UNIVERSITY of MARYLAND BALTIMORE

UMB News

Translating Data into Action

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Data scientist. Sexy?

An article in *Harvard Business Review* described the position as "the sexiest job in the 21st century."

Top row, from left: Emily Boulware, Alex Likowski, Cindy Schaeffer. Middle row, from left: Danica Marinac-Dabic, Anindita Saha, Murray Aitken. Bottom: Fadia Shaya.

Sexy or not, there was plenty to discuss as more than 1,000 registrants logged in to "Data Science to Power Implementation with Social Determinants of Health." The virtual conference attracted attendees from 13 countries, drawing from a wide spectrum of fields, including academia (research, clinical, teaching, and administration), patients and patient advocacy organizations, government, health systems, industry, and nonprofits.

"This program is intended to bring data to action and to inform mostly those who use data in their day-to-day to help them make decisions about treatment, prevention, and policy. And this includes all of us," said **Fadia T. Shaya, PhD, MPH**, professor, Department of Pharmaceutical Health Services Research at the University of Maryland School of Pharmacy (UMSOP), executive director of the Behavioral Health, Data to Action Program, and director of implementation and dissemination in informatics at the University of Maryland, Baltimore's (UMB) Institute for Clinical and Translational Research (ICTR) as she welcomed attendees.

Shaya and **Stephen N. Davis, MBBS, FRCP, FACE, MACP**, vice president of clinical translational science at UMB, co-chaired the virtual event. Davis also is the Theodore E. Woodward Professor of Medicine, professor of physiology, Department of Medicine chair at the University of Maryland School of Medicine (UMSOM), and director of ICTR.

"This conference is intended to help advance clinical and translational science efforts by providing a forum to facilitate scientific collaborations, to scale studies, and to disseminate common research resources throughout various networks," Shaya continued.

Attendees registered to learn ways of building multidisciplinary networks around data, implementation science, and digital health; to drive science and translation; and to advance improvements in the development, implementation, and dissemination of medical evidence, with an examination of social determinants of health. Data science is a blend of various tools, algorithms, and machine-learning principles with the goal to discover hidden patterns from the raw data.

Data and Individual Patient Care

How does data science translate into patient care? It all boils down to how it impacts the individual, UMB President **Bruce E. Jarrell, MD, FACS**, said in his keynote address.

Jarrell explained that UMB students created a health alliance to serve the West Baltimore community, using the University's Community Engagement Center as a focal point to provide services to underserved residents. Because COVID-19 pandemic restrictions prevented students from visiting residents in their homes, they virtually adopted the 140 elderly residents living in a nearby apartment complex.

"As you might guess, they had their share of significant medical illnesses," Jarrell said of the elderly residents. "All of the residents had great challenges interacting with the world. And they have really lost their coping skills. And I think many of them just wondered, particularly during this COVID period, what life was about."

The students knew they could help these residents better manage their social determinants of health, the conditions in the places where people live, learn, work, and play that affect a wide range of health and quality-of-life risks and outcomes.

"Public health, conclusions, and policies and measures are really important. But there's another really important part, and that is getting down to an individual patient," Jarrell said.

Jarrell relayed the story of an elderly resident, Mr. P., who had recently been discharged from a local hospital and had a complex illness affecting his heart and lungs. He had returned to living in his apartment but was mismanaging his medications, not following a proper diet, and did not know who his primary care physician was.

"The student described him as having given up, that he figured, 'Well, I guess I'm just going to live miserably for the rest of my life, and then I'll die,' " Jarrell said.

The student helped Mr. P. get access to health care, learn the purpose and proper dosing of his medications, and get facts about his diseases. "It was really a broad level of support for this individual, to get him back on a proper track," Jarrell said, adding that Mr. P. now has energy and feels better.

"Mr. P. is a powerful example of what I would say is expensive health care being undone by social determinants of health," Jarrell said. "Now, I know this conference is focused on collecting, it's focused on doing research. It's certainly using data that's representative of social determinants of health. Wherever those data reside … you can use this data to apply knowledge that will help make health care better and cheaper, and when I look at that, as a physician, that's a really good thing."

