



Making Sense of Data for Healthcare Providers

A Conversation with Drs. Sybil Klaus and Sarah T. Corley

Q. What barriers do you and other clinicians face in getting the right data at the right time to give the best care possible to your patients?

Corley: The problem that physicians are seeing now is they're receiving more and more pieces of information, but not in a format where they can make sense of it.

Q: Describe your personal experience with the burden of capturing an electronic health record while giving care.

Corley: Electronic health records were originally created long ago to help physicians document data in a legible format that they could access later. Over time, we saw them evolve to different purposes. With the advent of evaluation and management (E&M) coding, they became a tool to help doctors calculate the correct codes (which dictate payment). Then came "Meaningful Use." Physicians were starting to collect more information to document quality measures and their performance. With those requirements came an increased burden to document information that they might not necessarily have documented before as part of their patient care. We've seen a lot of complaints about the usability of electronic health records and physicians working longer days because of the documentation burden.

Klaus: Many physicians have complained that we are focusing more on the computer and data entry and have less time for clinician-patient interaction. I miss the days when we had more time to spend with our patients instead of entering all that information into the computer. I'm really looking forward to advances in capturing information, so I can look at the patient more, speak with them more, and engage with them more.

Q: Describe what you think needs to change going forward.

Corley: To reduce this burden and give physicians better information, I think many things are going to have to happen. We're going to have to balance the regulatory requirements and documentation needs to prove physicians are providing quality care, so that we pay them appropriately, without affecting their efficiency and ability to see patients. We don't want to cut back on their efficiency. We need a mechanism where we can process the different information coming in and turn it into knowledge, rather than pieces of data. It needs to be knowledge.



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Q: How is MITRE addressing this challenge?

Klaus: MITRE has experience with health data. We've been researching different components of health data for more than 15 years. For example, we're collaborating with academic partners at Johns Hopkins on research using predictive analytics to identify patients at risk for sepsis. Sepsis is a condition where an overwhelming bacterial infection causes your organs to stop working. It can cause a lot of morbidity and mortality. It's very important in treating patients with sepsis to diagnose it quickly. The sooner you intervene, the more likely the patient will survive. We are using machine learning to identify risk factors that are not clear using ordinary diagnostic methods. We're able to create a risk score and present that risk score that tells the clinician they should stop what they're doing and go see that patient right away.

Corley: The problem I expressed earlier about receiving too much data would be perfectly handled by taking all these information sources and distilling the data so it flags when the patient is at risk of sepsis or something else. One of the approaches people have proposed to reduce the documentation burden is to allow physicians to continue to document in prose, which is easier for them to do and easier for another physician to read and understand. Meanwhile, behind the scenes, the technology can capture all the data and use it for other purposes.

Q: What areas of new research are underway?

Klaus: We have several new research projects addressing ways to capture health data information more efficiently and effectively. Natural language processing is one example. When we need to pull information from an electronic health record that is in the free text form, we're able to do that automatically. It frees up time of the practitioner, and allows us to continue to use the prose that so often captures the story of the patient much more effectively.

We also are working in critical analytics and artificial intelligence. The computer and machine learning capture information and insights that we may not have observed in the encounter with a patient. The computer software can use this data to make predictions, such as who might be at risk of contracting sepsis or a mild traumatic brain injury. The same approach applies in identifying patients who are at risk for substance or opioid abuse.

Corley: Absolutely. Our research project looking at the risk of substance abuse, and specifically opioids, is capturing information from the prescription drug monitoring program database, which normally is presented in a very cumbersome way, like an Excel spreadsheet. We can use machine learning to identify the important variables and then present them in very easy-to-read, quick-to-use formats that allow a physician who is writing a prescription to make an intervention much earlier than is possible now.



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Q: What other organizations have we collaborated with to pioneer new approaches to the problem?

Klaus: In our research program, we collaborate with many different academic institutions and health systems. We're working with Billings Clinic in Montana to help patients when they need to be transferred to a higher level of care, to help coordinate the rural health system and transport, specifically. In rural settings, it's very hard to transport patients because they have limited resources and long distances to travel.

We're also working with academic partners. For patient safety and quality measures we're working with Boston Children's Hospital and Cincinnati Children's Hospital.

Q: What do you feel are the most important issues to address going forward?

Corley: The three critical gaps that I see where we need more research and tools are examining the data to understand the unintended consequences that can occur when a regulation is promulgated. The second is the way to pull together all the data that is available on a patient and their environment, their socioeconomic status, their genetics, info from their Fitbits and other devices—take all that information and present it in a usable format for the physicians and other clinicians caring for them. The third area where I think we need more research is in improving the way physicians can document what information they need without the burden of entering it themselves in the computer.

Klaus: I couldn't agree more. We are working on these three challenges right now. We're designing a policy simulator, which is taking information and using a simulation method to predict the impact that a policy might have on health outcomes. We are researching methods to present information to policy makers, health systems, physicians and clinicians, so that they can use it to make faster, smarter point-of-care decisions.

Finally, we are researching ways to use natural language processing and machine learning to capture the health information and reduce the input burden on clinicians when they're entering information into the electronic health record. In the long term, we hope to use other forms of media. For example, we could capture information from video or other data streams that will likely be used as patients move from the clinical setting to their homes. Our population is aging, and more people are choosing to age in place. We predict there will be a need to capture information using different methods and use that to help clinicians make decisions about their patients.

Q: Electronic health records involve so many stakeholders. What's being done to bring them together?

Klaus: MITRE has a history of convening disparate stakeholders to come together to develop a cohesive solution. As a not-for-profit organization and a trusted partner, these stakeholders know



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they can work with us without risking their intellectual property, and we can solve problems for the greater good.

Q: What is your hope for the future?

Corley: My hope is that MITRE will be working with its partners to facilitate learning from the expanding genetic and genomic information that we’re now gathering from patients to learn more about predictors of risk for disease, ways to modify disease, and how to maximize health. Because these factors are likely going to contribute a great deal to their health in the future.

Klaus: My hope for the future is that MITRE, together with our partners, can use data and find meaning in it. We’re looking for partners who can come together and bring this information and fuse it so that we can identify new insights from genetic information, individuals’ wearables information, and data from electronic health records. All this data can provide a more holistic view about a person, so that we can have new insights and finally start realizing the benefit of digitizing our health.



Sybil Klaus

MITRE Innovation Program – Health Innovation Lead
Provider Data Optimization

Dr. Sybil Klaus leads MITRE’s internal research program in healthcare. She has broad experience as a researcher, physician, public health expert, and teacher. Before joining MITRE, Dr. Klaus worked at the Johns Hopkins University School of Medicine as a Unit Medical Director and Physician Champion. She served as a pediatric physician for more than 14 years and has taught at several medical schools, including the Johns Hopkins School of Medicine. Dr. Klaus has also published numerous papers and a book chapter on nutrition and growth. She earned a B.A. in political science and a B.S. in cell and molecular biology from Tulane University, an M.D. from Emory University School of Medicine, and an M.P.H. from Johns Hopkins Bloomberg School of Public Health.



Sarah Corley

Chief Medical Officer – Veterans Health
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Sarah Corley, M.D., is an expert physician executive in health information technology (HIT). She is the Chief Medical Officer for MITRE’s work in the Department of Veterans Affairs. Dr. Corley practices part-time as a primary care internist in the metropolitan Washington, D.C. area, and has used electronic health records (EHRs) for the past 24 years. Her expertise is in the areas of HIT, regulatory oversight of HIT, using HIT to improve quality and patient safety, and optimizing clinical use of HIT.

