PATHOLOGY
Transformation

Review 2026

Chaired by Lord Carter of Coles

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Foreword

Pathology is fundamental to modern healthcare. It underpins urgent care, cancer pathways and long-term condition management, while operating largely out of public view. In earlier reviews, I argued for pathology to be organised and managed at scale to improve quality, safety and productivity. Since then, the UK has moved from largely standalone laboratories towards more integrated arrangements intended to reduce unwarranted variation, strengthen resilience and make better use of scarce expertise. The purpose remains straightforward: organise at scale, standardise what should be standard and measure performance in ways that support improvement.

That direction has been tested in practice. During the pandemic, services with shared operating models were better able to redeploy staff, balance work across sites, maintain continuity and respond at pace to exceptional demand. More broadly, where integrated operating models have been completed and managed well, the benefits are clear: stronger resilience, more consistent performance, better procurement, greater workforce flexibility, and a firmer platform for digital and automation. The lesson is simple. Integration is not an abstract policy preference. Done properly, it improves services and supports better outcomes.

Progress has been real, but slower than the system now requires. In too many places, organisational arrangements have been created without the full operating model needed to make integration work in practice. As demand rises, case mix becomes more complex and workforce pressures intensify, partial implementation is no longer enough. The task is not to revisit the case for change, but to complete it.

Pathology performance should also be understood across the whole patient pathway, not only within the laboratory. Timely diagnosis depends on reliable access to testing, including phlebotomy and sample collection, clear routes for requesting and reporting, efficient transport and processing, and results that can be acted on quickly by clinicians. Improvements in laboratory productivity will not deliver their full value unless the end-to-end pathway works well for patients and for the services that depend on it.

I am grateful to the Institute of Biomedical Science (IBMS) and its Council for commissioning this review. In doing so, they have shown leadership and confidence in the profession they represent, and a willingness to invite independent scrutiny of progress and performance. That matters, because this report is not an abstract vision document. It sets out a practical route from evidence and proof of concept to delivery.

Three requirements stand out. First, pathology needs common standards and comparable data, so that performance can be understood and improved with confidence. Second, funding and payment systems must support delivery and reinvestment, with payment more clearly aligned to activity so that value can be identified, retained and reinvested in the workforce, quality systems and infrastructure needed for safe and resilient services. Third, oversight must be clear, provider-agnostic and linked to improvement, recognising pathology as critical infrastructure for patient safety and timely diagnosis.

Pathology will continue to evolve with science and technology, both within the laboratory and closer to the patient. Common data standards, interoperable systems, reliable quality controls and mature operating models are needed to improve performance now; they will also make pathology ready for the safe and effective use of emerging technologies, including artificial intelligence.

Across the UK, health systems are moving towards earlier diagnosis and prevention, more care closer to home, better use of digital technology and data, and more productive, resilient services. Pathology is central to that future. The opportunity described in this review is achievable now. The next step is delivery: to complete the journey where it remains unfinished, and to ensure pathology operates with the maturity, capability and discipline that patients, clinicians and the wider health system need.

Lord Carter of Coles

Executive Summary

- UK pathology sits at the heart of the healthcare system. It delivers more than 2 billion tests each year and supports 95% of patient pathways.
- When pathology is weak, the whole system feels it. Delays, uneven access, fragmented oversight and variable operating model maturity do not stay within laboratories; they affect diagnostics, waiting times, cancer pathways, resilience and wider system flow.
- This report shows that improvement is achievable now. Across the UK, the issue is not whether health systems know what good looks like. It is whether they are prepared to scale what is already known to work.
- Demand for pathology is rising, and continued investment in workforce and infrastructure will be needed to support growth and deliver the ambitions of the 10 Year Health Plan. Completing the transformation already under way is the route to expanding capacity, strengthening resilience and realising the savings identified in previous reviews.
- Genomics, digital pathology and AI-enabled tools are expanding what pathology can deliver, from earlier diagnosis to more personalised care and better use of specialist expertise. Although AI is not yet a proven technology, like genomics it shows great promise.

The opportunity

- Analysis of national datasets and scenario modelling identifies an annual saving opportunity of approximately £450 million, with a cumulative impact of around £1.4 billion by 2029/30 if most activity operates at fully integrated operating benchmarks. The preferred route to releasing this value is a shadow price-per-test tariff, initially for community and GP-requested testing, with realised gains retained for reinvestment in pathology.
- This is a case for reducing unwarranted variation, improving performance, and creating a clearer route to reinvestment in workforce, digital infrastructure, quality systems and service resilience. High-performing service models that have already delivered efficiencies should not be expected to deliver the same savings again; the aim is to spread improvement while protecting the resilience of services that are already performing well.
- The opportunity is clinical, operational and financial: better turnaround for patients; stronger specialist capacity; improved resilience; and better value from resources already in the system.

The current pressures

- Fewer than half of providers meet acute turnaround standards in blood sciences.
- Fewer than 10% meet 7- or 10-day histopathology turnaround targets.
- Workforce is the immediate delivery constraint. Consultant vacancies remain high, particularly in cellular pathology..
- Nearly half of pathologists are aged over 50, with early retirement intentions rising.
- Scientific training capacity is constrained, limiting throughput, resilience and the ability to deliver reform.
- Quality standards remain generally high, with over 90% of laboratories accredited to International Organization for Standardization (ISO) 15189. However, oversight is fragmented, escalation is inconsistent, and newer delivery models such as point-of-care testing (POCT), digital pathology and direct-to-patient (DTP) testing are not always fully embedded within national assurance arrangements.
- Incomplete integration carries risk. Partially integrated service models show higher incident backlogs than either fully integrated or non-integrated configurations.

What is holding progress back

- Opaque costing and funding, which weaken benchmarking and obscure value.
- Incomplete single management arrangements, which leave some service models integrated in structure but fragmented in operational control, accountability and delivery.
- Dispersed assurance arrangements, which do not consistently link risk to consequence.
- Uneven digital maturity, which limits comparability, resilience and operational control.

What this review proposes

The review does not recommend further structural reorganisation. The priority is to make existing service models deliver as intended:

- Complete operational integration within service models.
- Establish a comparable national dataset spanning quality, workforce, access, digital and value.
- Strengthen workforce planning, training capacity and advanced practice across service models.
- Align digital infrastructure, workforce redesign and funding reform.
- Embed clear service model-level accountability with defined escalation pathways.
- Develop payment systems that are more clearly aligned to activity, so cost, value and reinvestment can be tested transparently before any live financial implementation.

The task is practical: reduce unwarranted variation; complete operational integration; build workforce resilience; strengthen assurance; track performance across the full sample journey; and ensure that performance expectations are matched by consistent data, governance and investment.

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Acronyms

ACP	Actes de cytologie et de pathologie (France)
AI	Artificial intelligence
APL	Approved Pathology Laboratory
ARS	Agence Régionale de Santé
AURAGEN	Auvergne-Rhône-Alpes Genomics platform (France)
BTS	Brevet de technicien supérieur (France)
CCT	Certificate of Completion of Training
CESR	Certificate of Eligibility for Specialist Registration
COFRAC	Comité français d'accréditation
CPD	Continuing professional development
CQC	Care Quality Commission
CRP	C-reactive protein
CSS	Complémentaire santé solidaire (France)
CT	Computed tomography
DAPB4101	NHS Digital pathology interoperability standard
DHSC	Department of Health and Social Care
DTP	Direct-to-patient
EBITDA	Earnings before interest, taxes, depreciation and amortisation
EBM	Einheitlicher Bewertungsmaßstab (Germany)
EPR	Electronic patient record
EQA	External quality assessment
ESR	Electronic staff record
FBC	Full blood count
FHIR	Fast Healthcare Interoperability Resources
FTE	Full-time equivalent
FY2024	Financial year 2024
GBEA	Guide de Bonne Exécution des Analyses (France)
GDP	Gross domestic product
GI	Gastrointestinal
GIRFT	Getting It Right First Time
GLH	Genomic Laboratory Hub
GP	General practitioner
HCPC	Health and Care Professions Council
HIV	Human immunodeficiency virus
HQ	Headquarters
HR	Human resources
HRG	Healthcare Resource Group
HSC	Health and Social Care
IBMS	Institute of Biomedical Science
ICB	Integrated Care Board
ISO	International Organization for Standardization
ISO 15189	ISO 15189 medical laboratories standard
ISO 15189:2022	ISO 15189:2022 medical laboratories standard
ISO 22870	ISO 22870 point-of-care testing standard
IT	Information technology
KPI	Key performance indicator
LIMS	Laboratory information management system
LINC	Laboratory information network (Wales)
LIS	Laboratory information system

MBS	Medicare Benefits Schedule (Australia)
MDT	Multidisciplinary team
MLA	Medical laboratory assistant
MSC	Managed service contract
NABM	Nomenclature des actes de biologie médicale (France)
NAPDC	National Annual Pathology Data Collection
NATA	National Association of Testing Authorities (Australia)
NGAP	Nomenclature Générale des Actes Professionnels (France)
NGS	Next-generation sequencing
NHS	National Health Service
NHSE	NHS England
NIHR	National Institute for Health and Care Research
NIPIMS	Northern Ireland Pathology Information Management System
NPAAC	National Pathology Accreditation Advisory Council (Australia)
PCR	Polymerase chain reaction
PLICS	Patient-level information and costing system
PMC	PubMed Central
POCT	Point-of-care testing
PPP	Paediatric and Perinatal Pathology
PQAD	Pathology Quality Assurance Dashboard
QA	Quality assurance
QC	Quality control
QMS	Quality management system
RCP	Royal College of Physicians
RCPA	Royal College of Pathologists of Australasia
RCPath	Royal College of Pathologists
RFID	Radio-frequency identification
RIHN	Référentiel des actes Innovants Hors Nomenclature (France)
SME	Subject matter expert
SNOMED	Systematized Nomenclature of Medicine – Clinical Terms
SOP	Standard operating procedure
SPA	Supporting Professional Activities
SPaN	Scottish Pathology Network
TAT	Turnaround time
TSH	Thyroid-stimulating hormone
UK	United Kingdom
UKAS	United Kingdom Accreditation Service
UNCAM	Union nationale des caisses d'assurance maladie (France)
VAT	Value added tax

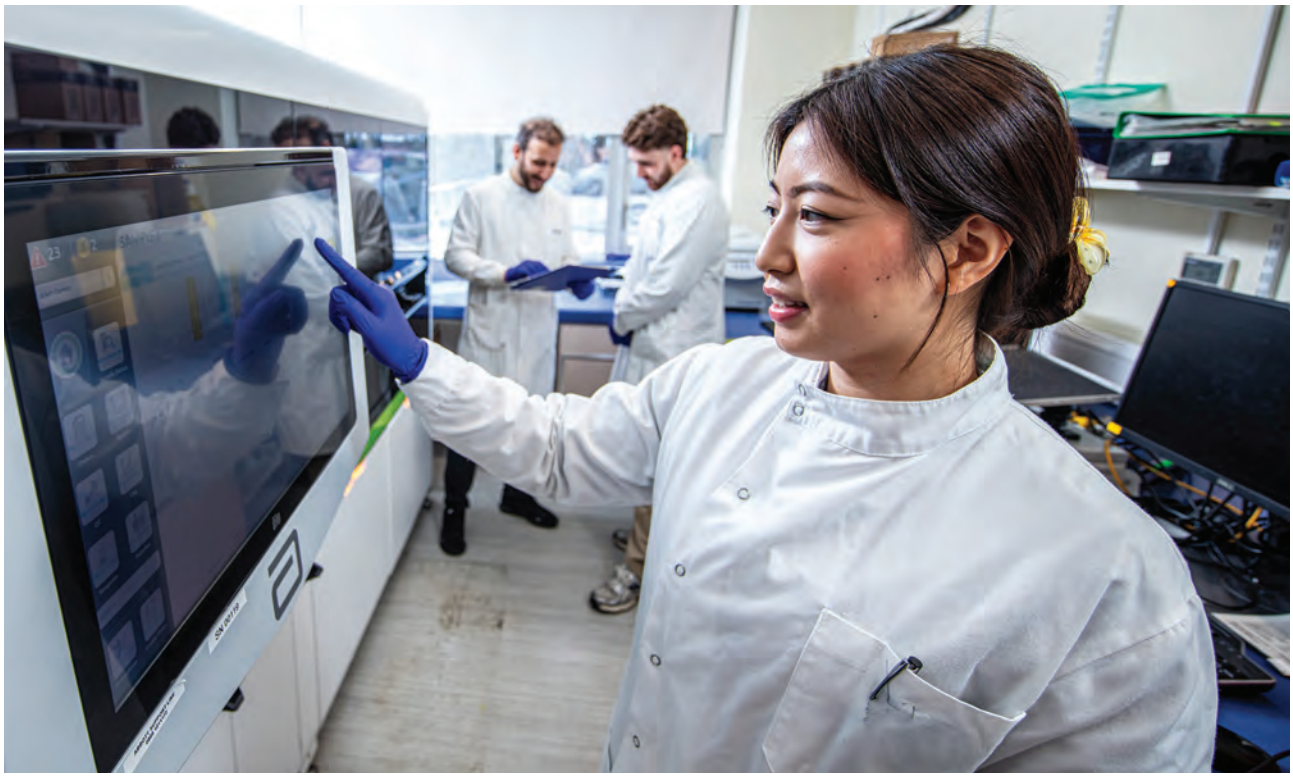
Analytical framework

This review combines objective national datasets with contextual evidence on governance and operating model design to assess performance across UK pathology services.