Data and Strategic Planning

"I've always been very interested in data — the way data is harnessed to inform decision-making," **Roger J. Ward, EdD, JD, MSL, MPA**, interim provost, executive vice president, and dean of the University of Maryland Graduate School, said in his afternoon keynote address. He noted that his first degree was in computer programming and data processing.

Ward said he often finds adopting the mindset of a data scientist helpful as he navigates setting the UMB 2022-2026 Strategic Plan, which is one of the responsibilities of his job as interim provost.

"Now, I'm not claiming to be a data scientist, absolutely not. But I have long appreciated and valued certain attributes that what I call strategic data scientists possess, that I have employed in the strategic planning process," he said.

Executives and higher education leaders use big data to help inform the strategies adopted by institutions and businesses, Ward added, noting data-driven decisions tend to be better decisions.

"Leaders who refuse to embrace this fact will eventually be replaced by others who do," he said. "You can't be successful in this environment where there is so much risk to every decision that we make, that you don't seek to use data, and rely on data, and embrace data in a compelling and effective way."

The conference was supported through a grant from the National Center for Advancing Translational Sciences and the National Institutes of Health, m-Principal Investigators Shaya and Davis, Project Officer Pablo Cure, MD, MPH. It was the inaugural event for aspirations for an upcoming conference series, under the Data to Action program theme.

Of course, no conference hosted by a health sciences institution of higher education would be relevant without delving into the coronavirus pandemic.

In his presentation, "Informatics, Ontology, Data Systems: The N3C," followed by Kenneth R. Gersing, MD, director of informatics, National Center for Advancing Translational Sciences, National Institutes of Health, Christopher G. Chute, DrPh, MD, MPH, Bloomberg Distinguished Professor of Health Informatics, professor of medicine, public health, and nursing, and chief research information officer, Johns Hopkins Medicine, explained the workings of the National COVID Cohort Collaborative. Also known as N3C, it is a centralized secure portal for hosting patient-level COVID clinical data, involving more than 2,000 data scientists from across the nation collaborating on COVID-related data analysis.

"What's different about N3C is we brought all of this information to one place, so that we can understand the predictors and risks of COVID in longitudinal patient records," Chute said. "From a data science point of view, one of the challenges is, 'Well, how the heck do you bring all this data together?' If it's from 53 different academic medical centers and rural health organizations, how do you consolidate that into a single data model that can sustain analysis and sustain inferencing so that we can learn what's helping and what's hurting with COVID?"

The first step, he said, was to bring all the data into one place, in a highly secure, safe environment.

"So this is an enclave where the data can come in. But by design, people cannot download the data or extract the data in any way. So organizations felt confident when they contributed data that there'd be very, very minimal chances of breach," he said.

Each patient in the collective — all 5.6 million of them — has approximately three years of electronic health record (EHR) data, as well as their COVID status and other information. Leveraging this data from patients across the country provides data scientists with a platform for "relatively unbiased and very, very powerful analysis of social determinants" of health, Chute said.

Data science also is a tool used to analyze health inequities, said Ebony Boulware, MD, MPH, professor of medicine, chief, Division of General Internal Medicine, Department of Medicine, vice dean for Translational Science, associate vice chancellor for research, Duke University School of Medicine, in her presentation, "Democratizing Data Science." She described her PowerPoint as "where the cloud meets the ground."

She explored the challenge of translating research discoveries to improve community health equity and how that may apply for future directions not only for research, but also for decision-making and policy.

"One of the things I think is very important for us to think about when we're talking about social and environmental determinants of health is that most of those determinants go beyond the walls or beyond the communities of health care and public health," she said. "We frequently talk about these influences on health. And we focus on targeted individuals, through interventions that might help with food availability, or help with someone's individual transportation needs. But many of the levers to modify these very important mechanisms — like the economy, the built environment, education, housing, and safety — go beyond public health sectors, and so other sectors need to be involved in this."

