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Harnessing AI's Potential for a Revolution in Cancer Screening

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Imagine a world where a non-invasive breast cancer test delivers results within 15 minutes, costing less than half the price of a mammogram in India. Think about a short messaging service in Kenya, providing vital advice to expectant mums, potentially saving lives.

These real-life scenarios share one thing in common: the transformative power of artificial intelligence (AI) and machine learning.

OpenAI's ChatGPT has taken the world by storm in recent months. Less well-known is how AI, which powers such large language models, is already revolutionizing many segments of health-care, from triage and treatment to patient communication and discharge. For example, Microsoft, a major investor in OpenAI, plans to integrate GPT-4 into electronic medical record systems.

These developments come at a critical time for us in Asia, as the region grapples with rising pressure on its healthcare systems due to rapidly ageing populations. Age brings a weaker immune system, and increased susceptibility to chronic diseases such as cancer. It is estimated that more than 50% of people with cancer are 65 years or older.

Additionally, the shortage of skilled healthcare personnel, is particularly pronounced in Asian countries with fast-changing demographics, such as India, China and Indonesia. These healthcare challenges have far-reaching consequences, including

higher costs, decreased patient satisfaction, and compromised health outcomes.

Disproportionate impact of cancer in Asia

Asia carries the highest cancer burden compared to other regions. Lung cancer mortality rate has risen in the region for the past two decades and is projected to affect more than 1.9 million people by 2040, in contrast with Europe and North America where death rates are steady or falling. Gastric cancer is another major concern, with more than 60% of new cases occurring in East Asia alone.

Regrettably, lung and gastric cancer face poor prognoses in Asia due to late-stage diagnoses, limiting the potential for a cure. Around 70% of non-small cell lung cancer, the most common type of lung cancer, are diagnosed at an advanced stage due to the absence of early symptoms and potential misdiagnosis, especially in countries where tuberculosis is endemic.

To address these challenges, it is crucial to prioritise effective and early diagnosis across diverse economies in Asia, from those capable of implementing newer technologies on a large scale to those emphasising cost-effective solutions due to resource constraints.

Value of AI-based solutions in early cancer detection

Lung cancer

AI-based solutions have already demonstrated significant value in healthcare, especially in driving earlier detection of diseases like cancer. In the context of lung cancer, low-dose computed tomography (LDCT) is the recommended gold standard for detection due to its increased sensitivity. However, its adoption in many Asian economies is hampered by challenges such as cost, accessibility, infrastructure and trained staff.

AstraZeneca, in collaboration with Qure.ai, has made substantial progress in applying AI-based medical imaging for early-stage lung cancer diagnosis across Asia, Latin America, the Middle East, and Africa. Our use of AI-enabled chest X-ray allows quick identification of lung nodules, facilitating timely referrals for further interventions and reducing the risk of missed cases. Other AI-based innovations such as Red Dot by Behold.ai in the UK and Lunit INSIGHT CXR by Lunit in South Korea, have also shown potential in enhancing lung cancer detection on chest radiographs.

Studies have shown the use of AI as a form of early screening improved the overall performance for lung tumour detection, increasing the identification of lung cancers in chest X-rays by 17.4% that would have otherwise been missed, as well as increasing the detection of smaller tumours.

Gastrointestinal cancer

AI innovations have also improved detection of other malignant tumour types such as gastric cancer. At this year's American Society of Clinical Oncology meeting, an AI-based prediction model was presented, showcasing its ability to analyse patient factors and clinical data to accurately predict the risk of gastric cancer development.

For gall blader cancer, while ultrasound is the most widely used type of screening due to its low cost, it is also associated with low sensitivity and accuracy. This could cause malignancies to be missed, leading many patients to be diagnosed at an advanced stage and resulting in a five-year survival rate of less than 10%. To address this challenge, the Indian Institute Technology, Delhi developed a deep neural network to more accurately analyse ultrasound images of gall bladders and generate clearer detection of any abnormalities.

Breast cancer

In breast cancer detection, AI innovations are being applied to address radiation exposure, discomfort, inconvenience, cost, variability in interpretation and low sensitivity. Wearable devices such as the Cyrcadia Breast Monitor (CBM) assist in detecting breast tissue abnormalities, particularly in dense breast tissue prevalent in Asia. Such devices can be a convenient alternative to monthly breast self-exams, facilitating early intervention when tumours are smaller and more treatable, with

initial studies demonstrating improved accuracy and sensitivity.

Beyond screening, AI-driven solutions also address challenges in breast cancer pathology, such as accurately identifying HER2 status in patients, a protein widely present in breast cancers. Current standard assays using immunohistochemistry face limitations in determining the low-HER2 ranges, potentially causingmisclassification. Digital pathology pilots using AI technologies, such as Mindpeak and Luma, aim to reduce discordance rates and augment the work of doctors to improve efficiency and accuracy in classifying tumours.

Embracing AI responsibly for improved patient outcomes

The remarkable use of AI has the potential to revolutionise cancer care by creating intelligent processes and workflows that can make healthcare more affordable, effective, personalised, and equitable. By alleviating the strain on healthcare systems, AI can ultimately lead to improved patient care and outcomes.

However, it is clear that we are still in the early stages of implementation and uptake of AI in healthcare has been slow and variable. Integrating AI into daily clinical practice will require greater engagements with various stakeholder on regulation, compliance, and standardisation, while upskilling healthcare workers to make the best use of the technology.

We also need to carefully address valid worry about AI replacing the human touch in health-care. With AI's rapid evolution, stakeholders need to stay informed and embrace continuous learning. Fully harnessing AI can drive transformative improvements across regions with varying resources, making healthcare more accessible, lowering costs and improving patient outcomes.

As healthcare leaders, it is our responsibility to establish resilient and equitable healthcare solutions, to ensure no one is left behind in the fight against one of the greatest challenges and threats of our time – cancer. Leveraging AI technologies within cancer care is critical, and we need to move quickly, to foster cross sector collaborations that can harness and develop AI responsibly and at scale, to achieve our ambition of eliminating cancer as a cause of death.