Where comparable UK-wide data are not available, analysis is transparently England-weighted. Findings are interpreted alongside structural context, including the Pathology Network Maturity Assessment, which provides insight into governance and operating model development but is not used as a standalone performance measure.

To enable like-for-like comparison, providers are grouped using a consistent operating model segmentation based on the degree of operational integration and activity flows. This classification is applied consistently across all chapters and underpins comparisons of quality, workforce, access, digital capability and value.

Detailed definitions, evidence hierarchy and limitations are set out in the Methods section.



Methods, definitions and evidence handling

This review combines national administrative datasets, published literature, regulatory documentation and structured stakeholder input to assess performance, variation and improvement opportunities across UK pathology services.

Evidence sources and weighting

The primary quantitative evidence is drawn from national administrative collections, including the National Annual Pathology Data Collection (NAPDC), the Pathology Quality Assurance Dashboard (PQAD), NHS Model Hospital datasets, and equivalent national datasets in comparator countries where available. These sources provide consistent activity, cost and quality indicators at trust and service model level.

Secondary weight is assigned to peer-reviewed academic literature, formal regulatory publications (for example UKAS and CQC reports), and official reimbursement schedules or statutory guidance in comparator systems.

Qualitative insights from stakeholder interviews, provider submissions and industry sources are used to contextualise operational mechanisms and implementation barriers. These are treated as supporting evidence and are cross-checked against primary quantitative data wherever possible.

Where only ranges or qualitative descriptions are available, they are presented as indicative context rather than precise benchmarks.

Timeframe and comparability

Unless otherwise stated, quantitative analysis focuses on the period 2020–21 to 2024–25, with partial 2025 data included where reported. International comparisons focus on the last decade of reform and on the period following the move toward operational integration within existing service models in England.

Data availability and definitional consistency vary between the four UK nations. Where comparable UK-wide datasets are not available, England-weighted data are used transparently, with caveats stated in the relevant chapters.

Operating model segmentation

For analytical consistency, providers are grouped using a standard operating model segmentation based on activity flows and the degree of operational integration, rather than on self-assessed maturity.

Integration in this review refers to operating as a single unified service through common standards and controls, including shared governance, interoperable digital systems, harmonised SOPs and quality management arrangements, and the ability to redistribute work and workforce across sites.

Service models are classified as:

- **Fully integrated service model** – Over 90% of activity is delivered within a single managed service operating with shared standards, unified governance and aligned digital and quality controls.
- **Partially integrated service model (transition state)** – Some activity is shared, but standards, governance or digital controls remain mixed or split, indicating incomplete operational integration.
- **Non-integrated service model** – Activity is distributed across multiple providers operating independently, without a unified managed service model or harmonised governance and controls.

This segmentation is applied consistently across quality, workforce, access, digital and value analyses to enable like-for-like comparison.

Key working definitions

To ensure clarity across chapters, the review uses the following cross-cutting definitions:

- **Quality** refers to the consistency, accuracy and clinical reliability of diagnostic testing, supported by accreditation, quality control, proficiency testing and incident management systems.
- **Access** refers to the timeliness and reliability with which patients receive diagnostic results once eligible for testing.
- **Value** refers to the relationship between cost, activity and performance, including productivity, skill mix and the efficient use of workforce and infrastructure.
- **Unit cost or unit price** refers to an illustrative cost or reimbursement rate per test, used to compare cost signals or indicative benchmarks rather than full system costs.

Where chapter-specific definitions differ slightly because of dataset conventions, those conventions are followed and any material limitations are stated.

Scope and limitations

This review examines structures, operating models, funding mechanisms, quality oversight and performance patterns. It does not attempt a comprehensive clinical audit of diagnostic accuracy, harm, mortality or morbidity across systems.

Tariffs, reimbursement schedules and per-test prices are used as indicators of relative cost signals. They differ between countries in scope and inclusions and may exclude elements such as clinical interpretation time, estates, digital infrastructure or downstream care. They are not treated as directly comparable to fully loaded UK cost per test.

The operating model segmentation is derived from activity flows and configuration data. While this enables consistent classification, it cannot capture all nuances of local governance or informal collaboration.

Data completeness varies between providers. Where submissions are incomplete or inconsistent, exclusions are applied transparently and noted in the relevant chapter. Scenario modelling in the Value chapter is based on stated assumptions and sensitivity testing; it illustrates potential system impacts rather than predicting exact financial outcomes.

International comparators are limited to high-income health systems with available data and broadly comparable clinical expectations. Lower- and middle-income settings, competition law analysis and formal antitrust assessment fall outside the scope of this review.

Environmental sustainability, equity impacts and workforce wellbeing are treated as cross-cutting considerations and are examined in relevant thematic chapters rather than inferred directly from international tariff or volume comparisons.

PART 1: INTERNATIONAL CONTEXT

Executive summary

Since 2016, the direction for English pathology has been defined by moving from stand-alone laboratories towards more integrated operating models, with common standards, shared platforms and unified governance. However, only around 15% of laboratories currently operate within fully integrated services. At the same time, UK pathology represents a substantial and growing area of expenditure, estimated at around £5 billion on the market definition used in this review. Expenditure is broadly in line with international peers as a share of gross domestic product (GDP), but delivers around 20%-30% fewer tests per capita, with clear caveats on comparability.

This section uses international research based evidence (particularly France, Germany and Australia) to test whether England's direction of travel is aligned with high-performing systems. It also identifies what enables integration to translate into improved access, quality, turnaround and workforce sustainability.

Across comparator systems, fully integrated operating models are now the default. High-performing systems typically use scale to:

- run central technical platforms
- standardise processes and quality management
- invest in automation and digital capability
- maintain local access points and clinical relationships.

Funding is a key driver. Where there are clear national unit prices (or price-per-test schedules), payers tighten rates over time and expect providers to respond through standardisation, procurement discipline, automation and sustained digital investment. For this to work, pricing must be transparent and cost-reflective, including the reinvestment needed.

England's starting position

The English model sits apart. Block funding supports universal coverage and stability, but internal pricing is opaque and there is no national price-per-test schedule. This:

- limits benchmarking
- makes it harder to track whether integration is improving value
- makes it harder to create consistent routes for reinvestment in equipment, digital infrastructure, logistics and training.

International evidence also reinforces that integration is a tool, not an end in itself. Quality regulation functions mainly as system assurance, complemented by a small set of safety and outcome indicators. Direct evidence linking fully integrated operating models to improved patient outcomes remains limited, so governance, transparency and clear accountability matter.

What England needs for integration to deliver

International comparators indicate that fully integrated services deliver benefits only when they are enabled by three mechanisms:

- **System assurance** – accreditation and surveillance used as a baseline for participation, supplemented by a small set of safety and performance indicators.
- **Transparent incentives** – clear pricing and investment signals that support standardisation, automation and procurement discipline over time, including sustained reinvestment in workforce and infrastructure.
- **Digital and logistics infrastructure** – shared LIMS, pre-analytics and transport models that allow scale to translate into reliable turnaround, access and resilience.

This chapter uses the French case study to illustrate how these mechanisms interact in a mature system, before bringing the findings back to the UK context.

Introduction

This chapter uses international experience to identify what enables fully integrated pathology services to deliver improvements in clinical safety, turnaround times (TATs), equity of access and workforce sustainability.

It draws on evidence from systems that have reached maturity in integrated delivery, specifically France, Germany and Australia, to examine how they organise pathology at scale, assure quality, and invest in digital and logistics infrastructure. It contrasts these approaches with England's current transitional position and draws out implications for the wider UK.

The analysis follows a deliberate funnel. First, it reviews broad international patterns to describe what 'good' looks like in integrated, digitally enabled pathology services, including the trade-offs systems have made between block funding and national unit prices, and between public and independent provision. Second, it presents a case study of the French system to illustrate how these levers apply in a comparable European context. Finally, it brings the findings back to the UK to test whether England's direction of travel is aligned with high-performing systems, and to identify the specific gaps that prevent partially integrated and non-integrated services from realising the benefits of scale.

The chapter explains how comparators have been selected, how evidence has been graded, and how definitions have been harmonised so that metrics such as TAT, incidents, accreditation scope and unit costs can be compared fairly. It is explicit about limitations. Accreditation is treated as system assurance rather than a direct proxy for outcomes, and incident and TAT data are used with caveats on comparability.

Ultimately, this chapter anchors the detailed domain chapters on Quality, Workforce, Access, Digital and Value. It provides an evidential baseline for the review's central questions about how fully integrated services should be implemented in practice, and about the economic and operational mechanisms that convert integration into consistent performance.

Methods, definitions and evidence handling

This review includes a comparative assessment of health systems that have pursued operational integration at scale. France, Germany, Australia and the United States were selected to represent statutory insurance, tax-funded and mixed models, and to reflect settings where operating model maturity and national quality regulation are documented and relatively mature. These comparators are used to test how funding, governance and workforce design influence quality, access, digital capability and value, before considering implications for England and the other UK nations.

The main quantitative evidence is drawn from national administrative datasets and published sources, supplemented by structured stakeholder interviews. Evidence is weighted using a three-tier hierarchy:

- **Primary** – National administrative performance datasets (e.g., NHS Model Hospital, French NABM data, Australian Medicare statistics).
- **Secondary** – Peer-reviewed academic literature and formal regulatory publications (e.g., UKAS, CQC).
- **Tertiary** – Industry reports and stakeholder interviews, used to explain operational mechanisms and implementation constraints and verified against primary data where possible.

The analysis focuses on the last decade of reform in comparator systems and the post-2016 move toward operational integration within existing service models in England, aligned to the current configuration of 27 pathology networks (service models).

Figures are presented where definitions and denominators are clear. Where only ranges or qualitative assessments exist, findings are described as indicative rather than precise benchmarks.

For consistency across chapters:

- **Eligibility** refers to entitlement to publicly funded diagnostic services.
- **Access** refers to the timeliness and reliability of receiving results once eligible.
- **Quality** refers to the consistency, accuracy and clinical reliability of diagnostic testing, supported by accreditation and quality assurance processes.
- **Unit price** refers to an illustrative per-test reimbursement rate used to compare price signals, not full cost structures.

Where reimbursement schedules cover only part of the testing workflow, this is stated explicitly and unit prices are not treated as directly comparable to fully loaded UK cost per test. In the UK, community and acute pathology activity may sit within different NHS funding and accounting routes, including block arrangements, local contracts and wider hospital payment flows. Where pathology is bundled into broader payment mechanisms, this review treats any implied unit price as a benchmarking signal rather than a direct reimbursement rate.

Scope and limitations

- The review focuses on structures, funding mechanisms, operating models and broad performance patterns. It does not attempt a full international comparison of diagnostic accuracy, harm, mortality or morbidity. These outcomes are examined in more depth in the Quality and Access chapters.
- Tariffs and fee schedules are used as indicators of relative cost signals, not full system costs. Their scope varies between countries and may exclude interpretation time, estates, digital infrastructure or downstream care.
- Equity, digital maturity, workforce sustainability and system resilience are considered at high level in the international context and examined in detail in the relevant thematic chapters.
- Comparator systems are limited to high-income countries with broadly comparable clinical expectations and available data.
- Environmental sustainability and net zero requirements are recognised as cross-cutting constraints but are not inferred directly from international tariff or volume comparisons.

Discipline-specific context

International evidence is strongest for high-volume, automated testing in blood sciences. Data for anatomical pathology are less standardised and less comparable. Accordingly, international analysis emphasises the industrial logic of operational integration and automation in blood sciences, while recognising that in cellular pathology the case for operational integration rests as much on clinical resilience and access to sub-specialist expertise as on efficiency.

Infection sciences operate under additional public health and surge-capacity imperatives. While automation applies to serology and molecular platforms, operational integration in infection services must balance efficiency with local resilience, antimicrobial stewardship and reference laboratory capacity. These considerations are reflected in the UK-focused chapters.

Funding, pricing and investment models

Tariff structures and block funding

International pathology markets have moved largely to activity-based contracts with transparent, centrally defined tariffs. In France and Germany, statutory health insurance sets a national fee schedule that reimburses individual tests, with negotiations between government, insurers and provider unions at regular intervals. In Australia, the Medicare Benefits Schedule performs a similar role, defining rebates for a basket of tests, with providers able to charge above that level if they do not bulk bill. In these systems, per test reimbursement is visible, contracts are usually negotiated nationally or regionally, and capital investment is supported by clear volume and price signals.

Within this landscape, France stands out as a mature example of integrated, unit price funded medical biology. A national NABM fee schedule governs reimbursement, tariffs are low and tightly controlled, and providers must comply with centrally set prices to participate in the market. Hospital provision is block funded, but most routine medical biology is delivered through large independent services operating within this per test framework. Over two decades, this combination of transparent tariffs and universal accreditation has driven structural integration at scale into a small number of large groups that can sustain investment in automation, logistics and digital tools despite downward pressure on tariffs.

