

Case study

Finding IPNs with AI in Thailand

How X-rays facilitated earlier lung cancer detection in an upper-middle-income country



Most people living with lung cancer in Thailand are diagnosed at a late stage, when survival outcomes are poor and treatment is limited. In a regional hospital facing a shortage of radiologists and an abundance of chest X-ray imaging, an AI tool offered a practical route to finding the cancers being missed – and a model that other resource-constrained systems could replicate.

Background

A system stretched thin: the case for a new approach to detecting lung cancer

Late-stage lung cancer diagnoses in Thailand reflect a health system that lacks the workforce capacity to act on what its imaging is already finding. A small-scale study at a Hatyai Hospital, a regional hospital, found that 87% of people with lung cancer were diagnosed at stage IV, with their chances of living for five years or more a mere 6%.^{1,2} Due to the prevalence of tuberculosis in Thailand, the country has established a national screening programme using chest X-ray, which is cheap and accessible.³ Every year, approximately 30 million X-rays are conducted.³⁻⁵ So the imaging exists – but currently the capacity to act on these screenings does not.

A shortage of radiologists means general practitioners (GPs) are often responsible for reviewing X-rays, with predictable consequences for nodule detection. Due to this workforce gap, pulmonary nodules are frequently not detected.⁶ When pulmonary nodules are found incidentally, they are often not recognised as lung cancer, and the people with them are managed through a tuberculosis clinic rather

than receiving oncology-based care, meaning their undiagnosed lung cancer continues to progress unknown and untreated.⁶

Data on missed opportunities became the catalyst for change. The deputy director of Phrapokklao Hospital's Cancer Center of Excellence in Chanthaburi used staging data to build the case with health system leaders for an incidental pulmonary nodule (IPN) management programme, established in early 2025.⁶ An analysis of chest X-rays taken between 2014 and 2018 at a university hospital in Bangkok demonstrated that almost 80% of lung cancer diagnoses were being missed on X-ray.⁷ These findings, coupled with the low number of stage-I diagnoses being made annually at Phrapokklao Hospital, solidified the argument for a programme that could enhance earlier diagnoses, open treatment avenues and improve survival.⁶

Finding, tracking and managing nodules at Phrapokklao Hospital

Recognising that workforce constraints made a traditional IPN programme unworkable, the hospital embedded an AI tool into its existing system to do the work a radiologist shortage previously prevented. The software integrates with the hospital's system for imaging and electronic medical records, and is applied to all chest X-rays taken at the hospital, including as part of the tuberculosis screening programme.⁶ Rather than requiring any change to existing workflows, it works in the background – analysing images as they are taken and flagging those with suspicious nodules for radiologist review.

Box 1. Workflow of the IPN programme at Phrapokklao Hospital

Finding

- The **AI tool is applied to all chest X-rays** taken across the health system, including through the tuberculosis screening programme.⁶
- The AI detects pulmonary nodules that meet the threshold for nodule malignancy and **flows these into a list for review**.⁶
- A **radiologist reviews the imaging collated by the AI tool** and identifies people with relevant nodules to invite to the IPN programme.⁶

Tracking

- The programme **nurse coordinator then contacts people via phone call** to enrol them into the programme by explaining what IPNs are and why follow-up care has been recommended.⁶
- The **AI tool also flags upcoming follow-up imaging and missed appointments**, which the nurse coordinator follows up directly.⁶

Managing

- People with **very high-risk nodules are referred to hospitals in Bangkok** to receive further diagnostics and care.⁶
- People with **medium-risk nodules have follow-up computed tomography (CT) scans** conducted at the Phrapokklao Cancer Centre for a more detailed assessment of nodules and their growth.⁶
- All **cases are discussed at a weekly multidisciplinary team meeting**; follow-up care decisions are based on clinical expertise and AI recommendations, as no IPN guidelines exist for the Thai population.⁶

Crucial elements of the IPN programme

Start with what you have

Thailand's abundance of X-ray imaging – cheap, accessible and available across a range of healthcare settings – offered a practical entry point for IPN detection that CT-based programmes could not. As an upper-middle-income country, Thailand has approximately one CT scanner per 86,000 people (slightly less than the global average for similarly developed countries), with the majority concentrated in major cities.¹⁸⁻¹⁰ Building an IPN programme around CT imaging was not feasible in most of the country.

