

Case study

From research to reality in the Mississippi Delta

How evidence-based lung nodule management has revolutionised the earlier detection of lung cancer



In one of the most socioeconomically disadvantaged regions of the US, where lung cancer rates are double the national average, a research study helped build a lung nodule programme to find the cancers that standard screening was never designed to catch. Comprehensive data collection and evaluation have allowed the programme to flourish.

Background

A region left behind: the need for research to tackle late-stage lung cancer diagnoses

High rates of lung cancer in the Mid-South are partially attributable to poor early detection strategies.

Rates of lung cancer in the Mississippi Delta are double that of the national average, and while rates are falling in the rest of the US, they continue to rise in the Mid-South region.¹ These abnormal trends have been attributed to low awareness of risk factors for lung cancer, late-stage diagnoses, and inadequate access to life-saving treatments – all of which are associated with the high levels of social deprivation across the region.^{1,2}

Management of incidental pulmonary nodules (IPNs) independently increases earlier detection of lung cancer, even when screening programmes are in place.

The Detecting Early Lung Cancer in the Mississippi Delta (DELUGE) programme was set up at Baptist Memorial Health Care Corporation (BMHCC, see *Box 1*) in 2015 to tackle the rising rates of lung cancer in the Mississippi Delta. BMHCC implemented concurrent programmes: targeted screening using low-dose computed tomography (LDCT), and lung nodule management, which acted as a safety net for people who had potentially malignant nodules identified through imaging outside of screening (*Table 1*) – that is, people with IPNs.³

Box 1. BMHCC

BMHCC is a non-profit community healthcare system that covers the Mid-South of the US – a region consisting of 128 counties in Eastern Arkansas, Mississippi, Western Tennessee, Southwestern Kentucky, Southeastern Missouri and Northwest Alabama.³⁻⁵

The Delta Regional Authority, which has been identified by Congress as the most socioeconomically deprived in the country, accounts for 44% of the BMHCC's remit.⁵

Table 1. Comparison of the outcomes from the two programmes of the DELUGE study between 2015 and 2024⁶

Performance measure	Lung nodule programme	LDCT screening programme
Number of people seen through the service	24,858	15,754
% of lung cancer diagnoses made in cohort	4.3%	3.8%
% of diagnoses made at stage I or II	57.5%	68.3%
Five-year survival rate for those diagnosed	46.0%	58.0%
% of cohort eligible for screening using US Preventive Services Task Force 2021 criteria*	48.1%	100.0%

* The USPSTF is a panel of experts in disease prevention and evidence-based medicine who provide recommendations about clinical preventive services. They create the eligibility criteria for lung cancer screening.

The DELUGE study established that IPN management is not an optional extra, but an essential mechanism to detect lung cancer earlier in populations that have previously been missed.

While both programmes proved that implementing early detection strategies helps improve survival rates, the lung nodule programme demonstrated that even if the whole eligible population underwent screening, 20% of early-stage lung cancers could only be diagnosed through IPN management.³

Finding, tracking and managing nodules within the Mid-South Miracle program

The Mid-South Miracle programme used key lessons from the DELUGE study to deliver multidisciplinary care for people with lung cancer, with IPN management being a core component of this. In 2020, the programme was implemented at BMHCC's Baptist Cancer Center.⁷ The programme is a seven-pronged, comprehensive service that provides smoking cessation, IPN management, LDCT screening, multidisciplinary care, high-quality surgical care, customised diagnoses and clinical trials.¹ The programme is offered at 26 centres within the BMHCC and aims to reduce deaths from lung cancer in the region by 25% by 2030.¹⁸

Box 2. IPN workflow within the Mid-South Miracle programme

Finding

- A natural language processing tool analyses radiology reports to identify noted pulmonary nodules, applies evidence-based rules to stratify findings, and supports automated worklist generation and follow-up tracking.⁸
- An external care management service is used to help filter or close low-risk/non-actionable findings based on programme rules and evidence-based criteria, reducing unnecessary navigator review.^{4,8}
- If people with IPNs are identified as needing follow-up care, the **ordering/referring physician and/or primary care provider (PCP) is notified and offered management** of their patient through the lung nodule programme.^{4,8}
- If the referring physician or PCP declines, they are still provided with follow-up recommendations by programme staff.⁴