Germany and Australia show variations on the same activity-based theme. In Germany, statutory sickness funds reimburse via a national EBM fee schedule, with test prices and volume rules agreed between government and professional bodies. Tariffs are generally higher than in France, reflecting a greater willingness to fund testing and support innovation and adoption of new technology, but they are periodically revised and subject to volume caps. In Australia, Medicare rebates are set nationally and underpin a market in which large private providers deliver most routine testing. Providers can charge above the rebate where they do not bulk bill, but the public rebate still structures investment decisions and market competition.

The UK model sits apart. Block funding remains the dominant mechanism, with pathology typically bundled into wider trust budgets rather than exposed to a transparent per-test tariff. Direct access and out-of-hospital diagnostics are often funded through block or locally negotiated arrangements, while inpatient testing is absorbed into wider secondary care payment flows. There is no national price-per-test schedule equivalent to NABM, EBM or the MBS, and internal costing methods vary between trusts and service models.

Universal coverage is secured by the NHS's publicly funded model, but the absence of transparent activity-aligned pricing has limited the benchmarking, investment and reinvestment dynamics seen in France, Germany and Australia. Progress towards integrated service models has depended on central reorganisation and local agreements rather than consistent financial signals. A related consequence is that adoption of novel or updated assays can be slower and more variable, with universal implementation often taking years even where the clinical case is established (for example high-sensitivity troponin assays and placental growth factor-based testing in suspected pre-eclampsia, where locally agreed pathways and investment decisions drive pace and consistency).

Block funding can provide short-term budgetary predictability, but it is a weak mechanism for a high-volume diagnostic service where activity, cost, turnaround, quality and demand can be measured. The relevant alternative is not uncontrolled fee-for-service, but a governed price-per-test approach, developed first as a shadow tariff, with core-volume assumptions, marginal pricing controls and explicit safeguards for quality, access, workforce, resilience and reinvestment.

This creates a structural contrast that the review has explored. International comparators show how activity-based models with clear tariffs can underpin long-term structural integration, capital investment and scaling across services. The English system operates the same structural services, but within a block-funded environment that does not systematically reward scale, transparency or productivity. Later sections examine how far that funding model helps or hinders the completion of integrated service models and the reinvestment of efficiency gains.

Price evolution, volume controls and reinvestment mechanisms

Over the last decade, most comparator systems have tightened the price of individual tests while allowing volumes to rise. In France, NABM tariffs for a representative basket of common tests, including full blood count, vitamin D, influenza polymerase chain reaction (PCR) and thyroglobulin immunoassay, have fallen by around 1%–2% a year in nominal terms. The current illustrative reimbursement for vitamin D is roughly a third of the UK's internal cost estimate and markedly below German and Australian benchmarks. These reductions have been absorbed mainly through integration of services and industrial efficiencies; large independent services have centralised platforms, standardised consumables and negotiated better procurement terms to maintain viability despite lower unit prices.

Germany and France have both had to manage the risk that fee-for-service reimbursement encourages over-testing. In Germany, centrally agreed EBM reforms have introduced volume caps and point budgets, with lower marginal reimbursement when activity rises beyond agreed levels. The 2025 reforms go further, introducing flat-rate payments specifically to support digital infrastructure, funded directly by a reduction of around 9% in reimbursement for existing tests – effectively transferring value from analytical volume to digital capability. Price per test for common assays remains higher than in France, reflecting a greater willingness to fund testing, but successive reforms have reduced average reimbursement in real terms. In France, a global expenditure envelope for medical biology is negotiated every three years; if overall volumes exceed forecasts, NABM tariffs are reduced across the sector through subsequent "avenants" to bring spend back within the agreed envelope. In both systems, investment in automation, digital order transmission and new flat-rate payments for digital services has been at least partly financed through these tariff and volume adjustments.

Australia illustrates the impact of holding public rebates flat. Medicare rebates for core pathology tests were effectively frozen for over two decades, with indexation only resuming for select specialties in 2025. In real terms, public reimbursement has declined, even as demand and input costs have risen. To maintain margins under this pressure, large independent providers have aggressively pursued economies of scale and widespread automation, while also charging above the rebate level where permitted. There is evidence that this has sustained rapid turnaround and supported widespread automation, but it has also contributed to rising costs to government and concerns about incentives for over testing.

In the USA, by contrast, list prices and reimbursements for common tests are far higher. Medicare defines baseline fees via the Clinical Laboratory Fee Schedule, but private insurers often pay two to three times more for the same assay. Nominal prices have been brought down at the margin by reforms and reference pricing, yet remain high compared with European benchmarks. This has supported cutting-edge capabilities and rapid access for well-insured patients, but at the cost of pronounced inequity and administrative waste. For the purposes of this review, the USA serves largely as an upper bound on what unconstrained, multi-payer activity-based models can produce, rather than a template for NHS policy.

These mechanisms sit alongside efforts to influence clinical ordering behaviour. In tariff-funded systems, laboratories and payers have used test utilisation protocols, reflex and reflective testing, and feedback to clinicians to reduce clearly inappropriate demand. The UK has pursued similar goals through programmes such as Getting It Right First Time (GIRFT) and national demand optimisation projects, but without a national tariff the financial incentives sit within block contracts rather than at individual test level. The Value and Access elements of this review return to how demand is managed in practice and how far services can influence appropriate test use.

The UK, operating without a national per-test tariff, has experienced a different pattern. Overall laboratory spend within block contracts has been held broadly static in real terms, despite rising demand and input costs. **Without explicit unit prices or national rules on volume, pathology has absorbed growth by squeezing local budgets, deferring replacement of ageing equipment and relying on short-term workforce measures.** The £50 million capital programme for digital pathology and the roll out of LIMS and artificial intelligence (AI) tools in community diagnostic centres demonstrate that targeted national investment can accelerate adoption, but these remain time-limited initiatives rather than a recurrent reinvestment mechanism.

Across these systems, three themes emerge for the UK analysis:

- Sustained downward pressure on unit prices in France, Germany and Australia has been deliberately linked to integration, automation and procurement discipline, creating a virtuous circle where scale pays for investment.
- Volume controls and tariff reforms have been used to manage demand and fund new capabilities, whether through flat rate payments for digital services or revised baskets of reimbursed tests.
- The English block funding model currently lacks a clear route for translating productivity gains from integrated operations into reinvestment in equipment, digital infrastructure or training at the service model level.

The rest of the chapter examines which elements of international pricing and reinvestment approaches could be adapted to support a more sustainable and transparent funding model for UK pathology services.

Innovation, new tests and reimbursement

Activity-based systems also shape how new diagnostics are adopted. In France and Germany, new biomarkers and technologies generally require inclusion in the national fee schedule before they can be widely reimbursed. Temporary mechanisms such as France's RIHN scheme provide interim funding for innovative tests, but full roll-out depends on formal tariff decisions that can take time. This can create a lag between scientific readiness and routine funded use, particularly where evidence is still emerging.

In the UK, block funding and local commissioning can allow individual trusts or services to adopt new tests ahead of national policy where they can absorb the cost, but conversely can delay adoption where budgets are constrained or benefits fall outside the local organisation. This flexibility has allowed some UK providers to be early adopters of niche or high-impact innovations, even where no national tariff yet exists, though it also creates variation in access. The Digital and Value chapters compare these routes in more detail, including for genomics and advanced molecular diagnostics.

Over two decades, France has moved from a fragmented landscape of small laboratories to a market where a number of large groups deliver most routine testing under a national fee schedule, within a universal insurance system.

This section looks at how that combination of structure, funding and assurance works in practice. It describes the split between medical biology and anatomical pathology, the patient and funding journeys for inpatient and outpatient testing, and the role of statutory and complementary insurance. It then considers how tariffs, budget envelopes and innovation schemes have shaped integration at scale, digital investment and workforce deployment.

The aim is not to present France as a template for the NHS, but to provide a clear reference point. Later, the subsequent UK analysis asks which mechanisms behind the French model – transparent tariffs, scale, and the link between accreditation and reimbursement – could support standardised, integrated pathology services in a publicly funded system.

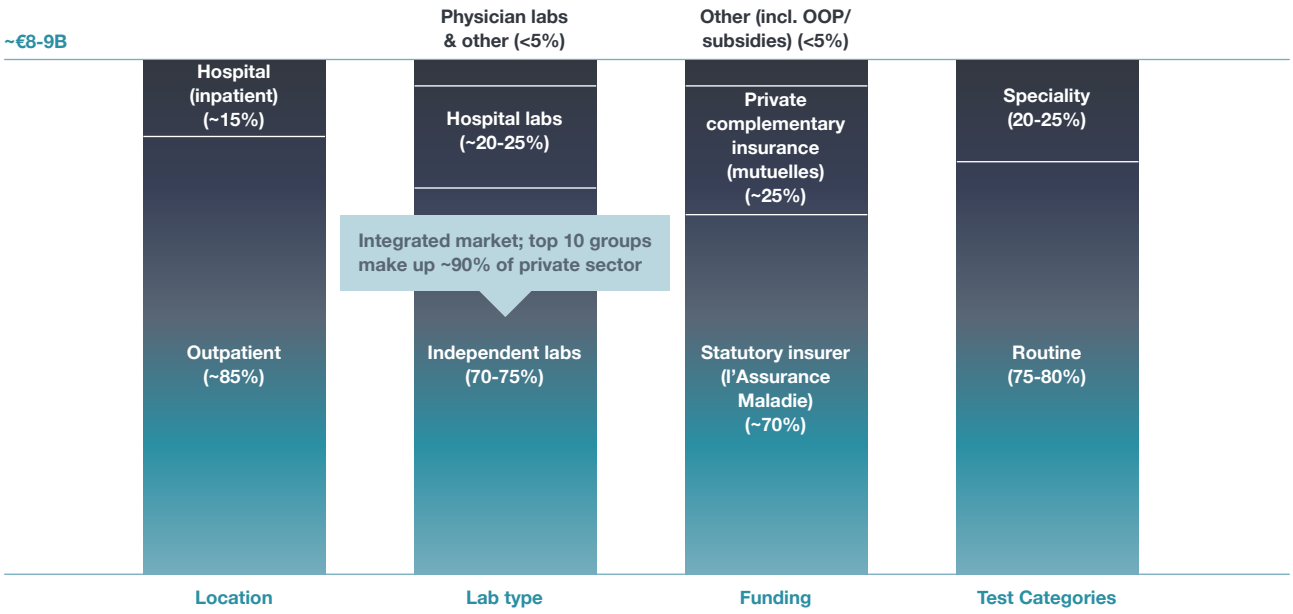
France – case study

Why France is the primary reference case

- France combines near-universal coverage with a medical biology sector integrated at scale, holding mandatory International Organization for Standardization (ISO) 15189 licensing across all laboratories.
- It sits at the "hard regulation" end of the international spectrum: statutory accreditation, regular external surveillance and clear enforcement powers, including the ability to restrict or suspend activity where serious quality concerns arise.
- Germany and Australia share similar statutory quality expectations, but the integration of services is less complete and data on cost and market structure are more fragmented.
- France therefore offers the clearest "end-state" example of standardised, digital-enabled, integrated pathology service under tight quality regulation.
- Ownership and insurance arrangements are treated as context, not as elements to replicate in the NHS. The operational mechanics that matter for this review – centralised logistics, interoperable LIMS, unified quality governance and service model-level workforce deployment – are ownership-agnostic and can be applied in publicly owned services.

Market Fundamentals

France laboratory diagnostic market 2024: estimated ~€8-9B with ~2% CAGR



Note: [1] "Other" includes other insurances (e.g. accident), coverage by associations/ companies and out-of-pocket expenses (OOP)
Source: HBI, OECD; Lit search; Market participant interviews

France – overview of structure and funding flows

France illustrates how an integrated, tariff funded market can organise high-volume medical biology alongside more specialist anatomical pathology. The overall laboratory market is around €8–9 billion with modest growth, dominated by outpatient, routine testing. Medical biology accounts for roughly 85–90% of test volumes and anatomical pathology for 10–15%. Most outpatient activity is handled by large independent groups running high-throughput automated platforms; inpatient work is mainly delivered by public hospital laboratories, with selective outsourcing of specialist tests.

