Clinical Chemistry

Communication of Scientific Information: Is It Time to Reassess?

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Guests:
John Sack, a founder of HighWire Press, and an expert on technology innovation, and Dr. Nader Rifai, Editor-in-Chief of *Clinical Chemistry,* and a Professor of Pathology at Harvard Medical School.

Bob Barrett: This is the podcast from *Clinical Chemistry*. I'm Bob Barrett.

The format of communicating scientific, technical, and medical information through professional journals has changed relatively little over the past 300 years. Although advances and information technology have dramatically altered search and discovery of scientific information, moving from a static to a living document, or exploiting social media tools to disseminate scientific information, has been slow coming. The April 2013 issue of *Clinical Chemistry* included a Question & Answer feature addressing new concept journals and communication of scientific information in today's digital age.

Joining us in today's podcast are John Sack, one of the founders of HighWire Press, and an expert on technology innovation, and Dr. Nader Rifai, Editor-in-Chief of *Clinical Chemistry,* and a Professor of Pathology at Harvard Medical School.

And Dr. Rifai, we'll start with you, what drove you to question the way we communicate scientific information?

Dr. Nader Rifai: Well, if you look back at the oldest continuously published journal in the world, and that is the *Philosophical Transactions of The Royal Society,* which started appearing in early 1665, and moved, let's say, to *New England Journal*, or PNAS in late 1800s, you will see that the format is quite similar to papers published today. You will have the introduction, the methods, the results, and the discussion section. You will have both the original reports and the letters to the editors. References started to appear in early 1900s and then abstracts were born around 1970.

In 1990s what we basically did, we took what we published on paper and stuck it on a screen. Of course, having the paper available electronically enabled us to enjoy many features like reference-linking and the ability to embed

other media such as podcast and videos. But the actual document, the actual paper, has remained static. It does not enable the readers to tailor the presentation of information to their liking or need, and more importantly it is not interactive. So, if you contrast that to the revolution in publishing and the presentation of information in the lay press, you cannot help to wonder whether we have taken full advantage of the technological advances that are available to us.

Bob Barrett: I'll turn to John Sack now. Mr. Sack, why do scientific journals not take advantage of technology to the same extent as the lay press?

John Sack: I'd say there are really two reasons: PDFs and promotion. In PDF, we found that people rely on the PDF for reading and for storing in their own local systems. So, because everybody is relying on the PDFs, it sort of goes to the lowest common denominator. The PDF limits what you can do to what you can fit inside that container.

There are all sorts of wonderful things happening on the internet with news sites and media sites, but they don't fit in the PDF, so that right up there, right up front, it's a barrier to publishing. Just as Nader said, we've taken a screen capture essentially and that's the PDF. The second reason is promotion. Your grant review committee or your tenure committee or your hiring committee, they have to recognize what you've published as a publication, just like the ones they've done, and I think that all together that makes things very conservative.

We're now starting to see change. So for instance, increasingly, video is part of articles that are published and we can put the videos inside the PDFs now. We're also increasingly seeing links outside from articles to raw data sets, that is, the actual data that the research write-up is based on. We're seeing people associating blogs and podcasts and tweets now with articles, and increasingly what we're going to be seeing is that those external things are going to be tied to the papers themselves. It'll take a year or two or three but I think it's going to be happening.

Bob Barrett: Well, what do you think is the biggest challenge to scientific publishing today, Dr. Rifai?

Dr. Nader Rifai: I think one of the biggest challenges is the proliferation of minimally important and useful articles. This unfortunate fact is really driven, by and large, by misguided academic criteria for promotion which frankly favors quantity over quality. If you look at ISI for example, the number of medical and scientific journals increased by 50% between

year 2000 and 2012. And now we have almost 8,300 journals in circulation.

This, of course, has been accompanied by a marked increase in the total number of manuscripts. So in 2012 for example, in PubMed alone, the number of scientific articles published worldwide surpassed 1.1 million, averaging 126 articles per hour. And if you look across all disciplines and all languages, the total number of publications is estimated to be twice as high. Clearly the open access journals and electronic format publishing have contributed greatly to this exponential growth. So if you take *PLOS ONE* as an example, which is the world's largest journal, it publishes over 2,000 articles a month. What is interesting though, is that according to Eugene Garfield who is the founder of ISI, a great deal of the world's medical literature is never recognized.

