

## Case study

# Research paves the way for nodule clinics in Vancouver

## Translating study findings into a sustainable programme



In British Columbia, the effective management of incidental pulmonary nodules (IPNs) was sporadic and unstructured, leading to missed opportunities for the earlier detection of lung cancer. Research to create an AI tool that analyses written information built the case for a new, efficient model of earlier detection.

## Background

## Closing the gaps in IPN care in British Columbia

**Since 2022, British Columbia, in Canada, has a lung cancer screening programme. However, until recently, people with IPNs and those who were ineligible for screening did not have a dedicated management pathway – and this led to inconsistent follow-up and care.** Approximately 30% of lung cancer cases in the province occur in people who do not smoke, and up to 50% of those diagnosed would not have been eligible for screening.<sup>1-3</sup> In Canada, outside of screening, an estimated 40% of people identified with small IPNs do not have their findings followed up.<sup>4</sup> The reasons for this are multifaceted: some healthcare professionals don't have full awareness, or training, to apply relevant guidelines, and are not supported to do so in existing referral pathways.<sup>4</sup> Many people with a detected nodule face additional barriers to navigating the health system, including a lack of English-language proficiency and unsuitable informational materials.<sup>1</sup>

**The Improving Detection of Early Lung cancer in a diverse population (IDEAL) study demonstrated that a natural language processing (NLP) tool can facilitate IPN identification, tracking and management.** One of the study's aims was to inform a standardised approach to reading and reporting computed tomography (CT) scans for IPNs.<sup>3-6</sup> The study, based in a large health authority, identified people with a pulmonary nodule greater than 6mm in all imaging that captured a part of the lung, who were then offered nodule follow-up and tracking.<sup>7</sup> Initial findings from one of the study's three sites, in Vancouver, demonstrated that using an NLP tool (*Box 1*) helped identify IPNs in unstructured CT radiology reports, and a significant proportion of these patients were subsequently found to have lung cancer

despite being ineligible for screening.<sup>6</sup> Only 8.8% of people with IPNs would have been eligible for lung cancer screening, demonstrating the important role of dedicated IPN management programmes in identifying and monitoring those who fall outside current screening criteria.<sup>6</sup>

#### **Box 1.** Natural language processing tools in IPN management

NLP tools allow computers to read and interpret unstructured text (such as radiology reports) and convert it into information that can be systematically reviewed.<sup>8</sup> In radiology, NLP is increasingly used to detect significant clinical findings that may otherwise be missed.<sup>9</sup> For IPNs specifically, NLP tools can help detect nodules mentioned in **all reports of CT scans that capture the lung**.<sup>9</sup>

## Finding, tracking and managing IPNs: a coordinated clinic model for service delivery

### **The findings from the Vancouver IDEAL site led to the establishment of a dedicated nodule**

**clinic to support routine IPN management.** The Vancouver clinic is run by a multidisciplinary team responsible for identifying, tracking and managing nodules (*Box 2*).<sup>1</sup> Framing the clinic as a quality improvement project in the local hospital helped the programme gain early traction and meant that processes around patient consent could be managed within the existing health system workflow, rather than through lengthy research protocols.<sup>1</sup>

**Box 2.** Structured workflow for identifying, tracking and managing incidental pulmonary nodules in a dedicated clinic

#### **Finding**

- **All 'lung in view' CT reports are processed through dedicated software to identify reported nodules**, which enables automated patient enrolment; nodules larger than 6mm are referred to the clinic in line with clinical guidelines.<sup>1</sup>
- **Referral prompts are embedded into cardiac radiology reports** to support timely clinic referral for nodules larger than 6mm.<sup>1</sup>

#### **Tracking**

- Once someone is enrolled in the programme, the **clinic notifies their family physician that it will manage follow-up** unless the physician and patient choose to opt out, mitigating pressure on primary care.<sup>1</sup>
- Each month, **the software identifies people who are due for follow-up imaging**; a nurse, acting as a navigator, reviews the list, confirms scan completion and follows up where needed, ensuring that no one is lost to follow-up.<sup>1</sup>
- **People with identified IPNs receive a letter explaining pulmonary nodules**; they are asked to attend the clinic for review.<sup>17</sup>

#### **Managing**

- **Patients are seen in the clinic by a nurse practitioner** (NP), who shows them the scan with the nodule; the staff respirologist and the NP jointly determine the appropriate follow-up plan.<sup>17</sup>

## Crucial elements of the nodule clinic

### Securing buy-in and funding

**The scale of nodule identification and follow-up, enabled by the NLP tool, generated the evidence needed to demonstrate impact; these data helped secure decision-maker support and unlock funding.** Early results from the IDEAL study demonstrated improvements in IPN detection, and showed that lung cancer could be detected at an earlier stage; the IPN cohort had a 5% lung cancer incidence.<sup>1</sup> These results gave policymakers and health system leaders the confidence to move from a time-limited research study to a funded nodule clinic, which is now operating in Vancouver.<sup>1</sup>

### Scaling identification through NLP

**The NLP tool underpinned the transition from research to implementation, acting as a central nodule registry that enabled identification, monitoring and follow-up at a scale that would not be feasible manually.** The NLP model was developed by a general radiologist who systematically identified the many different ways in which lung nodules and similar findings were described in radiology reports.<sup>1</sup> Then the radiologist iteratively refined the terminology over several months through regular feedback and validation.<sup>1</sup> Designing the NLP tool to reflect local radiologist reporting patterns meant that existing reporting practices could be maintained without modification. The NLP programme was validated on 1,000 scans.<sup>7</sup>

### Meeting people where they are

**The clinic's success depended not just on its technology but also on its ability to engage people who had faced significant barriers to accessing care.** Approximately 60% of people with IPNs who attended the nodule clinic were not born in Canada; many faced language barriers, limited familiarity with the health system and difficulty accessing primary care.<sup>17</sup> To ensure that everyone could engage with the service, the programme:<sup>1</sup>

- proactively identified people who required language support and conducted outreach and care discussions in the patient's preferred language, drawing on the hospital phone translator and a network covering more than 200 languages
- co-designed outreach materials with patient partners to ensure that they were accessible and culturally appropriate, and used plain language and visual elements
- contacted family physicians to gather information on people with no fixed address or contact details – a situation frequently encountered in emergency departments.

# Key takeaways

**Early real-world data help make the case for transitioning IPN management from a research initiative to a funded, sustainable clinical service.**

**NLP identification can systematically track IPNs at scale, reducing the risk of people falling through the gaps, and supporting earlier diagnosis of lung cancer outside standard screening eligibility.**

**Clear clinical ownership of IPNs – dedicated workflows, defined responsibility and integration with existing records – helps ensure that automated identification translates into timely clinical action.**

**Designing pathways around the needs of diverse patient populations (e.g. by initiating proactive outreach and culturally appropriate communication) means that the benefits of IPN management better reach the people most likely to be missed.**

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