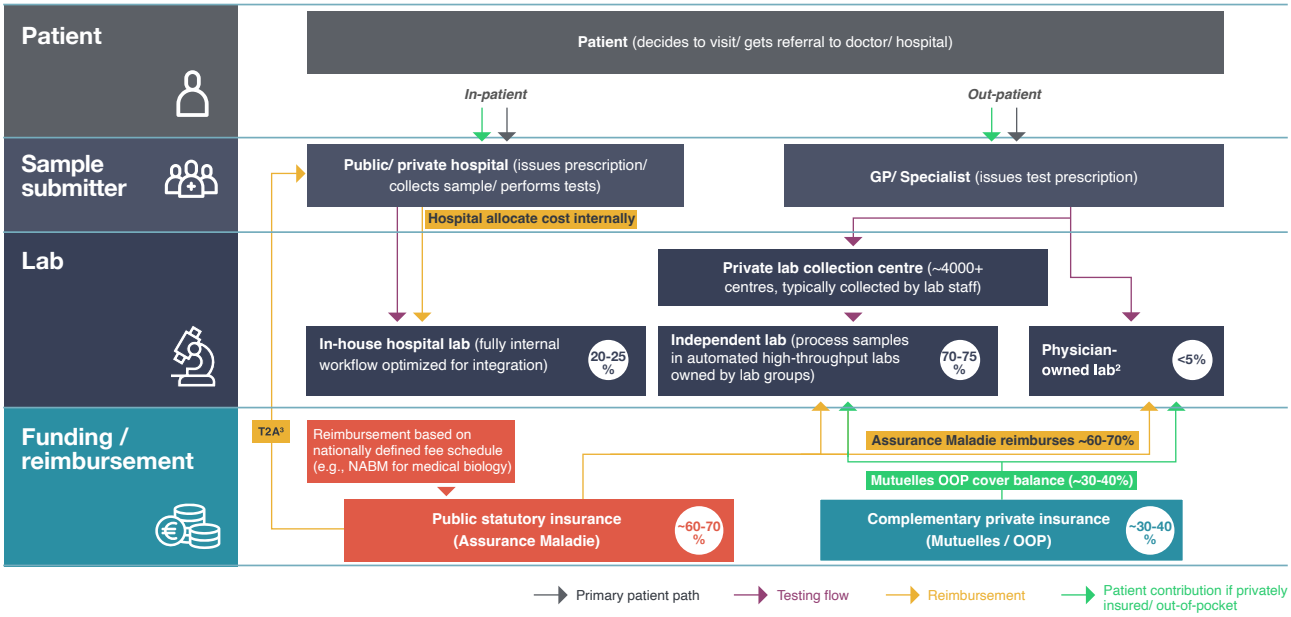
Coverage is near-universal. Patients move through distinct inpatient and outpatient channels, but the core funding comes from statutory health insurance (Assurance Maladie), topped up in most cases by employer-sponsored or individual complementary insurance. More than 65% of tests are performed by independent laboratories, supplied through a dense network of around 4,000 collection centres, while hospital laboratories undertake most inpatient testing within integrated care pathways. This effectively separates the high-volume, predictable community workload from the acute, complex inpatient workload - a segmentation that allows industrial efficiency in the independent sector but leaves the public sector carrying the higher unit costs of acute care.

Patient journey and service split

For inpatients, the journey is largely internal. Public or private hospitals collect samples, process them in in-house laboratories and allocate the cost within the hospital's activity-based (T2A) budget. Laboratory teams operate as part of the hospital workflow, with limited direct contact between payers and labs.

Market Fundamentals

Patient lab testing and reimbursement journey: flow varies by setting and insurance type



Note: 1) as of 2024; 2) Other labs include PoC in-house lab at GP/ Specialist; 3) T2A = Tarification à l'Activité;
Source: Lit search; Market participant interview

For outpatients, the dominant channel runs through GPs or specialists who issue test prescriptions that are fulfilled at private collection centres. Samples are taken by laboratory staff at these centres and processed in centralised independent laboratories owned by large groups. Small physician-owned laboratories now account for a minor share of total activity; almost all ambulatory testing flows through the collection-centre-plus-central-lab model.

Within this structure, medical biology covers the familiar high-throughput domains: clinical chemistry, haematology, immunology, microbiology and routine molecular diagnostics. Anatomical pathology spans tissue and cell diagnostics, including histopathology, cytology, immunohistochemistry and tissue-based molecular work. Outpatient anatomical pathology is predominantly delivered by independent anatomical and cytology pathology (ACP) laboratories; inpatient work sits with hospital pathology departments funded through T2A.

Interoperability between public hospital laboratories and private medical biology groups remains limited. Hospital information systems and LIMS are often separate from those of the independent service models, and data sharing is usually confined to results needed for individual patient care rather than system-wide performance oversight.

Funding architecture and tariff logic

Outpatient medical biology is reimbursed through the NABM fee schedule. Each test carries a nationally defined code, a coefficient and a base rate, supplemented by 'forfaits' (a set price) that cover elements such as patient handling, waste disposal and minimum billing. Tariffs are negotiated between the insurers' union (UNCAM) and laboratory unions under a national convention and updated through periodic amendments. Over 2015–23, cumulative tariff reductions are around 22%, with new tests entering the schedule through innovation routes such as the RIHN scheme.

Anatomical pathology uses a separate nomenclature (ACP/NGAP) with flat fees per act – for example per biopsy – that cover both the technical and professional components. These tariffs are negotiated by specialist medical unions with Assurance Maladie. Fees have been relatively stable but are widely viewed as undervaluing workload, and some molecular pathology is gradually shifting into NABM or RIHN funding streams.

Statutory insurance usually reimburses 60–70% of the NABM or ACP tariff, with the balance met by complementary insurance or, for a minority of patients, out-of-pocket payments. High-priority tests, such as those for HIV, hepatitis or chronic disease monitoring,

Medical biology

	B-coefficient (points)						Base Price	Amount Reimbursed	
	Fixed handling fee	Sample collection	Analysis fee	Safety/ disposal fee	Min. billing threshold	Special surcharges	Base Price	100% reimbursed	<100% reimbursed
Description	**Pre-analytical/ admin handling charged as a flat per-patient daily fee**, incl. registration, clinical info, sample adequacy checks, billed only by the managing lab	**Phlebotomy/ venipuncture fee, covers the act of drawing blood**, billed separately under NGAP when a lab or nurse collects the sample	**Main analytical act reimbursed via NABM**; Each test has its own code and B coefficient reflecting complexity and resource intensity	**Covers handling and disposal of biological materials** (blood, microbiology, pathology). Charged once per order to fund waste management and biohazard safety compliance	**Guarantees a floor tariff (B20)** per patient encounter with codes topping up small orders to cover labs overhead	**Suppl. for specific situations** e.g., urgent/ night/ weekend analyses, inpatient suppl in private hospitals, or certain highly specialised exams, compensating for atypical workload	**Nationally fixed monetary value of 1 B unit**; Multiplied by test coefficients and add-on fees to calculate the total reimbursed amount. Uniform across the country	**For tests fully covered by Assurance Maladie**, incl. tests linked to pregnancy monitoring, long-term chronic conditions, or specific public health programs (e.g. HIV, hepatitis C screening)	Majority of outpatient tests: Assurance Maladie **reimburses 60–70% of the NABM tariff, and the remaining 30–40% is paid by mutuelle or OOP**
NABM Code	9005	NGAP billed	1139/ 591+1608	9105	9905-9929	9001	€0.25 for B[3] €0.75 for PB/KB[3]	-	-
Example (Single vitamin D test at nighttime)	B16	PB1.5	B25	B3	-	B26		€17.91	€11.64[2]
Example (metabolic tests below threshold)	B16	PB1.5	B5 (Urea), B5 (Potassium)	B3	B10[1]	-		€10.16	€6.60[2]

For most routine tests, analysis is performed at local lab's technical platform. Should the lab must outsource a test, separate code (9008) is used to cover sample shipping fee.

Note: [1] Minimal threshold applies only to the sum of the analysis coefficients, therefore 10 complementary B-coefficient points allocated to make up total B20; [2] Amount reimbursed is based on 65% of the total reimbursement rate; [3] As of August 2025. Source: Assurance Maladie; AMELI.FR; NABM catalogue ver. 099; Lit search;

can be reimbursed in full. For standard reimbursable tests, laboratories must charge exactly the NABM tariff regardless of payer; they cannot mark up prices above the schedule. For non-reimbursed services they are free to set their own prices.

Complementary insurers and solidarity schemes then fill the gap. Mutuelles (private complementary health insurance policies) typically cover the remaining 30–40% of the tariff for most of the population, while CSS provides full coverage for low-income groups. Lab testing during inpatient stays is folded into hospital T2A payments, with no additional billing to mutuelles or patients in public hospitals.

Tariff construction in medical biology

French medical biology tariffs are built to reflect both test complexity and the main elements of the laboratory episode. Each reimbursed test is expressed as a B-coefficient made up of several components:

- a fixed handling fee for pre-analytical and administrative work (registration, clinical info, sample adequacy checks)
- optional sample collection fees billed under the NGAP schedule when a lab or nurse draws blood
- the analysis fee itself, where each NABM test code carries a B value that reflects complexity and resource intensity
- a safety and disposal component that covers handling and disposal of blood and other biological materials
- a minimum billing threshold (B20) that guarantees a floor tariff per patient encounter so that very small panels still cover basic overheads
- special surcharges for defined circumstances such as urgent, night or weekend work, inpatient tests in private hospitals, or highly specialised examinations.

These B-points are multiplied by a national base price per point (around €0.25–0.27 depending on category) to generate the total reimbursable amount. For fully covered tests, Assurance Maladie pays the full NABM value; for most routine outpatient tests it reimburses around 60–70% of the tariff, with the remaining 30–40% met by mutuelles or out-of-pocket payments. Illustrative figures for a vitamin D test show the full tariff in the high teens of euros when 100% reimbursed, and a lower net amount when only the statutory share is paid.

This structure means that, for a typical encounter, the tariff recognises pre-analytical handling, the analytical act, safety requirements and specific workload modifiers, rather than paying only for the analytic step. For tests outsourced between laboratories, a separate NABM code covers sample shipping so that the managing lab can retain responsibility for the overall episode.

Benchmarking

✔ Covered in per-test reimbursement ✔ Partially covered/ conditional reimbursement ✖ Not covered in per-test reimbursement

In DE, samples are typically collected at hospital/ GP, while in FR, patients often attend lab-owned collection centres directly for specimen collection.

	Workflow tasks	Germany			France (medical biology[1])		
		Provider	Funding mechanism	Commentary	Provider	Funding mechanism	Commentary
1	**Patient encounter & sample collection**	GP/ specialist/ clinic staff	✖ Paid to GP as EBM consultant code (03000), not billed to lab	Sample collection often bundled into physician fee, lab not bill for this	Typically, at dedicated lab collection centres	✔ (NABM forfaits for sample collection)	Collection is centralised & labs are paid directly, rarely done in GP
2	**Transportation to Lab**	GP/ clinic or lab arranges pickup	✖ Not reimbursed via EBM, often built into labs & providers' private	Lab absorb logistics costs unless they have private agreements	Lab-run courier systems	✔ (Only if outsourced, NABM code 9008 if required)	Transport is usually internal, reimbursed if 3rd party is used (rare)
3	**Accessioning / Registration**	Diagnostic lab (hospital/ private)	✔ Included in EBM per-test tariff	Part of the overhead for performing test, not separately billed	Lab staff at technical platform	✔ (Included in NABM test tariff)	Considered part of baseline cost of analysis
4	**Sample Processing**	Diagnostic lab (hospital/ private)	✔ (Main component of EBM per-test tariff)	Reimbursed per test, often low marginal cost	Private/ hospital lab	✔ (Main NABM test tariff)	Baseline cost of analysis
5	**Result Validation**	Variable: medical specialist or automated LIS	✔ (Only for some tests, separate reimbursement codes are used)	For routine test, no specific EBM fee for result validation	Medical biologists employed by lab	✔ (Included in NABM test tariff)	Labs must sign off results, part of baseline cost of analysis
6	**Report Delivery**	Diagnostic lab via LIMS or Fax	✖ (Cost absorbed within lab infrastructure)	Included in lab operation, LIMS system costs are not directly reimbursed under EBM	Lab via LIS system, app or email	✖ (Cost absorbed within lab infrastructure)	Digital tools expected as standard, part of baseline cost of analysis
7	**Clinician Review & action**	Ordering physician	✖ (Reimbursed as part of follow-up visit/ result mgmt. code)	No linkage to lab budget, follow-up billed under other EBM code	Ordering physician	✖ (Reimbursed separately via NGAP doctor-fee schedule)	Labs not involved/ paid for this step
8	**Patient communication**	Physician or nurse	✖ (Reimbursed under EBM consultation/ telemedicine code)	Lab does not interact with patient in most SHI-funded settings	GP, specialist or biologist (if follow-up required)	✖ (Reimbursed separately via NGAP doctor-fee schedule)	In rare cases, biologists may contact patient directly (e.g., urgent), but not separately billed

Note: [1] In France, pathology services are split between medical biology and anatomical pathology, medical biology is billed under NABM fee schedule whereas anatomical pathology is billed under a different scheme covering both technical and professional act (ACP/NGAP nomenclature);
Source: EBM catalogue 2025/Q3; NABM tariff schedule AMELI 2025; Lit search; Market participant interviews;

Scope of reimbursement across the workflow

Compared with some other systems, French medical biology tariffs explicitly cover a larger share of the end-to-end laboratory workflow. NABM includes forfaits for sample collection when performed by laboratory staff, pre-analytical handling and safety/disposal components. Courier and logistics costs for routine activity are usually treated as part of the group's internal operating model rather than itemised lines, but they sit within the tariff envelope and are regulated indirectly through ISO 15189 requirements on sample integrity and pre-analytical quality.

For outpatients, most samples are taken in dedicated laboratory collection centres run by the large groups. NABM forfaits remunerate sample collection in those centres, and transport to the central technical platform is typically organised and funded by the group as an internal cost. Accessioning and registration at the platform are treated as part of the baseline cost of analysis and included in the main NABM tariff. Sample processing and result validation by medical biologists employed by the lab are also covered within that tariff.

