Essay: How can the integration of AI into clinical practice improve diagnosis and patient outcomes, and what impact will this have on workforce training?

By Dr Anna Wang

It's Monday and Sarah, a chest radiologist, logs on to her computer to start the first task of the day – reviewing chest images. Scrolling through the worklist, she clicks the AI button on the sidebar to see if there are cases requiring her immediate attention. The AI hasn't flagged anything critical so Sarah clicks on the oldest one on the list, a CT scan of a patient with lung cancer. The patient recently underwent treatment and had this follow-up CT scan to assess the tumour response. The AI algorithm matched the lung nodules found in this CT to ones found in a scan made before treatment, and generated a report. In addition to finding no new lesions, the AI analysis shows that the target tumour responded to treatment and its size has decreased by 32%. Looking through the images to check that the AI has outlined the tumour correctly and hasn't overlooked any nodules gives Sarah confidence in the results. A positive story to start the day, great! Sarah knows that AI isn't always perfect but when paired with her clinical expertise, she can now review many more cases and help get patients their results faster.

Going back to the worklist, Sarah finds that the AI software has flagged up a routine chest x-ray performed on an inpatient only ten minutes ago. The AI spotted a potential collapsed lung and prioritised it for review. Opening the image, Sarah sees that indeed, the patient has a serious case of a collapsed left lung and immediately alerts the patient's clinical team for treatment. Phew. Without AI that image might have only been reviewed much later in the day and delayed the patient's treatment. The rest of the morning continued without incidence, and after lunch it's time for a meeting with specialists across the hospital – surgeons, oncologists, pathologists and nurses – to plan treatments. For one lung cancer patient, the option of post-surgery radiotherapy is discussed. Whilst radiotherapy could decrease the chances of cancer recurrence, it might also harm healthy parts of the patient's heart and lungs. To help them make these types of decisions, the team recently introduced an AI tool designed to predict if individuals might benefit from radiotherapy based on their chest images.

Sarah has been involved in the extensive testing required before the software's clinical use and is pleased to see it now playing a part in delivering personalised patient care. Sarah's final job of the day is to prepare some teaching materials for lectures she's giving to trainees. With a click, Sarah opens up the AI-powered chatbot on her computer and types 'make powerpoint slides based on the first specialty training exam curriculum in clinical radiology'. After some simple edits, Sarah has time to add a few interesting case studies from her own work that she thinks the trainees would benefit from. Before logging off, she quickly checks tomorrow's schedule for any last-minute changes and with that, it's time to head home.

The scenario presented here is fictional and definitely different from the healthcare we are all used to but I hope it shows a snapshot into the potential applications of AI to improve patient care. As with all new technologies, the integration of AI into the current healthcare system also poses many questions. For example, in this scenario, AI prioritised the scans for review based on their urgency but how do we know it's suggesting the "right" cases? How well does AI work in fringe cases where underlying medical conditions may not be so obvious? How can we ensure that the underlying training data provides a fair representation of the patient population? And can it keep up with new advances in medical knowledge? When used for CT scans, there are indications that AI could lower radiation doses to patients without adversely affecting clinical judgements. But how do we know what AI is showing us is real? In short, how do we ensure that

AI has a positive effect on the patient pathway? These questions are partly why there has been a call from many professional bodies such as IPEM and the Royal College of Radiologists for more guidelines into quality control and auditing of AI algorithms before widespread clinical use.

Work in this area has already started. For example, the LungIMPACT trial is assessing whether a real-world AI algorithm similar to one Sarah used in the scenario can improve patient waiting times for diagnosis by flagging time-critical cases. Trials such as this help build a body of evidence for cost-benefit analysis to ensure safe implementation. As part of this drive, workforce training in AI is also key. The likely widespread use of AI across healthcare means that foundational knowledge in AI will play a crucial role in establishing staff confidence in the care that they are giving to patients and its general involvement to make clinical decisions. The depth and type of knowledge required will also depend on the workforce group. Whilst a radiologist might require familiarity with the capability and limitations of specific AI software, clinical scientists involved in auditing and monitoring of AI might require both broader and more technical knowledge about the algorithms and potential biases.

Training for staff in patient facing roles will also allow for better interactions with patients whether when communicating results involving the use of AI or addressing AI related concerns patients might have. These varying workforce needs should be reflected in training, ranging from foundational courses to specialist hands on education for specific clinical scenarios. In all cases, AI education will need to be established as part of the curriculum in training programs. The high demand and pressure currently faced by healthcare services makes AI impossible to ignore. Though not without its challenges, safely incorporating AI into our healthcare system with appropriate staff training has the potential to help build towards a solution.