Artificial Intelligence, Cancer Screening, and Population Health

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Image-based cancer screening supported by artificial intelligence (AI) is not just a concept reserved for the future. It is an active tool that is already enhancing clinical efficiency and diagnostic accuracy throughout the US. Radiology practices using AI will likely reduce the number of false-positive exams, eliminating unnecessary costs and patient anxiety associated with follow-up procedures. There should be great hope for population health based on the advances we see first-hand, every day, in imaging thanks in no small part to AI.

Sadly, however, over 260,000 Americans die from breast, lung, prostate, and colon cancer every year.[1,-4] Adding to the complexity of the fight, nearly 10 million patients missed their cancer screenings during the pandemic.[5] It is well established that screening and early detection are among the most effective weapons against cancer mortality. The White House, through its re-energized Cancer Moonshot, recently announced a goal of reducing the impact of cancer by 50% over the next 25 years.[6] To achieve this goal, it is imperative to remove current barriers to screening. By driving the efficiencies in imaging that will increase access to screening, AI will play a critical role in the success of the Cancer Moonshot.

Access and Patient Outreach

It is the responsibility of the federal government, as well as ours as leaders in radiology, to offer all individuals access to high-quality screening. It is also our responsibility to encourage them to take advantage of cancer screening. To this aim, new machine-learning technology is available to help identify and communicate with those who need screening to help them schedule their imaging appointments. As providers begin deploying this technology, they will see dramatic gains in patient compliance with national screening guidelines.

Lung Cancer Screening and AI

Nearly 130,000 people in the US will die of lung cancer this year. According to an American Lung Association report, only 5.7% of people at high risk for the disease undergo screening exams. [7]

Fortunately, the United States Preventive Task Force recently adjusted its recommendations for annual lung cancer screening with low-dose computed tomography. As a result, an estimated 15 million Americans now qualify for lung cancer screening, nearly double the number of previously qualified individuals.[8,9]

We asked several thought leaders at a recent thoracic radiology conference about how an increase in compliance would impact their workload. Although nearly all were passionate about the positive impact on high-risk patients, many shared their concerns about the potential impact on their reading volumes. Many radiologists described regularly reading well into the evening just to keep up. They said that even a slight increase in compliance would generate bigger backlogs and a need for more radiologists.

Considering the current nationwide shortage of radiologists and technologists, AI offers a much-needed solution for lung screening and population health programs. AI-based tools already available today can automate pulmonary lung nodule detection, classification, volume calculation, and growth assessment. They can also

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identify and track incidental nodules and generate reports. In magnetic resonance imaging (MRI) screening for prostate cancer, for example, AI can help segment the prostate, automate volume measurements, and integrate prostate-specific-antigen density calculations.

One of the most significant benefits to AI technology is that it automates routine, high-volume, and time-consuming tasks, driving substantial gains in efficiency for any screening and population health program. As imaging centers and healthcare providers drive greater patient compliance with national screening guidelines, AI will play a critical role in enabling radiologists to handle heavier reading volumes.

AI in Screening Mammography

As mammography providers implement AI with state-of-the-art, high-definition screening systems, their radiologists are certain to report significant efficiency gains and improved detection of cancers that otherwise might be missed with less advanced technology. Owing to heavy reading volumes and the complexities associated with breast cancer detection, lesions can escape the eye of even the best-trained radiologists. But when integrated into the screening workflow, AI can serve as an excellent "virtual second reader" to help catch these tumors. Indeed, AI can dramatically impact any breast screening program's detection capability, efficiency, and quality. [10,11]

AI-supported medical imaging is critical to any population health strategy. The radiology community has a responsibility to help private payors recognize AI's financial and social benefits in all cancer screening. This is particularly true for breast, prostate, lung, and colon cancers, which make up the majority of those that can be detected by imaging in their early stages.[12]

Far from being just a distant dream, AI is a potent weapon that can be deployed in imaging today to help the country's medical and scientific community shoot for—and reach—the moon.

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