Digital result delivery – via LIMS, secure web portal or app – is treated as part of the laboratory's infrastructure and operating model. There is no separate reimbursement line for digital tools, but the expectation is that modern IT and reporting systems are "baked into" the tariffed activity. By contrast, the steps that sit outside the NABM package are the clinical review and communication: the ordering physician's interpretation, follow-up consultation and any subsequent patient communication are reimbursed under the separate NGAP doctor fee schedule rather than funded from the laboratory tariff.

Benchmarking against Germany highlights this scope difference. In Germany, EBM per-test tariffs mainly remunerate the analytical act, with collection and transport often bundled into physician fees or absorbed in practice contracts, and LIS/infrastructure costs treated as overhead. In France, the NABM schedule recognises more of these elements explicitly within the lab's reimbursed activity, even where some logistics costs remain internal to the provider.

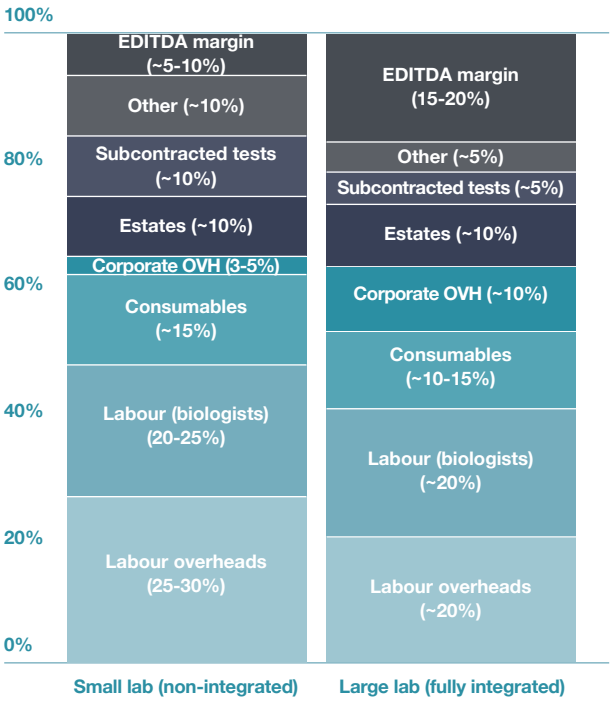
For the UK, the main implication is that any move to more centralised platforms will need to couple integration and operating at scale with funded, quality-assured pre-analytical transport, rather than treating logistics as an unfunded or ad hoc local pressure.

Cost structure and scale effects

Cost data from French laboratories show how standardising and integrating services changes the economics of medical biology.

Cost breakdown

Breakdown of sales (% revenue, 2024)



Note: Cost breakdown for indicative ~€1M testing site
Source: Market participant interviews; lit search

In a small, stand-alone lab, laboratory overheads for non-biologist staff typically account for 25–30% of revenue, with biologist labour at around 20–25%. Consumables and reagents take roughly 15%, estates about 10% and subcontracted tests a further ~10%. Corporate overheads are low (around 3–5%) because central functions are limited. EBITDA margins in this model are typically in the 5–10% range.

In a large, centralised lab within an integrated group, the mix shifts. Laboratory overheads fall to around 20% of revenue and biologist labour to about 20%, reflecting more efficient allocation of staff across a larger platform and greater automation. Consumables remain significant at 10–15%, but larger volumes support better pricing and higher equipment utilisation. Estates costs stay around 10%, but with a more optimised footprint and higher throughput per site. Corporate overheads rise to around 10% as HR, IT, finance and procurement are centralised, but this is offset by savings elsewhere. Subcontracted tests and “other” costs fall slightly. Overall, EBITDA margins rise into the 15–20% range – an improvement of roughly 10–15 percentage points.

The levers behind these shifts are all scale related: route-optimised logistics and central management of transport and insurance; reduced dependency on outsourcing as more specialised tests are brought in-house; rationalisation of real-estate; shared service models for support functions; stronger purchasing power over reagents and equipment; and central reading models, often supported by digital workflows, that lower per-test labour.

Contract models by provider type

Contracting arrangements differ by setting but pricing flexibility is limited across the system.

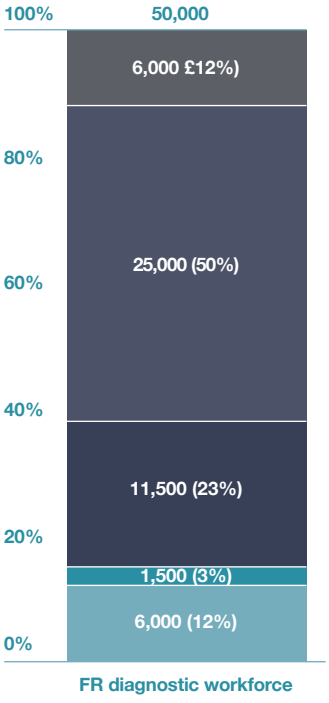
- **In-house hospital laboratories**
  Hospital laboratories do not hold separate commercial contracts. They operate as part of the hospital structure, with activity funded through T2A for inpatients and NABM/NGAP fee-for-service for any outpatient work. There is no direct volume link to funding beyond the hospital’s overall T2A envelope. Prices are fixed nationally and hospitals decide how to allocate their budget; any cost pressures in the lab are absorbed internally.
- **Independent and physician-owned laboratories**
  Independent and small physician-owned laboratories also operate without bespoke contracts. They receive referrals from GPs and specialists and are reimbursed directly via the NABM schedule. Tariffs are uniform nationwide and cannot be negotiated locally, so labs cannot adjust pricing in response to local demand or cost variation. There is no explicit price–volume linkage, but the sector as a whole is subject to expenditure caps and periodic tariff cuts.

Private clinics and outsourced work
Private clinics may run their own laboratories or outsource testing to independent groups. Where outsourcing occurs, clinics typically enter 3–5 year contracts with private labs. Payments are bundled into forfaits or negotiated package rates, and contracts can include volume thresholds or service commitments. Even here, scope to pass through cost changes is constrained by the national tariff framework and the clinic's own reimbursement environment.

Overall, the contracting landscape reinforces the central role of the national tariff: whether activity sits in hospitals, independent labs or outsourced clinic work, prices are largely fixed by NABM and related schedules, with only limited room to adjust for local costs.

Workforce model

Estimated direct employment in France's diagnostic laboratory workforce (2023)



Note: Bac = Baccalauréat (national high school diploma)
Source: Public Health in Practice Vol 9 2025; Lit search

Role	Education level	Description
Biologists (incl. self-employed / TNS)	**Bac +9 to +10** (Doctorate in Medicine or Pharmacy + residency in Medical Biology)	**Lead medical interpretation of lab results** Supervise teams, **ensure quality compliance, and validate reports** **Coordinate with referring physicians and develop testing protocols** Responsible for **accreditation and clinical governance** **850+ biologists added to the workforce over the L4Y**
Technicians (incl. nurses	**Bac +3** (e.g., BTS in Medical Biology or State Diploma	**Perform sample collection**, blood draws (phlebotomy), and specimen processing **Operate diagnostic equipment, perform tests,** ensure pre-analytical & analytical reliability Maintain and calibrate lab instruments Often frontline in **automated high-throughput labs**
Medical Secretaries	**Bac +1 to +2** (e.g., FCIL Medical Secretariat)	**Welcome and assist patients** in person or by phone **Schedule appointments**, manage administrative workflows **Process external test orders and ensure documentation** is complete Input patient information into the LIS (Laboratory Information System)
Support function	**Bac +3 to +5** (Business / Engineering Schools)	**Back-office roles:** HR, finance, legal, IT, procurement, facility management Project management and lab group HQ operations, play a key role in large lab networks (e.g., Cerba, Biogroup)
Others (e.g., logistics, facility)	Mixed levels – often subcontracted roles	**Courier services** (sample pickup/delivery), facility maintenance, cleaning, logistics **Many are subcontracted,** especially in large networks **Critical to pre-analytical turnaround** and cold chain integrity

Workforce model

France's diagnostic laboratory workforce is estimated at around 50,000 staff, with biologists and technicians providing the core clinical and technical expertise:

- **Biologists (including self-employed)**
  Around 6,000 staff (about 12% of the workforce) are medical biologists, typically with a doctorate in medicine or pharmacy plus residency in medical biology (Bac +9 to +10). They lead medical interpretation of results, supervise teams, ensure quality compliance, validate reports and coordinate with referring clinicians. Biologists also carry responsibility for accreditation and clinical governance, particularly in large independent groups. More than 850 biologists have been added over the last four years.

  These roles combine elements that, in the UK, sit across consultant pathologists, clinical scientists and senior biomedical scientists.

- **Technicians (including nurses)**
  Technicians form the largest single group at about 25,000 staff (50%). With education at Bac +3 (e.g. BTS in medical biology or state diploma), they perform sample collection and phlebotomy, operate diagnostic equipment, run tests and maintain instruments. They are often based in automated high-throughput labs operated by the major groups.

- **Medical secretaries**
  Around 11,500 staff (23%) work as medical secretaries, typically with Bac +1 to +2 training. They welcome and assist patients, schedule appointments, manage administrative workflows, process external test orders and enter information into the LIS.

- **Support functions**
  Approximately 6,000 staff (12%) hold support roles at Bac +3 to +5 level in areas such as HR, finance, legal, IT and procurement. They include project managers and HQ roles within the large service models and are central to running integrated platforms.

- **Other roles (logistics, facilities, etc.)**
  A smaller group of around 1,500 staff (3%) work in logistics, courier services, facility maintenance and cleaning. Many of these roles are subcontracted, especially in the larger service models, but are critical to pre-analytical turnaround and cold-chain integrity.

Taken together, biologists and technicians make up more than 60% of the workforce and anchor both clinical decision-making and frontline laboratory operations in the integrated model.

International practice also shows that senior non-medical scientists can lead services safely within clear scopes of practice. In some systems, including parts of the USA and Europe, PhD-level laboratory directors or advanced scientists hold responsibility for method validation, quality improvement and aspects of clinical liaison. The Workforce and Quality chapters consider how far these models of advanced non medical leadership and service model level deployment are transferable to the UK, and what safeguards and training capacity would be required.

Access and turnaround times

Coverage is near-universal and supported by a dense outpatient service of around 4,000 collection centres, although rural gaps in access remain. Routine turnaround times are generally within 24–48 hours and can be same day in major urban service models. Specialised tests typically take 2–5 days, while NGS and other advanced molecular diagnostics run at 1–3 weeks depending on complexity and central processing. NGS capacity is expanding through RIHN and genomics initiatives, but many such tests are still outside the core NABM reimbursement catalogue and rely on temporary funding routes.

However, published international datasets rarely disaggregate laboratory performance by geography, ethnicity, deprivation, disability or other protected characteristics. As a result, the equity impact of integration across different patient groups is only partially visible in this chapter. Available evidence suggests that dense urban networks and collection centres support faster access, while rural areas rely more heavily on transport logistics and may experience longer median turnaround times. The equity analysis in the UK-focused Access and Quality chapters therefore relies primarily on domestic data and patient experience, including digital access and the experience of patients who cannot easily reach collection points, rather than extrapolating from international averages.

Quality and digital capability

All laboratories are ISO 15189 accredited, with annual audits and full reassessment every 4–5 years. Integration and economies of scale have supported centralised technical platforms, automation and standardised processes, with reported improvements in test reproducibility and lower error rates in medical biology. Cytology and histology are less automated and standardised, and hospitals increasingly outsource some of this work to independent laboratories to access scale and specialist capability.

High-throughput labs use AI-enabled LIMS and quality-control algorithms, with digital dashboards providing real-time visibility of turnaround and quality indicators. Patient portals and apps have improved individual access to results, although interoperability between providers remains limited. National programmes such as the France Health Data Hub and the Médecine Génomique initiative (including SeqOIA and AURAGEN) aim to improve data sharing and support AI training.

Public–private consortia such as PortrAIt are developing AI tools that increasingly enable a 'dry-lab' model, where analysis is centralised in virtual reporting hubs while physical sample preparation remains decentralised. However, experience in France suggests that this technological capability does not automatically translate into rapid adoption of diagnostic Whole Slide Imaging. While integration drives investment in 'digital logistics' (LIMS, tracking and patient apps), in some independent medical biology groups, adoption of diagnostic digital pathology has been slower than in leading UK service models because the direct financial return is uncertain unless very large volumes are centralised.

In the UK, investment in scanners and digital workflows is often justified on clinical safety and workforce grounds as much as on direct productivity gains. The Quality and Digital chapters examine this distinction for histopathology in more detail.

Anatomical pathology and cancer diagnostics

International evidence on anatomical pathology is thinner than for high-throughput medical biology. Published sources give fewer comparable metrics on histology and cytology turnaround, reporting quality and the impact of digital pathology and AI on cancer pathways. The French case shows that these services are less automated, with hospitals increasingly outsourcing some activity to independent laboratories, but does not yet support a clear assessment of how standardisation and integration affects cancer waits or diagnostic accuracy. The Quality and Workforce chapters return to these questions, focusing on histopathology, cytopathology, digital reporting and the workforce models needed to support them.

