Clinical Pearl: The Clinical Utility of the World Wide Web As It Relates to the COVID-19 Pandemic: Part 2

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In last month's editorial, we discussed the World Wide Web's discovery by Tim Berners-Lee and how his goal of connecting information to investigators all over the world has been achieved during this COVID-19 pandemic as it relates to clinical and research data. (1) As a Post-Doctoral Research Fellow, Tatiana Anderson suggested some additional important clinically relevant questions for us to discuss.

"In last month's editorial, we discussed the World Wide Web's discovery by Tim Berners-Lee and how his goal of connecting information to investigators all over the world has been achieved during this COVID-19 pandemic as it relates to clinical and research data. (1)"

1) How exactly does the WWW help clinicians, researchers, and data scientists in their day-to-day jobs?

I have co-edited four clinical textbooks with colleagues that have been published since 2016. What was interesting was some feedback I received from our pediatric residency program director at Comer Children's Hospital at the University of Chicago, Dr. Lisa McQueen, who was coeditor in our most recent book about pediatric simulation. (2) When I proposed the idea to her, her concern was that no one reads and refers to textbooks anymore! As Tatiana also noted, textbooks get outdated quickly. The information on the internet can be continuously updated to reflect the latest research. This is certainly the case when it comes to information coming from investigators from all over the world regarding COVID-19 infection/disease. However, the readers, whether they be clinicians, investigators, administrators, or parents, need to know where to look and what information they can trust. Here are a couple of updated examples as it relates to COVID-19 in pregnant women and their newborn infants. Zambrano and colleagues from the Centers for Disease Control and Prevention (CDC) published an update about the characteristics of symptomatic women of reproductive age with lab-confirmed SARS-CoV-2 infection by pregnancy status in the United States (U.S.), January 22-October 3, 2020 in the Morbidity and Mortality Weekly Report (MMWR). (3) These data were from 409,825 women, ages 15-44 yrs., with symptomatic SARS-CoV-2 acute infection, and 23,434 (5.7%) were pregnant. After adjusting for age, race/ethnicity, and underlying medical conditions, pregnant women were significantly more likely than non-pregnant women to be admitted to the intensive care unit (10.5 vs. 3.9 per 1000 cases; adjusted risk ratio=3.0). (3) Although the absolute risks are low, pregnant women are still at increased risk for more severe illness. (3) Pregnant women with symptoms of COVID-19 infection should be counseled to seek prompt medical care safely. What is relevant for this discussion of the WWW's utility is that these data come from reliable sources and are clinically up to date and readily available via the internet. The absolute numbers of cases in this report are truly impressive, and the authors note that these cases are reported electronically to the CDC using a standardized case report form or NNDSS as part of COVID-19 surveillance efforts. (3) This information relates to the second point made by Tatiana Anderson, which is the utility and reliability of centralized data repositories at local, national, and global levels that can be analyzed using open-source data tools like R or Python. The third point made relates to connecting patients to clinical trials, and in this case, the new COVID-19 vaccine trials are up and running, although, at this point, they do not include pregnant women and newborn or young infants. The researchers' concerns relate to the safety of these new vaccines for pregnant women, their fetuses, and the potential effects on their newborns after birth. (4) However, quick dissemination of these trials and other research results are evident on an almost daily basis. (5)

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Indeed it is these data tools that will help make the web smarter and more context-sensitive. Although may of the search engines of today are very good at guiding searches and predicting the intent of the user, and disseminating information, they will pale in comparison to the data-intense tools of tomorrow, where algorithms will understand the ramifications of multiple users in multiple locations searching for causes of unusual symptoms that may be linked to the next pandemic. These predictive analytics leveraging the best of breed data tools will take us to the next quantum improvement.

2) How does having a deeper understanding of the structure of the WWW help a clinician access information?

In the previous paragraph, we discussed the paper by Zambrano and colleagues from the Centers for Disease Control (CDC) recently published in the *MMWR*. The CDC is a reliable resource for up-to-date research and evidence-based guidelines to follow during this pandemic. Unfortunately, there has been much controversy over the politicization of the recommendations published by the CDC, leading to a decrease in the public's trust in the organization's ability to provide reliable information controversy over the politicization of the recommendations published by the CDC.