Tracking

- People with IPNs are **contacted by programme navigators via phone call and letter** outlining recommendations for their follow-up care.^{4,8}
- **Navigators use a purpose-built digital dashboard, connected to electronic medical records, to track people** with IPNs through the programme, schedule appointments and identify any missed follow-up.^{4,7,8}
- The digital dashboard has built-in clinical decision aids to ensure navigators from different BMHCC sites provide the same evidence-based care, limiting variability in care provision.⁷

Managing

- People with **IPNs receive follow-up care as per the Fleischner Society guidelines.**
 - Those with nodules $\geq 8\text{mm}$ are recommended for further evaluation at the lung nodule clinic.⁹
 - Those deemed high risk are discussed at a weekly multidisciplinary oncology conference.⁴
- People diagnosed with lung cancer through the programme **receive multidisciplinary follow-up care in the Mid-South Miracle programme**, which has been shown to improve survival rates while also supporting person-centred care.⁴

Crucial elements of the lung nodule programme

Listen and evaluate

Overreliance on manual systems and inconsistent service provision contributed to issues with IPN management. In 2023, gaps in nodule identification and follow-up were identified, resulting in delayed care and a frustrated workforce.⁷ A whole-service evaluation was undertaken to identify the barriers that were causing variation in care provision across different sites in the BMHCC; fragmented tracking systems and consequently excessive manual administrative work for programme staff; and a high number of low-risk or non-actionable findings requiring navigator review.^{4,7}

Dedicated digital tools and external support services have helped increase workforce capacity and improve the programme's ability to identify, review and manage pulmonary nodules. To rectify the issues identified through the evaluation, a purpose-built digital platform was implemented.^{4,7} The platform embeds clinical decision aids into care workflows to reduce variation in care provision, and includes a bi-directional dashboard that seamlessly updates based on patient information from electronic medical records to allow programme navigators to easily track patients.^{4,7} An external care management service was also introduced to assist with the initial review and triage of all nodules flagged on radiology reports, including filtering low-risk or non-actionable findings according to programme rules and evidence-based criteria. This freed up time for programme navigators to focus on patient engagement and clinical decision-making.^{4,7} Since implementing the evaluation's recommendations, the programme has identified twice the number of nodules that were identified in the previous year.^{4,7}

Data, data and more data

Dedicated data managers facilitate constant programme evaluation and improvement. Within a secure database, the lung nodule programme consistently collects data on demographics, clinical characteristics, procedures, complications and health outcomes.¹⁰ These data are managed by full-time administrators who abstract, manage, audit and update data for all cohort individuals using the health system's standard operating procedures.¹⁰ This constant analysis tracks programme performance and has helped identify high-risk populations who need more targeted and considered outreach to engage with the programme.⁴ The implementation of the purpose-built digital platform for the programme also means that data insights from clinics in the BMHCC are collected and shared to facilitate collective service improvement and standardisation.⁴

We are the champions

Programme staff based in urban centres travel to rural clinics to promote engagement with the lung nodule programme, and foster relationships to ensure consistent service provision across the BMHCC. The programme is in place across the BMHCC, but there is variation in staffing levels and programme workflow between hub and spoke sites.⁴ Clinical and administrative champions are used to promote engagement with the programme, as well as monitoring and reporting on local programme performance.⁴ Programme navigators and nurses also attend rural sites to share insights from metropolitan hubs with rural staff, as well as fostering relationships to ensure effective service delivery in locations without the workforce capacity to have a full clinical and administrative team.⁴ The use of champions has resulted in less variation in service provision and a more engaged workforce across clinics.⁴

Key takeaways

Understanding the impact of an IPN programme on a specific population through research studies can help embed effective IPN management programmes into standard healthcare services.

Listening to programme staff to inform the evaluation of an IPN programme, and updating the service based on their feedback, helps ensure optimal service provision while reducing workforce capacity demands.

Using dedicated staff to facilitate comprehensive data collection and analysis is essential for service assessment and improvement, and to ensure that IPN management reflects the needs of high-risk populations.

Knowledgeable staff champions share insights about IPN management across different sites in a large health system, and can foster relationships to ensure consistent service provision.

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