

A woman with dark, curly hair is shown in profile, looking towards the left. She is wearing a dark blue patterned t-shirt and a necklace. She is holding a tablet computer. The background is a kitchen with a brick wall and a window. The image is overlaid with a large blue circle containing text, and other decorative elements like a red circle and a light blue circle.

Technical Innovations Change Behavioral Health and Suicide Prevention Paradigm

***Machine Learning and AI
provide new functionality
and scalability***

In the U.S. in the last 20 years, there's been a trend toward normalizing mental healthcare and removing its stigma and a corresponding rise in the need for developing effective behavioral health solutions.

According to the U.S. Department of Health and Human Services, one in four Americans [suffer](#) from a mental or substance abuse disorder. In 2019, more than 45,000 American adults died from suicide—including 6,261 U.S. Veterans.

Better news, however, is ahead, thanks to new approaches in addressing behavioral health challenges and detecting risk factors associated with suicide. These changes are emerging largely owed to innovative technologies, including the use of real-time machine learning (ML) and emotion artificial intelligence (Emotion AI).

A New Approach

A multidimensional approach integrating real-time ML capabilities could assist in detecting potential risk factors for suicide by drawing upon multiple data sources.

For example, responders on the Department of Veterans Affairs' (VA's) Veterans Crisis Line (VCL) must answer a significant number of calls per shift and need tools to assist them in assessing a veteran's suicide risk level in real-time. An effective algorithm could detect emotion and or stress in a caller's voice by analyzing acoustics, voice level, speed and pauses in the conversation. The resulting distress prediction value could then be viewed by the operator during the call.

The right technology could further identify and integrate additional data to inform a responder of the likely risk to a veteran. Data from the veteran's service and medical record located in the Veterans Health Information Systems and Technology Architecture (VistA) would be valuable in assessing a veteran's risk level. Available data combined with additional socioeconomic data from key non-clinical elements within VistA could be used to help determine the veteran's risk of suicide.

If, for example, a veteran has received a high disability rating in the past, inquiring about their current challenges related to their disability would be valuable in determining potential risk. Similarly, if a veteran's appeal for a disability claim has recently been denied, this might also add additional stress and contribute to a risk profile.

And if VCL responders are provided with information about a Veteran's financial well-being, whether, for example, they are behind on mortgage payments, they could be offered more tailored resources to alleviate those areas of stress and risk.

Emerging Area of Interest: Emotion AI

Human empathy is a complicated idea with many facets. At its most basic level, however, empathy is about being aware of another person's emotional state. Theoretically, machines could help us more if they were capable of that level of comprehension.

Emotion AI is a branch of computer science that uses specific information, various elements of human speech and facial expressions, to identify a range of human emotions. Applying emotion AI can have a big impact, especially in healthcare.

For example, let's use the VCL described above. Emotion AI can give crisis line responders yet another tool to better understand, and therefore, support and assist veterans in need. Verbal information such as vocal emphasis, tonality and speech rhythm can be analyzed in real-time to help make a quick decision about the level of assistance needed by the caller.

And voice isn't the only application of emotion AI. Sentiment analysis, a technique for natural language processing, finds and measures the emotional undertone of text samples, whether they are little fragments or comprehensive samples. This has become widely used in a variety of fields, from marketing, where it can be used to analyze and customize product recommendations, to finance, where it may be used to predict stock movement.

That said, this technology must be implemented in an atmosphere of trust. Solutions to address mental health and suicide would have a positive impact only if there is trust and accountability in the development and implementation of AI, especially with respect to cases involving human emotion and behavior modification. Leaders, practitioners and users need to understand AI's ethical and accountable implications.

New Electronic Health Records Spurring Adoption

In recent years, there has been promising work modernizing and re-imagining EHRs. EHRs were initially data repositories and documentation systems that captured data and supported health system billing activities. However, like all technologies, the original version of the EHR has reached the end of its lifecycle. Today, new systems that include EHRs, but do much more, help facilitate the care delivery process and optimize clinical workflows.

According to a recent Gartner report, EHRs alone are no longer sufficient to meet the demands of mass digitization and personalization of care. Instead, the EHR is a foundational capability that must connect to a richer ecosystem of modern digital health applications, systems, services and devices necessary to deliver high-quality, affordable and patient-centric care. The next generation EHR is evolving into a clinical data platform capable of integrating advanced new technology and supporting the use of evidence-based medicine at the point of care.

There has been an introduction of new EHRs born in the 21st Century Cures Act era, that anticipate the requirement of freely sharing data. Specifically, provisions in the law call for partnerships among health information exchange networks, educational and research initiatives, and health information technology (IT) certification requirements that encourage interoperability. Outcome data would allow payers to apply ML and AI to have better insight on the value of the care they purchase.

Population-level data transfer that is aligned with Health Insurance Portability and Accountability Act of 1996 (HIPAA) is also central to having a learning healthcare system, advancing many research priorities and use cases, and modernizing public health reporting. A challenge in



the implementation of these provisions includes aligning incentives and requirements for data sharing and the question of whether currently proposed rules and guidance supports the goal of improved patient access and health information exchange. Once the policy is fully implemented, researchers, clinicians and patients would have the power to advocate for improved patient access and interoperability.

The new EHRs were designed with open architectures, a move away from all-inclusive and inflexible systems. To wit, they didn't retrofit Fast Healthcare Interoperability Resources (FHIR) into a closed, legacy system. Instead, they were purposefully designed as a starting point, with the FHIR application programming interface (API) interoperability standards model.

Increasingly, these 21st century EHRs are proving effective for states facing more and more behavioral health challenges. Behavioral health focuses on negative actions patients take, including gambling, substance abuse and eating disorders. The challenges are complex, because poor mental health is caused by a variety of factors, such as genetics, environment, trauma and individual choice.

As these new EHRs become the foundation of an ecosystem of care delivery systems, patient data privacy and security are paramount. Approach data security in five steps:

1. **Analyze:** Conduct an annual security assessment to check for vulnerabilities
2. **Plan:** Create and implement a response plan that has clear guidelines to follow in the event of a breach
3. **Educate:** Ensure your staff is aware of cybersecurity policies and alert them whenever a change in the response plan has been made

4. **Protect:** Encrypt sensitive data and keep your network infrastructure secure by limiting personal devices, restricting access to protected health information (PHI) and updating your systems regularly
5. **Invest:** Allot a healthy budget for network security, including staff and the tools they require

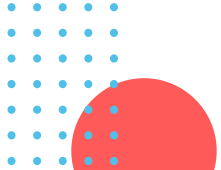
The more evolved EHRs help meet these challenges because they identify, track, integrate and share patient data across systems and healthcare team members. The new EHRs, with added ML and AI technologies, can help predict stressful situations and head off destructive behaviors before they occur. This results in better patient administration, healthier patient outcomes and more effective cost containment.

Conclusion: A Paradigm Shift in Care

It's an exciting time of change for healthcare IT. Like other industry verticals, the healthcare industry is adopting technology that can drive the cost of service down, rather than up. Digital transformation through the adoption of innovative health IT solutions can advance healthcare quality, equity and access while reducing the overall cost of care.

The 21st century EHRs are finally addressing the challenges of digitization and the need to personalize care. The EHR is becoming a foundational capability that connects to a richer ecosystem of modern digital health applications, systems, services and devices necessary to deliver high-quality, affordable and patient-centric care. ML and AI can be "plugged in" to support the use of evidence-based medicine at the point of care.

This technology is a force multiplier for mental health caregivers who are often stretched to the limit while helping the suffering.



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