For example, of the 38 million articles published between 1900 and 2005, about half have never been cited a single time. Indeed 70% of the journals that are indexed by ISI have impact factor less than two, and 40% have impact factor less than one. So the unfortunate thing is the researcher, at the present time of abundance of information, does not have an effective and an efficient way to find the relevant articles. You do a simple search using a couple of keywords, and you will get tens or hundreds of articles, most of which are not useful to you. One day, and that's hopefully soon, we will have personal robots that will know what we read, they will know what we write, so they can identify for us exactly what we need.

Bob Barrett: John, do you think that we're just going to stop publishing journals in print? And if so, when is that going to happen?

John Sack: Well, let's differentiate printed issues of journals from printable articles in journals. I think that's a helpful distinction here, and the answer is different based on that distinction. First of all, the printable articles, PDFs essentially, they are not going away anytime soon. We've done enough interviews with enough researchers to know that they are wedded to the PDFs. Half of the people we interviewed read the PDFs online, but half still print them out and write on them and then either file the paper away or they just discard it, but people really like that printable version. But printed issues, where you have the whole collection of articles all bundled together and put in a nice cover, those largely have gone away, except for major medical journals where there's a lot of advertising that's bound together with the print issue, and this is really part of the revenue that a publisher is expecting.

I think there's new option which is going to change this, and has already started changing it with medical journals, but I think increasingly the basic science journals, and that's the laser printer was introduced back in, I think it was mid-80s, I think 1986. And nothing really has changed how we print out things much since then, until the tablet came along with the iPad. Now, with the iPad and with other tablets, you can really combine a print-like reading experience where you have high quality pages in front of you and you can turn them pretty quickly, the ability to scan, you can combine that kind of reading experience with the online advantages, like searching and linking. So I think we're going to see more of a shift away from print as more and more people start feeling comfortable with having issues delivered on their tablets rather than in their mail boxes.

Bob Barrett: Dr. Rifai, let's talk about peer review. You have any thoughts on that?

Dr. Nader Rifai: Well, peer review process is clearly imperfect, but in my opinion it's still the best system we have. It reminds me of Winston Churchill's characterization of democracy, in fact. In the past 10 years, and with the birth of open access business model in publishing, there has been a trend toward moving to a less restrictive review process. There are a lot of experiments at present that examine a variety of review processes including the traditional peer review, open review, closed review, post publication crowd sourcing review, et cetera.

The results of these experiments will determine whether there was a compelling reason to move away from the traditional peer review system. At the present time though, we do not have a compelling reason to abandon a system that worked well for us for many, many decades.

Bob Barrett: Finally, Mr. Sack, can you comment on open access compared to subscription access?

John Sack: Yeah. I think it's really "open access vs. subscription access" comes down to a choice of who pays. With open access, typically the author is paying a fee; with subscription access it's the reader who's paying a fee. We're very familiar and comfortable in our day-to-day lives as consumers with both those models coexisting. If you think of it with many of the websites that you use, somebody else is paying. You, as the reader, are not paying. Now, we're are starting to see a few websites where you as the reader do pay, the *New York Times*, the *Wall Street Journal*, they have these models where you're starting to pay.

So I think we are getting to use to this, both coexisting. And I think that the same thing is going to be happening in the world of scientific literature: not one answer for all journals or for all authors. It's why many journals that I worked with now have introduced an open access option, even within a subscription access based journal, so that if an author really wants an article to be open access, they can pay a fee and it becomes an open access article. In journals where there are lots of readers, so journals like *Science* magazine, it's just cheaper to spread the cost publishing an article over a huge readership. But in journals they're very niche-focused where there might only be a thousand subscribers worldwide for any one article, even fewer people likely to read it, then it's cheaper for the authors to pay a fee to publish the article.

But then we get into "what about fields or types of articles where the work isn't funded?" So you might have a case report, interesting as it is, it's not funded research, or you think more broadly an article in the humanities, really nobody is paying for that research. So ultimately I think the choice is going to be up to authors, and what they care about, and whether they have the funding available. From what we know, what authors care about is putting research in front of the largest number of their peers if they can, and if that's an open access model then that's what they'll choose, if it's a subscription journal that will reach the most potential readers, then that's what they'll choose.

Bob Barrett: That was John Sack, one of the founders of HighWire Press. He and Dr. Nader Rifai, the Editor-In-Chief of *Clinical Chemistry*, were our guests in today's podcast examining communication of scientific information in today's digital age. I'm Bob Barrett, thanks for listening.