Value for statutory insurance

From the payer perspective, volume has been growing at around 3–4% per year, driven by chronic disease management, screening programmes and population ageing. Over the same period, NABM tariffs have been reduced by about 5–9% in the last two years and by roughly 1–2% per year over the last decade. Productivity gains from integration, digitalisation and optimised capital and operating expenditure have absorbed part of this pressure.

COVID-19 testing illustrated the adjustment process: initial tariffs were relatively high, then reduced through successive reviews as volumes rose and costs fell, and this experience has informed more regular tariff reviews. As tariffs have fallen, laboratories have increasingly turned to digitally enabled operating models – automated pre-analytics, centralised logistics and batching – to maintain margins. Public debate has grown around the profitability of large independent groups and the balance between cost containment, investment and returns, with further tariff reductions under consideration.

These figures describe the laboratory profit-and-loss boundary, not the full cost to the health system. EBITDA margins are calculated after reimbursed revenue and direct laboratory costs; they do not include clinician time for ordering and interpretation, wider governance and regulatory overheads, or downstream treatment costs linked to test use. They also reflect specific accounting choices and corporate structures in large independent groups. In this review they are used to illustrate how low tariffs, integration and digital investment interact to keep laboratories viable, rather than as a benchmark margin for NHS pathology services.

From France to England – funding levers for integrated pathology services

France provides a worked example of how transparent tariffs and integrated service models can support access, quality and investment within a tight budget envelope. Several features are relevant when considering England's block funded services.

First, the scope of the tariff is broader. NABM reimburses most of the laboratory episode for outpatient medical biology, including pre-analytical handling, analysis, safety and defined surcharges, with separate codes for sample collection and shipping where needed. In England, pathology spend is folded into trust block budgets and internal prices often focus on the analytical step, with pre-analytics, digital tools and clinical liaison funded implicitly. This makes it harder to see which parts of the pathway are driving cost and where efficiencies from standardisation and integration are actually realised.

Second, the price signal is both national and visible. French laboratories are paid according to a single fee schedule with nationally fixed tariffs and limited local variation. Germany and Australia follow the same basic pattern, with national fee schedules reshaped periodically through negotiation and reform. England has no equivalent national tariff for a defined basket of tests, so services cannot benchmark unit income or cost against peers in a consistent way, nor can commissioners easily compare providers or track the impact of integrating services on value.

Third, integration and investment are structurally linked. In France, sustained tariff reductions over a decade have been accompanied by large-scale integration into a small number of groups and widespread automation. Cost data show that large central laboratories reduce overheads per test, optimise staffing and use their purchasing power to lower consumables and equipment costs, while also investing in LIMS, AI and logistics. English service models have many of the same structural ambitions, but the block-funding environment does not explicitly tie tariff pressure to a route for recovering investment in digital and equipment at service model level. While the operational mechanics of integration are ownership-agnostic, the incentive to drive efficiency is sharper in profit-driven models; **a UK equivalent requires strict ring-fencing of efficiency gains so they are reinvested in the service rather than absorbed by wider Trust deficits.**[1]

Fourth, system assurance is bound into the funding model. Universal ISO 15189 accreditation is a condition for participation in the reimbursed market. Annual audits and periodic full reassessments create a consistent baseline of quality management, even though accreditation is not a direct outcome metric. In England, accreditation remains central but is not directly linked to how money flows, and quality oversight is spread across several bodies. The French model illustrates one way of aligning system assurance, funding eligibility and integration, while also showing the risks of over-reliance on a small number of corporate groups.

Fifth, workforce roles and central teams are built around the integrated model. Medical biologists lead interpretation, governance and clinical liaison across large platforms; technicians and support staff are deployed into automated hubs and collection centres; logistics and back-office functions are scaled centrally. English service models aim for similar deployment, but role definitions, titles and banding remain less standardised, and workforce planning is still largely trust based rather than service model based.

Taken together, these contrasts raise a set of questions for the UK analysis that follows:

- Which parts of the laboratory pathway should be explicitly priced or costed if service models are to complete integration and reinvest efficiency gains in digital, equipment and training?
- Is there value in defining a national benchmark price or tariff basket for selected tests, even if full activity-based funding is not adopted?
- How far should accreditation and other system assurance tools be linked to eligibility for particular funding mechanisms or investment programmes?
- What workforce and governance functions need to sit explicitly at service model level if England is to realise the scale effects seen in France, without replicating its ownership and insurance structures?

1. Nothing in this review implies support for changing the NHS's tax-funded model or expanding corporate ownership of laboratory services; the lessons drawn from France relate to operational levers that can be applied within publicly owned, publicly accountable service models.

International models – implications for the UK

Across the comparator systems, several points are consistent. Integrated services are now the default rather than the experiment. High-performing services use large service models to run central technical platforms, standardise processes and invest in automation, while maintaining local access points and clinical relationships. Structure is necessary, but on its own it does not guarantee quality or resilience.

The economic case for integration is strongest in high-volume blood sciences. In cellular pathology, the primary arguments relate to maintaining sub-specialist expertise, peer review and sustainable cancer pathways rather than pure throughput. Infection Sciences (microbiology and virology) sit between these logics; high-throughput serology and molecular platforms benefit from scale and automation, but surge capacity, antimicrobial stewardship and close clinical liaison place limits on how far a pure high-volume model is appropriate. These differences are reflected in the UK-focused chapters on Workforce, Access and Quality.

Set against this clinical and structural picture, the international evidence cited in this chapter is largely structural and quantitative. It contains relatively little on patient-reported experience or public attitudes towards integration and different ownership models. It also provides limited direct evidence linking integration to patient outcomes, including cancer outcomes, in a way that supports causal conclusions. Those perspectives are captured through UK engagement activity and are reflected in the subsequent chapters on Access, Quality and Value.

Funding arrangements determine how far those service models can use their scale. Where there are clear, nationally defined tariffs, payers can tighten unit prices over time and expect providers to respond through integration, procurement discipline and digital investment. Where funding is block based and internal prices are opaque, it is harder to see whether integration is improving value or simply absorbing pressure.

Quality regulation functions mainly as system assurance. France, Germany and Australia use statutory accreditation, regular surveillance and enforceable consequences as the baseline, then complement that with a small set of outcome and safety indicators. None of these systems treat accreditation alone as a proxy for clinical outcomes, but they do use it as a gateway to reimbursement and market participation. In the UK, UKAS accreditation is strongly embedded in NHS commissioning and assurance expectations, but it does not operate as the same kind of statutory gateway to reimbursement or service participation.

Evidence directly linking integration and regulatory posture to better patient outcomes is limited; most published data concern process indicators such as turnaround times and error rates rather than mortality, morbidity or diagnostic accuracy. Published international literature also describes instances where rapid integration and scaling of services created operational fragility or local access concerns, reinforcing that integration is a tool that requires strong governance, not an end in itself.

Digital capability and data infrastructure are the main multipliers. Services that have converged on shared LIMS, automated pre-analytics and digital reporting have been able to translate structural scale into more reliable turnaround, better workload management and clearer performance information. Genomics, NGS and AI tools are being layered on top of these foundations rather than substituting for them.

Finally, workforce and training capacity are the binding constraints everywhere. Even in well-funded, integrated service models, shortages of pathologists, medical biologists, trainers and technical staff limit what they can deliver, with pressures varying by specialty and geography. The international examples point towards service model-level workforce planning, protected educator time and advanced practice roles as the levers that make structural integration work for patients.

Bridge to the UK

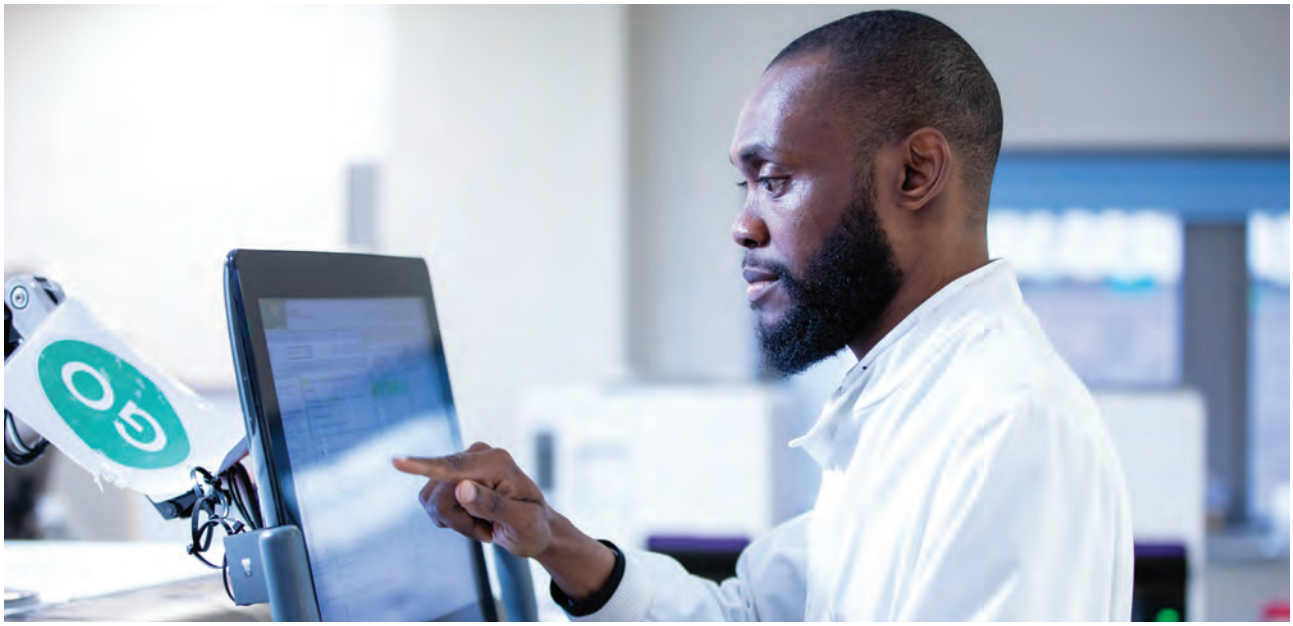
Taken together, the international evidence narrows the choice set. Where France and Australia operate as mature, fully integrated service model markets, England remains in transition, with only around 15% of laboratories operating within fully integrated pathology services. However, performance data from this integrated minority corroborate the international experience.

Emerging domestic evidence indicates a strong positive association between integration and performance, particularly in blood sciences laboratories: service models operating in a fully integrated way (where more than 90% of activity flows through a single provider) routinely report faster turnaround times, fewer safety incidents and higher productivity than their non-integrated peers.

This suggests that England's service model structure is directionally aligned with high-performing systems. However, the fact that the majority of service models remain non-integrated suggests that structural policy alone is insufficient to drive change. To bridge the gap between the high-performing minority and the rest of the system, the focus must shift from 'what' structure is needed to 'how' it is enabled. Consequently, three questions now matter most:

- **How workforce roles and training can be reconfigured at scale to bridge the capacity gap, using automation and advanced practice to deliver sustainable workforce productivity.**
- **How governance can shift from static accreditation to transparent, data-driven performance monitoring, ensuring that integration delivers verifiable gains in safety and quality.**
- **How funding models can evolve from block contracts to transparent tariffs that explicitly fund the logistics, digital infrastructure and training pipelines required to secure equitable access.**

These questions frame the UK-focused chapters that follow. The Workforce chapter picks them up first. Grounded in UK data and clinical priorities, it examines whether existing service models have the people, roles and training capacity needed to turn structural integration into sustainable access, quality and value.



PART 2: DEVOLVED NATIONS

Executive summary

Pathology services in Wales, Scotland and Northern Ireland show that the pressures identified in this review are not confined to England but take different forms across service models and geographies.

Across the four nations, the clearest comparable signals are cost per test and tests per full-time equivalent (FTE). These figures should be treated as indicative benchmarking measures, not tariffs, prices or full end-to-end pathway costs. They are based on available reported data and are affected by differences in coverage, definitions, activity mix and local costing methods. On that basis, England remains the lowest-cost comparator at around £2.20 per test. Scotland and Northern Ireland are both at about £3.00, while Wales is at around £4.32. A similar spread is visible in tests per FTE, a useful proxy for workforce productivity and operating efficiency: England records 48.4 thousand tests per FTE; Northern Ireland 40.2 thousand; Scotland 30.6 thousand; and Wales 24.3 thousand.

Wales combines the highest unit cost with continued consultant scarcity and uneven progress towards more integrated delivery.

In Scotland, rising demand, relative cost stability and the strongest recent post-pandemic cost reduction coexist, but fragmented delivery and uneven digital maturity remain unresolved.

In Northern Ireland, recent cost improvement from a higher baseline sits alongside acute workforce fragility and regional disparity.

The national patterns differ, but the drivers are consistent: scale, workforce configuration, digital capability and cost structure are the main determinants of pathology resilience and value across the four nations.

Introduction

The data collected from Wales, Scotland and Northern Ireland are sufficient to establish a four-nation context, but not to support a single fully comparable scorecard. Data definitions, coverage, granularity and reporting maturity differ between administrations, and the devolved evidence should be read on that basis.

The strongest comparative signals are in reported cost, tests per FTE, workforce and selected activity measures. Reported cost per test, tests per FTE and workforce distribution allow meaningful comparison across administrations, provided they are read as benchmarking indicators rather than complete measures of price, tariff or end-to-end pathway cost. The evidence is less complete for quality, access and full digital maturity, where like-for-like national datasets are not yet consistently available.

