VIEW FROM THE TOP
Health Informaticians Drive Innovation from Bench to Bedside

Please tell us about the professionals supported by AMIA: health informatics experts.

The professionals in health informatics focus on the collection and analysis of medical data. Following that analysis, they apply what they’ve learned back into the health environment, in order to improve the overall quality of patient health and healthcare. The field of health informatics is unique in that we’re involved with the virtual cycle of collecting data in a useful way that allows us to gain additional insights, and those insights are applied back into the practice of care.

How has the health informatics field evolved?

Health informatics has existed for close to 30 years as a concentrated area of study. Many people engaged in the field of health informatics began as computer scientists with an interest in collecting, analyzing, and using health information. In the early years, many clinicians, nurses, and physicians saw health informatics as a tool to improve the delivery of healthcare. For years, many of these folks saw health informatics as an area in which they could apply their expertise and delve into the fundamental aspects of healthcare problems. In doing so, a new discipline was formed to try and solve how we represent knowledge, how we extract it, as well as how we apply that knowledge back into the field.

With the adoption of electronic health records (EHRs) and other advancements, health informatics evolved from a field of study into a profession. People began to see health informatics as a practice to apply what they’ve learned in ways that are much more practical and closer to the bedside.

Does health informatics deal strictly with using information to improve clinical outcomes, or does it also apply to areas such as administrative decision making or capital planning for medical equipment?

It tends to be clinical, biologic, and population focused more so than, say, administrative. However, administrative data can sometimes help if you’re trying to determine cause and effect in terms of clinical interventions, for instance.

We can understand the breadth and range of the health informatics field by thinking about the level or scale at which the environment is engaged. We have bioinformaticians who think about DNA. We have folks who are interested in biomarkers and small molecules, who take a precision medicine perspective. They might be engaged with millions of different kinds of molecules. Others might be engaged with diseases while trying to understand from a precision medicine perspective how the unique characteristics of a patient affect his or her disease. And so, they are talking about perhaps thousands of diseases.

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Others in health informatics might be engaged with consumers on an individual level. There are those who think about EHRs and the practice of medicine, and they might be focused on practices of about 2,000 people. Then there are those who are interested in population health and data analytics; they analyze databases involving millions of people. Other health informaticians are involved in clinical research and are working to investigate the fundamentals of healthcare. Their focus might involve every patient or person on the planet, and so they think at the scale of a billion. In that way, you can think of informatics expanding across the entire continuum: from DNA to the entire world's population. Professionals in bioinformatics tend to be focused on DNA and small molecules, while those in health informatics tend to work from diseases, and all the way up through clinical research.

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Healthcare facilities are collecting more data than ever before through medical devices and networked systems. One major challenge is making sense of the data, which is what you’re talking about. With all this information being collected, how much is just noise as opposed to providing meaningful insights?

I always think that we have more data than we can typically manage. When you look back 100 years ago to when the Mayo brothers were thinking about managing patients in Rochester, MN: They are the ones who really invented a new way of managing health information. Prior to that, physicians would enter patient information into a ledger and would sequentially manage each patient in that ledger, but that information was never shared and you were unable to look across diseases. The Mayo brothers were interested in the effectiveness of particular surgical procedures. They developed elaborate systems for collecting and collating information, which was the beginning of the modern medical record.

So, we’ve been determining how to manage information from the very beginning. As we develop more sophisticated ways to do population analytics or applied clinical decision support, our ability to collect information always seems a little bit better than our ability to manage and analyze the data that are available.

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It’s just the nature of the field. As it becomes easier to collect information, our ability to summarize and analyze is always going to lag behind somewhat. This is where health informatics experts can help by making sense of the data.

You are a medical doctor. How and why did you make the transition from practicing medicine to health informatics?

I was always interested in the intersection between IT and healthcare, even when I was in medical school. I spent some time at the...
National Library of Medicine and the Lister Hill Center learning about IT and PubMed—learning about how they were using computer technology to manage the growing amount of medical information and applying it for educational purposes. I completed my residency at Stanford, which had a medical informatics training program, when Silicon Valley was emerging, along with the development of the computer chip and networks. Following that residency, I went back and got my PhD in Biomedical Informatics from Stanford. It wasn’t until I joined the Office of the National Coordinator for Health Information Technology that I gave up my medical practice. Throughout my education, there was always a thread of trying to leverage IT and apply it to healthcare problems.

Turning back to EHRs: How do you think healthcare facilities are doing overall in terms making smart use of EHRs? What grade would you give them?

In terms of the adoption of EHRs—moving from paper records to EHRs—I would give a grade of A– to an A. We’re going to be well over 90% in major medical centers, and I believe smaller practices are in the range of 70% to 80% in terms of EHR adoption. So I think we’ve done a good job of moving from paper to electronic means of managing information, but that brings with it a lot of challenges. It requires physicians to think differently about how they collect and use information.

There are challenges with interoperability because many of the EHRs weren’t necessarily envisioned to be in this networked environment. Many of the EHR systems were developed a long time ago, so we have older technology in play in the healthcare environment. Meanwhile, we have sophisticated interfaces at work on our smart phones, for example.

A lot of work needs to be done in terms of the way we’re using the information encompassed in EHRs. We need to improve our ability to use the EHR as a tool for improving the care of patients, rather than it being a seen as a barrier to the physician-patient interaction. I would give that aspect a grade of C– to a C.

These are good problems to have, because they reflect an advancement. We’re still talking about paper records, so of course we’re still going to have problems with interoperability. It’s just a matter of working out the kinks as we move forward.