Another crucial source of credible and reliable data come from articles published in peer-reviewed journals from all over the world. An example is a paper by Yang and colleagues from BMC Medicine entitled 'Pregnant women with COVID-19 and risk of adverse birth outcomes and maternal-fetal vertical transmission a population-based cohort study in Wuhan, China.' (7) This was a population-based cohort study of 11,078 pregnant women, 65 of whom had confirmed COVID-19 infections, and no maternal or neonatal deaths. (7) However, they were at increased risk of having preterm birth and cesarean section compared to those pregnant women without COVID-19 infection. (7) In addition, there was little evidence to support the vertical transmission of COVID-19 infection in this study. (7)u This paper was published in a peer-review journal by investigators from the Chinese Department of Public Health and Tongji Medical College, Wuhan, China. (7)

Having a deeper understanding of how data are collected, analyzed and the rigors of the peer-review process for credible journals can help guide clinicians and researchers to find reliable data at the source. One can think of the source of this data as the center of a 'web.' As the results/conclusions of the study are re-reported through various means (for example, through print media, social media, blogs, etc.), they get further and further away from the source and become more and more subject to bias, opinions, and political spin.

The dynamic nature of the web must be leveraged to prevent the insertion of extraneous information. "Web-centric" information can and should always be appropriately sourced and linked to direct reporting. While there is always room for "OP-ED," it must be clearly identified as such.

3) Why is it sometimes a problem that patients consult the internet and "self-diagnose"?

As a pediatric critical care pediatrician for about 30+ years in a highly-educated area, families would often come to us when their infants and children were admitted to the hospital after "Googling" information on the internet and talking with their relatives. Now that patient-centered care and family-centered rounds have become best practice in most areas, clinicians need to take our families' ideas into serious consideration. As Tatiana notes, searching the internet for any clinical issue does not guarantee that the information you get is truly evidence-based, best practice, and state-of-the-art. The average patient may not know the difference between a credible and non-credible source, may not have access to the source of the information because the original article is behind a paywall, or may not have the medical background knowledge necessary to interpret findings. The matter is further complicated by rampant misinformation (whether intentional or unintentional) amplified over social media platforms such as YouTube and Twitter (8). Misinformation about health issues, such as the safety and effectiveness of vaccines, can delay or prevent care and, in some cases, cost lives. (9)

"Although these web-like manifestations are the substance that makes the World Wide Web so enduring to us, we must remember its potential as "an internet." The very fact that it provides connection, content, and context is the basis for our ability to amalgamate data from myriad sources to provide the raw material for big data and predictive analytic solutions that would have been improbable just twenty years ago."

The term 'infodemic' was coined to describe the current climate, defined as "an overabundance of information- some accurate and some not- that makes it hard for people to find trustworthy sources and reliable guidance when they need it." (10,11) Some studies have even found that 'fake news' and inaccurate information may disseminate more quickly and wider than evidence-based news. (12) In focusing on information related to pregnancy and the care of newborns, websites can range from best-practice (13-15), to mother's internet clubs, to grandparent's advice websites. It is little wonder that patients and family members often come into the clinic with pre-conceived notions related to their health- accurate or not.

Moreover, the arbitration of news sources has taken on a new and enhanced priority, with many social media sites, now labeling or identifying potential misinformation or conflict with known facts. Although some may protest that this is a form of censorship, contexting information and providing a basis for reporting, highlighting these posts by those in a position of authority, defines the essence of evidence-based research. Since the web can promulgate misinformation, there must be a method for checks and balances.

Especially during this COVID-19 pandemic, clinicians must help manage rumors and dispel misinformation and conspiracy theories to mitigate fear and stigma. Clinicians should stay up to date on current recommendations for diagnosis and management of COVID-19 and be able to refer patients and families to reliable resources such as the CDC, National Institutes of Health (NIH), American College of Obstetrics and Gynecology (ACOG), and American Academy of Pediatrics (AAP) websites.

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