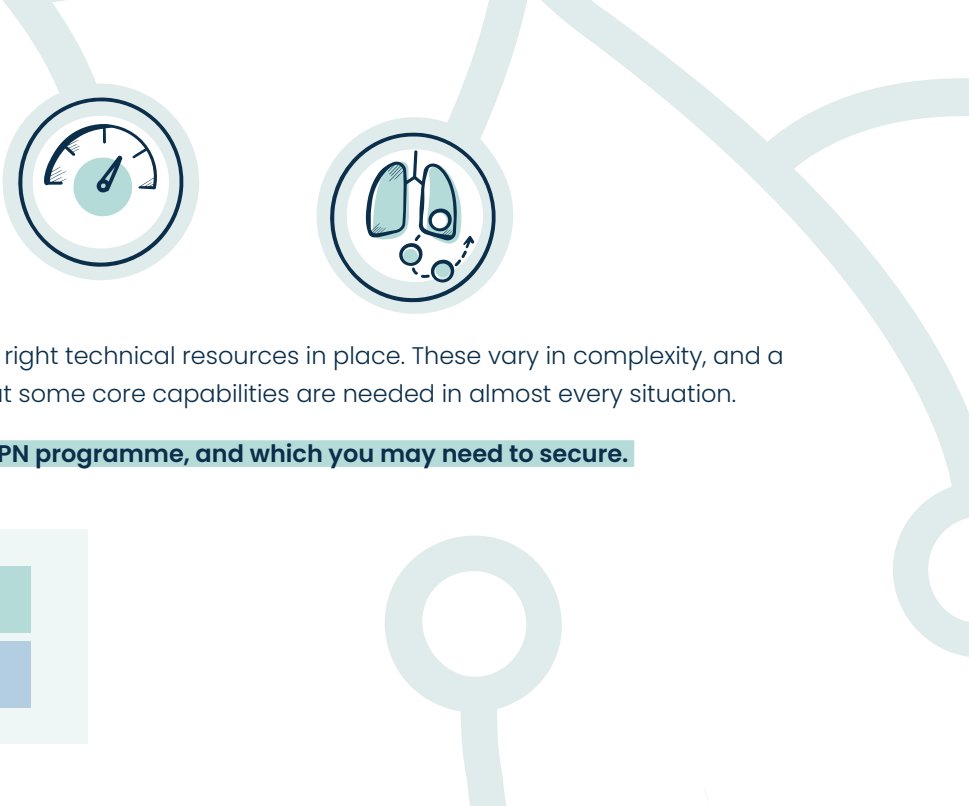


Supporting resource

Technical resources and tools to help support an IPN programme



Delivering an effective incidental pulmonary nodule (IPN) programme depends on having the right technical resources in place. These vary in complexity, and a programme can be implemented across health systems with different levels of resourcing, but some core capabilities are needed in almost every situation.

Use the list below to identify which resources you already have and could draw on for your IPN programme, and which you may need to secure.

Essential and Optional Keys

Colour keys indicate which resources are essential, and which can enhance and optimise a programme but are not essential to running one effectively.

Essential

Optional

Essential

Technical resource	Purpose	Considerations
Computed tomography (CT) scanner	A CT scanner is required to accurately assess nodule growth. ¹ While IPNs can be initially detected on X-rays, CT imaging is required to accurately measure a nodule and conduct follow-up imaging to assess growth – a key indicator of malignancy. ¹	Is there enough CT scanner capacity to conduct follow-up imaging? Can you use CT scanners out of hours to increase imaging capacity? Do you have the workforce capacity to conduct and review CT imaging? Are there processes in place to calibrate CT scanners to ensure consistency in imaging?
Electronic health records/electronic medical records (EHRs/EMRs)	EHRs/EMRs store patient data, which are needed to accurately assess risk in an IPN programme. ¹ They also enable care information to be centrally accessible to allow programme staff to see what care a patient has received. ²	Are EHRs/EMRs centrally accessible in your health system? (If applicable) Do EHRs/EMRs link up with other health systems in your region/country? Are patient details input correctly and wholly? Are EHRs/EMRs routinely reviewed or updated for accuracy?

Essential

Technical resource	Purpose	Considerations
Picture archiving and communication system (PACS)	The PACS stores and shares medical imaging that is vital for an IPN programme where assessing nodules on imaging is how malignancy is determined. ^{1,3} It is accessible from different parts of the health system and allows for centralised image-sharing. ³	Will the IPN programme have access to the PACS?
Bronchoscopy equipment	Bronchoscopy equipment is needed to provide further diagnostics when a high-risk nodule has been identified as part of the IPN programme. ⁴ This is a minimally invasive procedure where a small camera is used to look at internal structures of the lung to detect possible cancer. ⁵ Biopsies can also be taken during the procedure to pathologically assess nodules in a laboratory. ⁵	Will the available equipment be able to cope with the predicted increase in diagnostics? Will additional resourcing be required to pathologically assess nodules biopsied via bronchoscopies?
Natural language processing (NLP)	Unlike AI image-analysis tools, NLP tools analyse the text of radiology reports to identify nodules, rather than the images themselves. NLP tools are deployed in the PACS to identify key words and phrases that indicate an IPN has been noted on imaging. ⁶ NLP tools can be trained on local reporting style and patterns so that a change to workflow is not required to identify nodules. ⁷ The NLP tool collates a list of all mentions of IPNs, which can then be reviewed by a programme administrator for accuracy. ⁷	Has NLP been tested and tailored to your health system? Do you need ethical approval to implement the tool?
AI to review imaging	An AI tool can be deployed to do a 'first read' of imaging to identify potentially malignant IPNs. ⁸ The tool assesses imaging and flags any suspicious nodules, which are then reviewed by a radiologist. ⁷ This helps reduce demands on the workforce while still ensuring a high level of accuracy and specificity. ⁸	Has the tool been validated in your local population? Does use of an AI tool require ethics board approval in your health system? How will you minimise false positives?

Optional

Optional

Technical resource	Purpose	Considerations
Radiomic/volumetry software	These measurement tools are embedded into imaging review software to help radiologists measure nodules volumetrically while assessing nodule morphology for likelihood of malignancy. ⁸ This facilitates measuring nodules more precisely, meaning growth (a key indicator of malignancy) can be more accurately assessed over time. It also helps reduce demands on the workforce by limiting the amount of manual measuring required. ⁸	Has radiomic/volumetry software been validated in your population? Does your workforce require additional training to use radiomic/volumetry software? Are appropriate IPN guidelines embedded into the tool to facilitate nodule assessment?
Navigation software	Navigation software is embedded into a health system's EHR and flags when patients have upcoming appointments, have missed follow-up care or not had follow-up appointments scheduled. ⁹ The software's notifications are used by programme staff to ensure appropriate care is provided. ⁹	Is navigation software embedded into your EMR (if you have one)? Has navigation software been tested in your local population? Does your workforce require additional training to use the software? Do patients need to be notified of the use of the software?

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