The devolved evidence supports a consistent UK-wide pattern: pathology performance is shaped by cost structure, workforce configuration, scale and digital capability. But because coverage, definitions, granularity and maturity of reporting differ between administrations, the comparison should be read as a structured cross-national comparison rather than a fully standardised scorecard.

Methods and definitions

Evidence from Wales, Scotland and Northern Ireland is drawn from national administrative returns and published data, benchmarked against England where comparable measures exist. Time periods are not fully aligned across all measures. Most Welsh and Scottish series run from 2018/19 to 2024/25. Northern Ireland series are shorter in places and are not consistently available at the same level of granularity across the period: some 2024/25 aggregate data are available, but regional and discipline-level detail are absent in different years. England remains the principal benchmark where national benchmarking is most mature.

Available data cover more than 70% of the devolved administrations' population and provide full or partial coverage across all three administrations. Eleven returns, including rejected Freedom of Information requests, were excluded unless otherwise stated. Some comparisons are partial, and some are limited to histopathology.

For Northern Ireland in particular, the evidence base is constrained less by total absence of data than by inconsistent granularity across years: for example, some regional test series end before 2024/25, while some discipline-level cost and workforce data are available only for 2024/25. Cost-per-test series exclude indirect costs where stated in the source returns. Workforce totals include substantive, bank and agency staff across clinical, non-clinical and management groups.

Data reality and intra-national variation

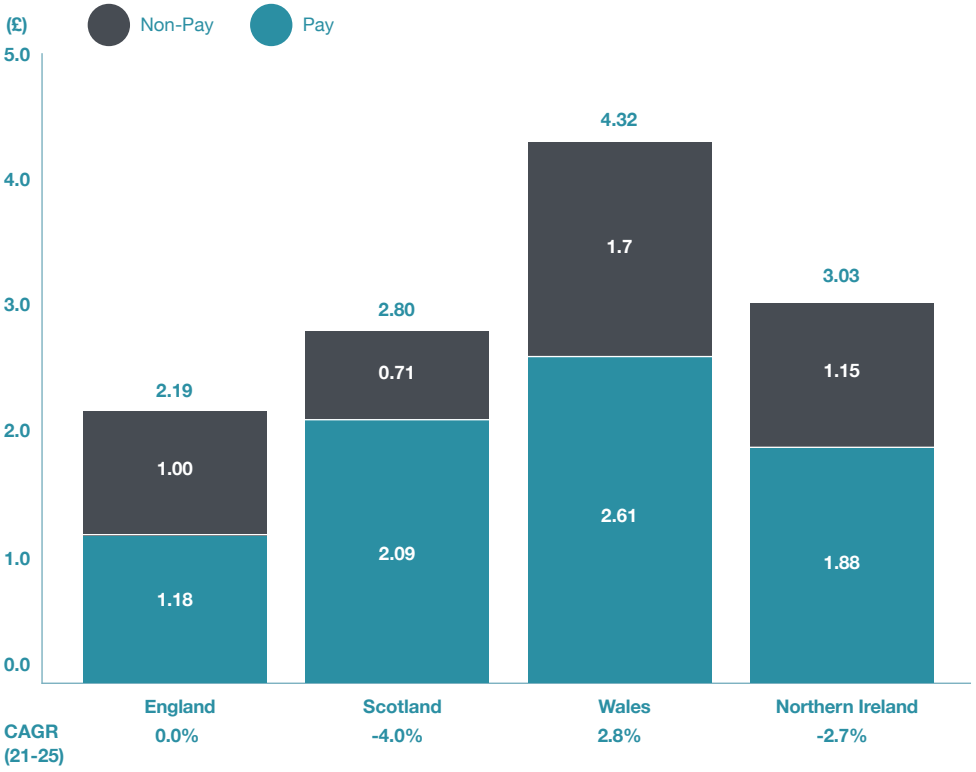
The four-nation aggregates tell a clear strategic story, but the underlying data are uneven and in places partial. Some Scottish regional returns cover only histopathology or other narrow specialty groupings, producing apparent unit costs as high as £29–£107 per test; these figures reflect partial coverage rather than whole-service performance. Wales continues to operate with heavy reliance on outsourcing of work. Around half of the Health Boards send activity to England. Rural geography presents additional challenges - with laboratories more than 50 miles apart in some areas. This adds further constraints on service configuration.

In Scotland, some apparent changes in scientist numbers are likely to reflect differences in workforce recording and classification rather than genuine loss of frontline capacity. Data availability itself remains patchy: several Scottish boards submitted no returns, two Welsh bodies submitted no returns, and Northern Ireland data are not consistently available at the same regional and discipline-level granularity across years. These limitations do not overturn the headline conclusions, but they do mean that intra-national variation is wider, and some local cost and productivity figures less reliable, than the national aggregates suggest.

BENCHMARKING | COST

Pay costs drive the gap in cost per test across the Devolved Administrations, with Wales at nearly 2x England

Pathology cost per test across Devolved Administrations; 24-25



Source: NAPDC (2018-2025); NHS Wales; NHS Scotland; HSC Northern Ireland

Commentary

Pay costs are the primary differentiator across Administrations; workforce transformation (skill-mix optimisation, automation) is a potential primary, high-impact lever to converge toward England's benchmark

England operates at the lowest unit cost with an **even pay/non-pay split**, benefiting from scale and standardised delivery models

Wales is a clear outlier at ~2x England, driven by a **disproportionate pay component** (e.g., locum reliance), pointing to entrenched structural challenges

Scotland and N. Ireland show strongest cost trajectory (-4.2% & -2.7% CAGR), converging toward Scotland – **lessons on sustaining resilient services** should be shared

Cross-administration Benchmark

Cost and cost mix

Cost per test varies materially across the four nations. England remains the lowest-cost benchmark at around £2.20 per test. Scotland and Northern Ireland are both at about £3.00, while Wales is at around £4.32, close to twice the England level.

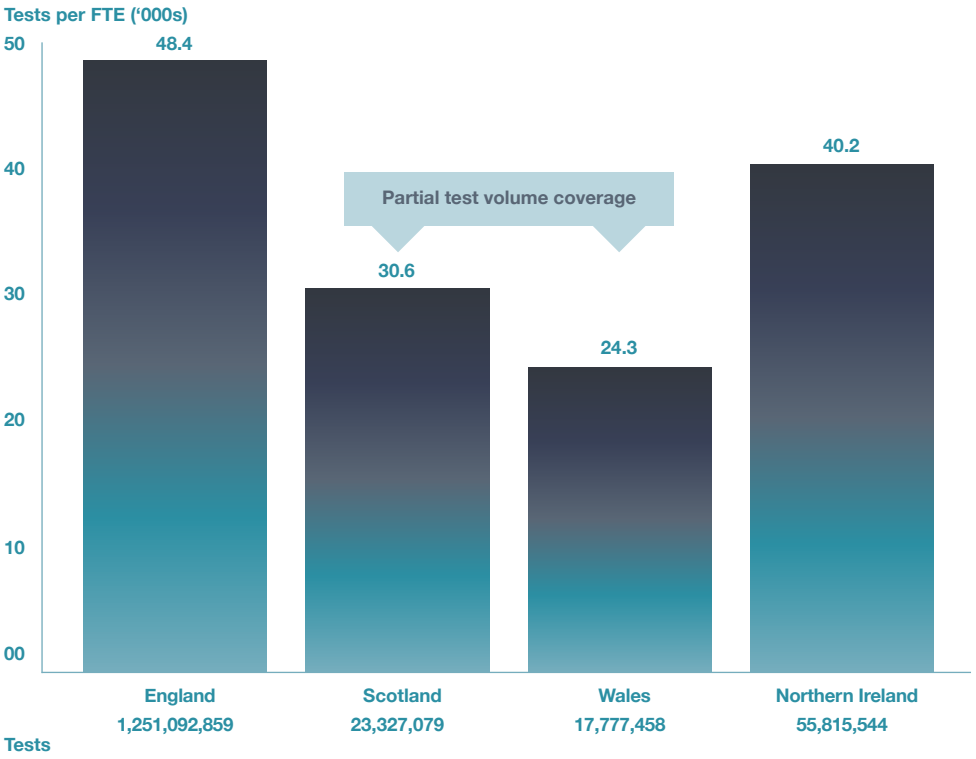
Pay cost accounts for most of the difference. England combines the lowest unit cost with a relatively even pay and non-pay split. Wales stands apart through a markedly heavier pay component. Scotland shows the strongest recent post-pandemic reduction in cost per test, while Northern Ireland has also improved from a higher baseline and now sits close to Scotland.

Behind that single-year comparison, the national trajectories differ. In Wales, rising unit cost is increasingly associated with non-staff cost escalation alongside workforce pressure. In Scotland, cost per test has remained broadly stable despite rising test volume, and recent post-pandemic benchmarking indicates the strongest reduction rate among the devolved administrations. In Northern Ireland, cost per test has fallen from a higher baseline, with recent improvement still evident but less pronounced than in Scotland. The differences are not simply differences of degree. Wales, Scotland and Northern Ireland show three distinct cost trajectories, reflecting differences in scale, workforce configuration and service model.

Wide disparity in tests per FTE across Administrations points to significant differences in workforce productivity and/or operating models

BENCHMARKING PRODUCTIVITY

Pathology tests per FTE across Devolved Administrations; 23-24



Source: NAPDC (2018-2025); NHS Wales; NHS Scotland; HSC Northern Ireland

Commentary

A 2x productivity gap between England and Wales signals clear scope for workforce reform, automation and shared learning across systems

NB: Devolved Administrations are subject to additional geographical challenges

England leads at 48.4k tests per FTE, reflecting benefits of scale, standardisation and automation

N. Ireland achieves **40.2k** despite smaller test volumes – demonstrating opportunities to drive volume with lower headcount

Wales at **24.3k** and **Scotland** at **30.6k** may benefit from targeted skill-mix optimisation, digital enablement and cross-Administration best practice transfer

Productivity and workforce availability

A similar spread is visible in tests per FTE, a useful proxy for workforce productivity and operating efficiency. England records 48.4 thousand tests per FTE, Northern Ireland 40.2 thousand, Scotland 30.6 thousand and Wales 24.3 thousand. The gap between England and Wales is particularly marked and points to substantial differences in workforce configuration, skill mix, automation and operating model. Geography, coverage and service configuration differ between administrations, but the spread is too wide to treat as minor variation around a common baseline.

Workforce availability is uneven within administrations as well as between them. Staffing and productivity vary markedly by region, some comparisons are partial or limited to histopathology, and smaller geographies are more exposed to fragility in specialist cover, training capacity and rota resilience. In Northern Ireland, the interpretation of regional productivity and workforce patterns is also constrained by uneven year-by-year data granularity, with some regional test series ending before 2024/25 and some discipline-level data available only in 2024/25. Even so, the same underlying pressures recur across the four nations: scale, automation and workforce configuration all shape productivity, resilience and value.

Wales

Operating context and activity

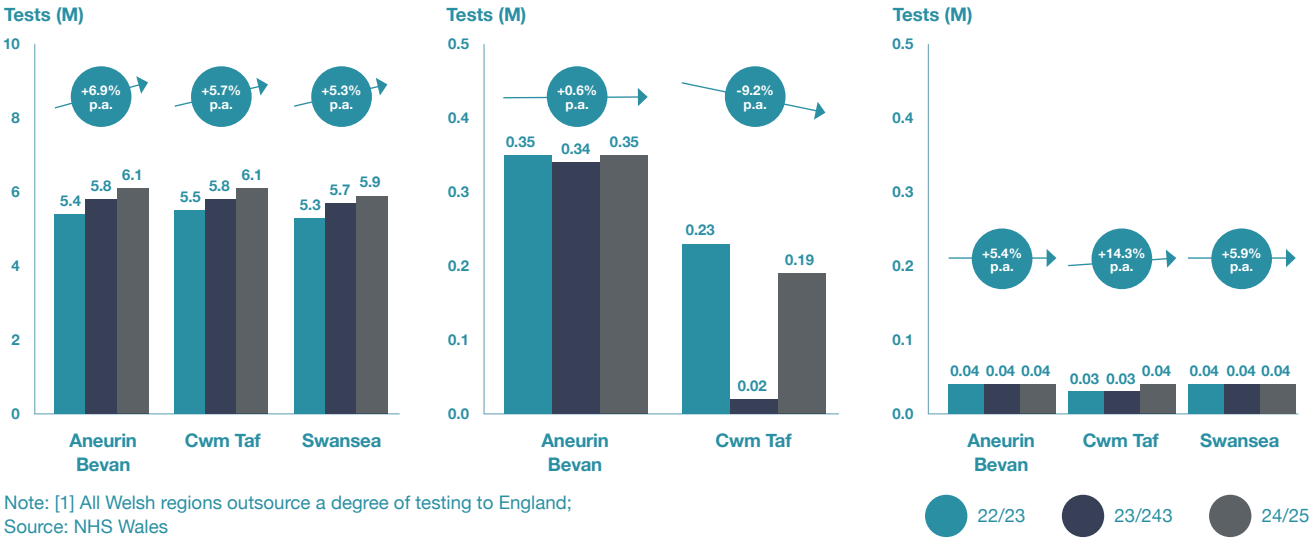
Pathology services in Wales are moving towards more integrated regional delivery, but progress remains uneven across Health Boards. In parts of the system, services are still delivered in smaller units that limit efficiency and resilience, with all Health Boards outsourcing some work and around half continuing to send activity to England. Rural geography, fragmented governance and uneven progress on shared infrastructure continue to limit standardisation and make sustainable service delivery harder to achieve.

