills during a pandemic). Therefore, human biologists and other scientists need to be explicit and transparent about the importance of inductive research as preludes to deductive studies and the steps needed before findings can be applied for any greater good.

**Publicize the Work**

Effectively communicating science can be challenging, and there is a variety of formats that each come with advantages and disadvantages. There is no “best” strategy, but there are ways to develop and nurture platforms for communication and two-way channels. We focus on a few approaches we have found useful, but this is by no means exhaustive.

Half-life the Message

Effective science communication can be done in the time it takes to travel from one floor to another on an elevator, ~30 seconds. Start with a hook then attempt to explain the research in 2-3 minutes. Then distill the message, speaking smarter (not faster), and eliminate jargon until it gets to 30 seconds. This exercise, commonly used in improvisational theater, is referred to as half-lifing because the length of the message is halved with each iteration, as with radioactive decay (Aurbach et al., 2018). The final succinct message one can relate at a moment’s notice, whether the goal is to influence change (the elevator “pitch”) or simply informational (the elevator “speech”).

Web sites and repositories

Many academics have no central location where all of their works can be found. It is prudent to set up a professional website where all one’s publications can “live.” Alternatively, curate a Google Scholar, ResearchGate.com, Academia.edu, or LinkedIn.com page, which can steer interested parties to one’s work while also collecting analytics for professional review.

Use institutional repositories to make white papers, grey papers (reports), preprints, theses and dissertations, and other documents accessible and citable. Many of the most interesting and potentially actionable models for COVID-19 transmission, as James Holland Jones noted in developing his commentary for this issue, are so new that they have not yet been peer-reviewed. Yet, in facing a crisis of the magnitude of the COVID-19 pandemic, these may be critical works worth sharing immediately. Furthermore, citations of such papers are included in some analytics.

Blogging

Blogs can highlight aspects of one’s work not appropriate or ready for publication. Furthermore, linking to the works of others draws attention to one’s own research and can lead to direct encounters and collaboration. The reality of academic publishing is that, because of the importance of peer-reviewed publication requirements for promotion and tenure, blog writing may not be rewarded. However, collecting analytics on views and reads, much like the professional sites above, can provide useful data on the broad reach of one’s work.

Magazines and newspapers

Far more people are likely to read an article written for a popular science magazine or local newspaper than a blog or peer-reviewed journal article. Furthermore, several online science magazines cater to anthropology, human biology, and related disciplines. Wide-distribution magazines like *Sapiens*, *The Conversation*, *Scientific American*, *PLOS SciComm*, *Medium*, and *Aeon* have online portals for proposals and editors who work closely with scientist authors to crafts articles that are publicly accessible, informative, and fact-checked. Furthermore, they also provide the analytics important for convincing academic administrators, advisers, and colleagues that writing for the general public is meritorious.

Press releases

Writing an article is no guarantee any audience will read it; promoting human biology science is up to the human biologists. Many researchers prefer to craft their own press releases, whether they use media relations liaisons or not, to ensure the release accurately represents the findings. However, it is beneficial to consult institutional public relations offices for help with this. University publicists help craft press releases and contact media. If one’s institution has little to no support, reach out to colleagues who promote their work well and ask for assistance.

Podcasting

Podcasts have become an extremely popular form of media. The number of science podcasts has grown exponentially (MacKenzie, 2019). This growth is unsurprising given the low production costs and ease of access to the required technology. There are already a handful of field-specific podcasts through which human biologists can promote their research: *The Sausage of Science*, *Zombified*, and *The Arch and Anth Podcast,* to name a few. However, for those seeking guidance on starting a podcast, we recently wrote about our methods and experiences producing *The Sausage of Science* specifically for a human biology audience (Ocobock and Lynn, 2020) .

Local Events

Local events, such as Science Café, Science on Tap, and Two Scientists Walk into a Bar©, can be excellent avenues for building personal connections within one’s community. Though these events often involve “preaching to the choir” (Ocobock and Hawley, 2020), they are opportunities for science storytelling among interested non-scientists. Many cities already have regular public outreach events, and, for those that don’t, there is advice for starting one at sciencecafes.org.

Infographics, videos, and digital stories

Finally, multimedia formats can be powerful tools for making research findings accessible for diverse audiences and are also useful in the classroom. For example, infographics (see accompanying example), short videos explaining one’s research (think 3-minute thesis), and digital stories are highly engaging visual representations that appeal to the human bias for visual learning (Lankow et al., 2012). Furthermore, the software needed to complete these projects is freely available (infographics: Piktochart, Canva, and Venngage; video: YouTube; digital stories: Adobe Spark).

**Conclusion**

In a crisis time, good science communication from human biologists is more important than ever. We provide practical suggestions for honing effective science communication skills, including knowing one’s audiences and goals; opening the lines of communication through producing elevator pitches and storytelling; promoting human biological research through blogging, podcasts, and local events; and exploring translational multimedia. Given the life or death situation, the world needs the expertise of human biologists, so let’s be heard.

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