That concept in data science also was reflected in Shaya's presentation of her Data to Action team research on drivers of COVID-19 prevalence and mortality.

"Patient input is critical," added Danica Marinac-Dabic, MD, PhD, MMSc, FISPE, associate director, Office of Clinical Evidence and Analysis, Center for Devices and Radiological Health, U.S. Food and Drug Administration (FDA). She presented on "Digital Health Technology: Regulatory Opportunities and Applications in Coordinated Registry Networks."

"Even if we talk about maturity or interoperability or generating data that are patient-reported outcomes, not what matters or disparity, patient input is the key, and we are utilizing increasingly digital health tools to obtain that input."

In her presentation, "Integrated Coordinated Registry Networks and Digital Solutions," Marinac-Dabic's FDA colleague, Anindita Saha, assistant director, Digital Health Center of Excellence, Center for Devices and Radiological Health Office of Strategic Partnerships and Technology Innovation, explained the role of the Center of Excellence. The center focuses on coordinating, supporting, and amplifying work that's being done in the arenas of medical devices, artificial intelligence, machine learning, wearables, patient-generated health data, interoperability, cybersecurity, virtual reality, and augmented reality.

"We know there's a shift towards patient-generated real-world data and real-world evidence," she said. "And it's really the key to understanding patients' lifestyles and behaviors that can help fill in gaps in traditional clinical trial data and can be leveraged to better understand safety and clinical benefit."

Meanwhile, in addition to N3C creating opportunities for massive data collection and collaboration, it has another benefit, explained Harold Lehmann, MD, PhD, professor, Section on Biomedical Informatics and Data Sciences, Division of General Internal Medicine, Department of Medicine, Johns Hopkins School of Medicine, in his presentation, "N3C and SDoH (social determinants of health)."

"This is an amazing opportunity for junior folks to get involved. We've had people from medical students through professors doing work in this," he said. "It's an amazing opportunity for younger folks basically to rub shoulders, even if virtually, with people from all over the country and with all levels of expertise."

In her concluding remarks, Shaya thanked NCATS and all the speakers. She said this conference achieved its goal to start a conversation with diverse stakeholders on how to get involved in data science and how it can help them make clinical and policy decisions in real time. The next step is to continue this engagement with further sessions focusing on specific data topics.

Additional speakers included:

Kenneth R. Gersing, MD, director of informatics, National Center for Advancing Translational Sciences, National Institutes of Health, presenting on "Bioinformatics in the CTSA (Clinical and Translational Science Award)"

Ester Villalonga Olives, PhD, MSc, assistant professor, Department of Pharmaceutical Health Services Research, UMSOP, "Social Capital Disparities"

Cindy Schaeffer, PhD, associate professor of psychiatry, UMSOM, "Using Analytics to Inform Digital Health Technology Use"

Murray Aitken, MBA, MComm, executive director, IQVIA Institute for Human Data Science, "Digital Therapeutics and Human Data Science"

Jaih Craddock, PhD, MSW, MA, assistant professor, University of Maryland School of Social Work, "Social Networks Approaches"

Tim Oates, PhD, MS, professor of computer science and electrical engineering, University of Maryland, Baltimore County, "AI and Disparities"

Arpad Kelemen, PhD, professor of organizational systems and adult health, University of Maryland School of Nursing, "Learning Models: Motivational Mobile Health Games"

Wendy Camelo Castillo, MD, MSc, PhD, assistant professor, Department of Pharmaceutical Health Services Research, UMSOP, "M-health in the Curriculum"

Emily Dow, PhD, assistant secretary of academic affairs, Maryland Higher Education Commission, “Trends in Data Science Education Programs”

To view all four sessions of the conference, plus review the agenda, speaker topics, and poster sessions, please visit https://www.pharmacy.umaryland.edu/programs/bhrt/data-science-and-social-determinants-of-health/recordings/.

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