In terms of interoperability, we are seeing some of the same issues today that we were talking about 15 years ago, whether it’s proprietary considerations, lack of incentives, or lack of standardization. Do you see progress on interoperability, and why has it been such a tough nut to crack?

Many people believe that interoperability could be solved “if everybody just adopted the system that I created,” but I’m not sure that’s the right solution. The fundamental issue around interoperability is that it’s not some state that will emerge where everything will be perfect thereafter. Interoperability really is defined in two ways: 1) the ability to exchange information and 2) the ability to use the information that has been exchanged. So interoperability is not a state of being; it’s a capability or functionality that you didn’t have before. You can’t define interoperability separate from the thing that you want to do.

Again, just like data, it’s always going to be a little bit ahead of our ability to execute the analysis. This notion of interoperability is going to be one of those things that we’re always going to find new things that we want to do with the data that will require us to be more interoperable.

Interoperability is about exchange and use of the data. If we look back five or 10 years, we’ve made good strides toward interoperability. We have to be very precise about what it is that we want to accomplish, then put our efforts toward achieving that new functionality and that new notion of interoperability. Meanwhile, we have to realize that it isn’t going to solve all of our problems. It will be an incremental approach to arriving at interoperable solutions.

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Earlier you mentioned the involvement of health informatics professionals with precision medicine. First, how would you define precision medicine? Also, how do you see health informatics professionals driving it forward?

Many define precision medicine as using genetic information and applying the specifics of a person's genetic makeup to make decisions about prescribing drugs or a particular therapy. Although that certainly is a part of precision medicine, I think it's much broader than that.

Precision medicine is about having all of the information that you need to precisely target an intervention to an individual. The reason I like that definition is that it's targeting an intervention—not necessarily a treatment or a drug—because it could be that you want to perform this intervention before the patient becomes "the patient," when they are still at that point healthy or perhaps have a particular risk profile.

Finally, it's about having all of the information, because it may not be a person's genetic makeup that has the biggest impact on the ability of that person to get well or to have their diabetes under control, for example. It could be because they live in a neighborhood where it's not safe to exercise, so they tend to be housebound. Or it could be that they are living in a "food desert" where grocery stores that have fresh fruits and vegetables are not accessible.

Those are the considerations that have a broader impact. Therefore, precision medicine is not just about genetic information; it's about all the data that would be relevant for a particular person's health or health condition, in order to target the kinds of things that would make sense for improving their care.

To that end, health informatics professionals are thinking about how to collect, analyze, and use this information. It's not just about health information any longer; it's about other sources of data, whether they come from devices like Fitbits or other sources that can be used to understand best practices in treating patients and defining the right interventions to support them.

How does the world of health informatics affect the work of healthcare technology management professionals, such as clinical engineers and biomedical equipment technicians?

Current-day devices such as pacemakers, glucometers, and insulin pumps have sophisticated algorithms around how they interact with patients, the environment, and other things. Increasingly, rather than working in isolation, these devices are going to start to get networked together, and we're going to start to see how the Internet of Things can continue to help us understand about how to care for patients more effectively.

For example, at a conference I attended recently, some folks were developing technology that would link administration of asthma medication to patients' smartphones. They were developing an application that would record the number of puffs taken by patients, with the inhaled medication data linked to smartphones. We discussed a potential scenario where the technology involved could allow us to notice that many people are starting to take their asthma medications more frequently in a particular region of the city, based on medication administration and GPS data. If such a pattern was observed, you could send alerts to the smartphones of the asthma patients in that area and warn them that the air quality appears to be poor in a very localized pocket of the city, as well as provide precautions such as staying indoors.

When scenarios such as that start to become a reality, how you represent the knowledge and how you standardize it is going to become increasingly important, because that's going to allow insights across devices. If these new technologies do not speak the same language, it's going to be very challenging to derive broader insights into patient populations and public health.

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At a conference I attended about five years ago, a physician said that he felt as if he sometimes no longer treats patients but instead he treats machines, because of the proliferation of technology. As healthcare moves more in the direction of data analytics and informatics, do you have a concern that we’re studying numbers, trends, and macro-concepts, while the individual patient gets lost?

I think there are two ways in which this might play out. Certainly, many of the challenges that people have when interacting with EHRs are caused by usability problems with the technology, and a lot of that is driven by regulatory requirements surrounding how healthcare is delivered and paid for. Capturing the right information so that you can generate bills for patients is still one of the primary interactions, and it takes away from physicians interacting with patients. Therefore, the possibility exists that things are only going to get worse as we try to collect information for quality assessment and things like that.

However, I believe a bright future is ahead—one that isn’t predicated on physicians grappling with this overwhelming amount of information. The reason for my optimism is that if you go back 100 years, healthcare was trying to deal with a new kind of technology that was coming into the healthcare delivery system, and they were trying to figure out how to utilize this new technology to increase return on investment, as well as improve the safety and efficacy of care.

Between 1906 and 1912, the Journal of the American Medical Association had a series of articles on the physician’s automobile, and how physicians should use the automobile to improve the practice of care delivery. But by 1912, they stopped writing articles about the physician’s automobile because in 1908, Henry Ford developed the Model T. As a result, it stopped being about the physician’s automobile and just started to be about the automobile.

Therefore, my more optimistic view is that IT is eventually going to reach the point where it can be used to empower patients to be first-order participants in their care. Just like my cellphone allows me to be much more productive when it comes to email, keeping in touch with my family, and making hotel and airline reservations, I can foresee a future where IT is used to empower patients to have more interactions with physicians.”