Leveraging the existing infrastructure was the key design decision that made a successful programme possible. In contrast to CT imaging, X-ray is widely available, transportable and already in routine use at scale through the tuberculosis screening programme. CT imaging is still used for accurate nodule measurement once IPNs are identified, but using X-ray for initial detection balances resource constraints without compromising the quality of follow-up care.⁶ The result: 8.2% of people with IPNs detected via an X-ray received an early-stage lung cancer diagnosis through the programme, a huge improvement on standard clinical practice before the programme launched.^{6*}

Earning clinical confidence

The AI tool was validated against radiologist practice before being embedded into the programme, a step that was essential for building clinical confidence in its outputs. In 2022, the tool was assessed by being retrospectively applied to chest X-rays; it detected suspicious abnormalities in almost 20% of people who had undergone chest X-rays, resulting in lung cancer diagnoses that had been missed – some up to 101 months after the original imaging – and so were only identified at a late stage.¹¹ When the tool was applied to chest X-rays of hospital staff in 2024, it accurately assessed images just under 93% of the time, which was considered sufficient to meaningfully reduce radiologist workload, though it showed a tendency to produce more false positives than radiologists.¹² These findings demonstrated that if the tool was applied systematically to all imaging, and findings were triaged in a timely manner, it could facilitate earlier-stage diagnosis at scale.

Embedding the tool into routine clinical workflows transformed detection rates and expanded its role beyond simple nodule identification. Once in use, the tool facilitated detecting stage I lung cancer at five to six times the rate of standard practice.^{6*} It has since been trained to differentiate between tuberculosis lesions and lung cancer to minimise false positives and incorrect diagnoses.⁶ The tool also now provides programme management support by tracking the progress of people with nodules through the programme and generating recommendations for follow-up care based on risk profiles and nodule morphology.⁶

Winning over the sceptics

Among clinicians, scepticism and mistrust about AI tools were barriers to programme uptake; addressing these concerns directly, rather than assuming adoption would follow deployment, was critical to the programme's success. When the service launched, there was mistrust among clinicians about AI tools, a lack of understanding about what the tool detected, and uncertainty about its ability to detect early-stage lung cancers.⁶ The director of the IPN programme responded by hosting a dedicated information session at one of the hospital's clinician education conferences, explaining both the AI tool and the rationale for its use.⁶ Particular emphasis was placed on how the tool could have prevented late-stage

* Unpublished programme data from 2025 to 2026.

lung cancer diagnoses.⁶ Comparing the new AI tool with another already in use in the health system helped allay concerns about poor performance by demonstrating the new tool's greater efficacy.⁶

Continual sharing of results has sustained engagement beyond initial launch. Any IPN detected with the AI tool is communicated back to the clinician who ordered the initial scan, demonstrating the tool's impact directly and encouraging continued use.⁶ Programme findings are presented regularly to the wider hospital workforce.⁶ This approach has produced a stepwise increase in the tool's use among other clinicians.⁶

Key takeaways

Leveraging existing X-ray infrastructure as a first-line detection tool for IPNs in settings where CT capacity is limited, and using CT to follow up and confirm, can help balance resource constraints with clinical quality.

Embedding AI tools into existing clinical workflows can facilitate uptake while also ensuring appropriate follow-up care is recommended and provided.

Collecting programme performance data and regularly presenting it back to the clinicians who ordered the original imaging can demonstrate real-world impact and encourage engagement iteratively.

Proactively addressing scepticism and mistrust about AI through targeted education is key to allaying fears and biases among clinicians.

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