Activity growth is concentrated in blood sciences, where test volumes are rising rapidly from a sizeable base. Outside blood sciences, the pattern is more mixed: microbiology activity is uneven and falls in some areas over the period shown, while histopathology has grown from a much smaller base.

Blood Sciences is experiencing rapid test growth, on a sizable baseline, supporting efforts to maximise automated technology and scale

WALES | ACTIVITY

Blood Sciences: ~6% p.a. test growth **Microbiology:** ~3% p.a. test reduction **Histopathology:** ~8% p.a. test growth



Note: [1] All Welsh regions outsource a degree of testing to England;
Source: NHS Wales

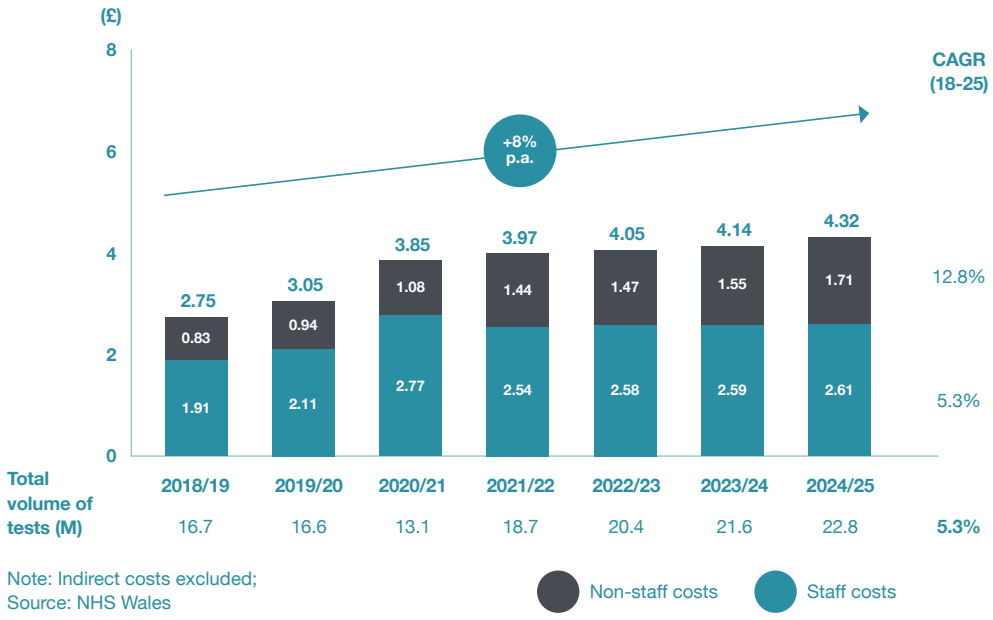
Cost profile

Wales remains the highest-cost administration in the four-nation comparison. Cost per test has risen faster than activity, with total cost per test increasing by about 8% a year while test volumes have grown by around 5% a year. Staff-cost growth has broadly tracked demand. The sharper pressure has come from non-staff cost escalation, which has more than doubled since 2018/19 and is the main driver of rising unit cost. This pattern is visible across the main disciplines rather than being confined to a single service area.

Cost per test growth has outpaced volume growth by 22%; growth driven by non-staff costs, signalling scale and structural inefficiences

WALES | COST PER TEST

Pathology costs per test in Wales; 2018-2025



Note: Indirect costs excluded;
Source: NHS Wales

Commentary

- **Total cost per test** has risen 18%, whilst tests have grown at only 5% p.a., signalling a need to efficiently address test growth
- **Staff costs** growth has matched demand
  - **Reliance on locum staff** due to vacancies
  - Suggests **opportunity for efficiency gains** from workforce optimisation or automation
- **Non-staff costs are the primary driver of cost escalation** and have more than doubled since 18/19
  - Suggest challenges with scale efficiencies and other structural challenges

Workforce profile

The Welsh pathology workforce has grown by around 14% since 2019, or about 2% a year, while retaining an approximately 90% clinical ratio. Scientists and clinical support staff, who account for about 81% of the workforce, have driven most of that growth. Consultant pathologists remain scarce, accounting for only around 2% of the workforce, and consultant numbers have been broadly flat over the period. By contrast, the wider medical pathology workforce has contracted, with medic roles falling and remaining concentrated in a small number of centres.

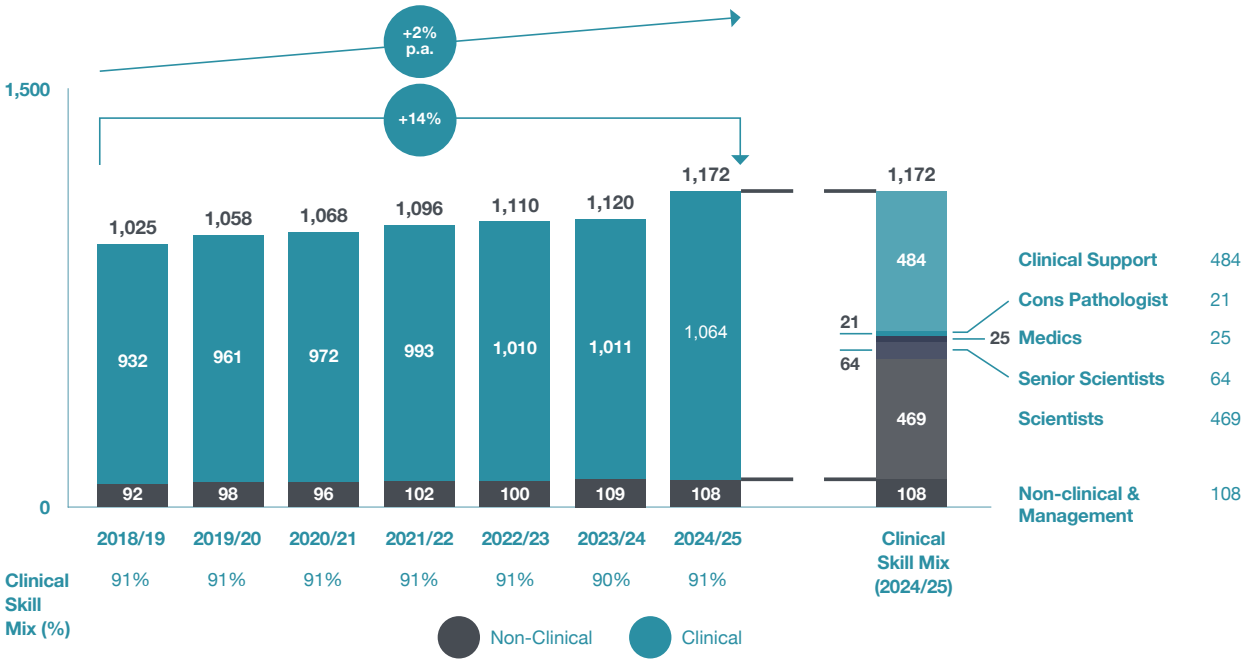
Growth in senior scientist and support roles has outpaced scientist growth by more than twofold, indicating scope to expand advanced scientific and support roles in a planned way to sustain delivery and relieve pressure on consultant capacity. Consultant shortages remain acute, with heavy locum dependence in some areas and continued reliance on overseas recruitment in hard-to-fill roles, particularly in histopathology.

The main Welsh pressures are clear: high unit cost, continued consultant scarcity, and the need to expand advanced scientific and support roles in a planned way to sustain delivery.

Welsh Pathology workforce has grown 14% since 2019 at 2% p.a., but Consultant Pathologists remain a scarce resource

WALES WORKFORCE

Pathology workforce growth and clinical skill mix (substantive), FTE[1]



Note: [1] Total workforce includes Substantive, Bank & Agency Staff
Source: NHS Wales

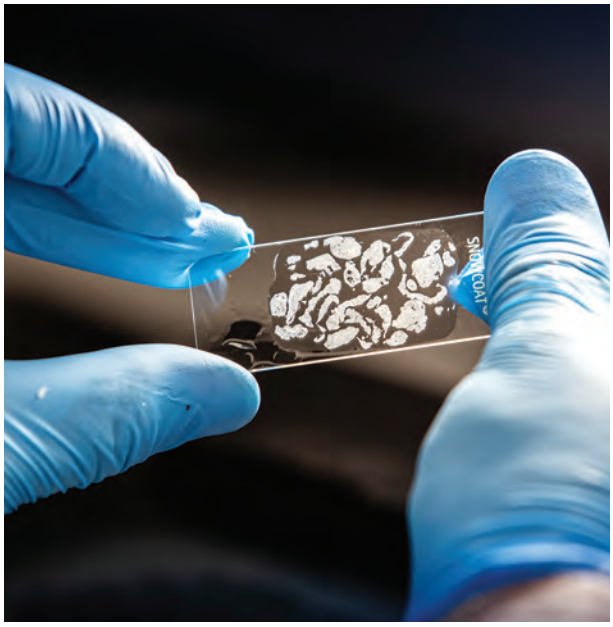
Commentary

- **Workforce expansion at 2% p.a.** is consistent across clinical and non-clinical staff, maintaining a ~90% clinical ratio
- **Scientists and Clinical Support** (81% of the workforce) account for the majority of growth, supporting service delivery and automation adoption
- **Consultant Pathologists remain the least prevalent group** (2%), with flat growth posing risks to Histopathology reporting capacity and service sustainability
- **Advanced Scientist roles** and expanded scope of practice could alleviate pressure on Consultant capacity

Scotland

Operating context and activity

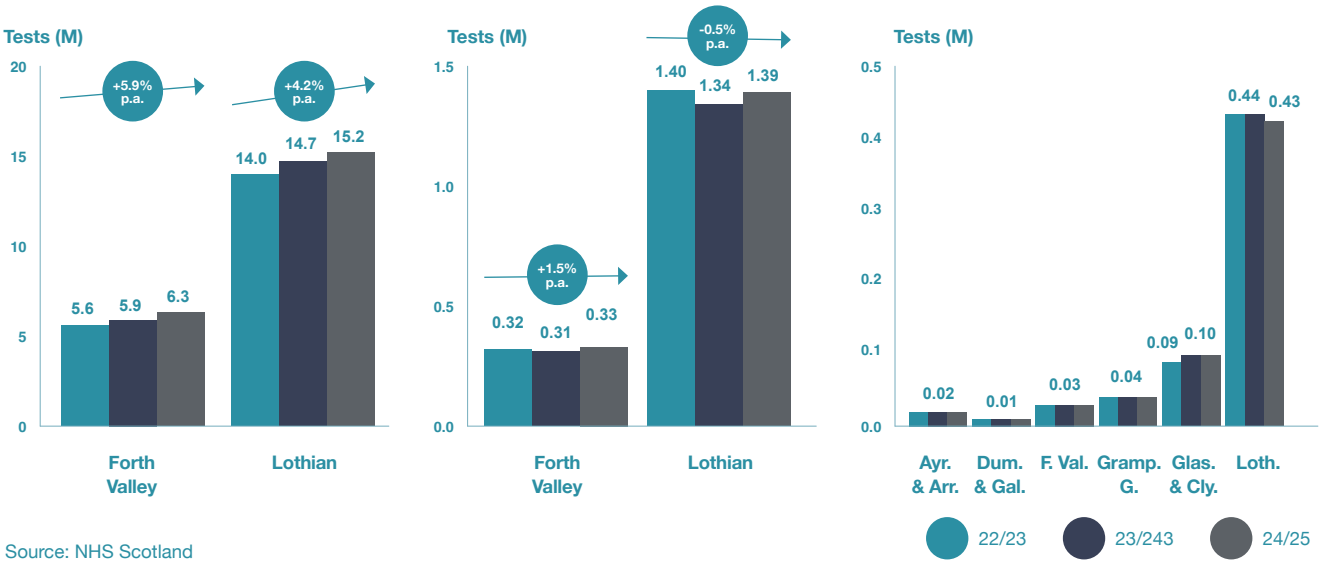
In Scotland, progress towards more integrated pathology service models has not progressed and service delivery remains fragmented across boards. Activity continues to grow in blood sciences from a sizeable base, while histopathology is broadly stable and microbiology is largely flat. The service operates across a sparse geography with long transport routes, and digital infrastructure and automation maturity remain uneven between boards. Demand is rising, but the conditions needed to realise the full benefits of scale, where possible, remain only partially in place.



Blood Sciences is experiencing rapid test growth, on a sizable baseline, supporting efforts to maximise automated technology and scale; Histo is stable

SCOTLAND ACTIVITY

Blood Sciences: ~5% p.a. test growth **Microbiology:** ~0.1% p.a. test reduction **Histopathology:** ~1% p.a. test growth



Source: NHS Scotland

Cost profile

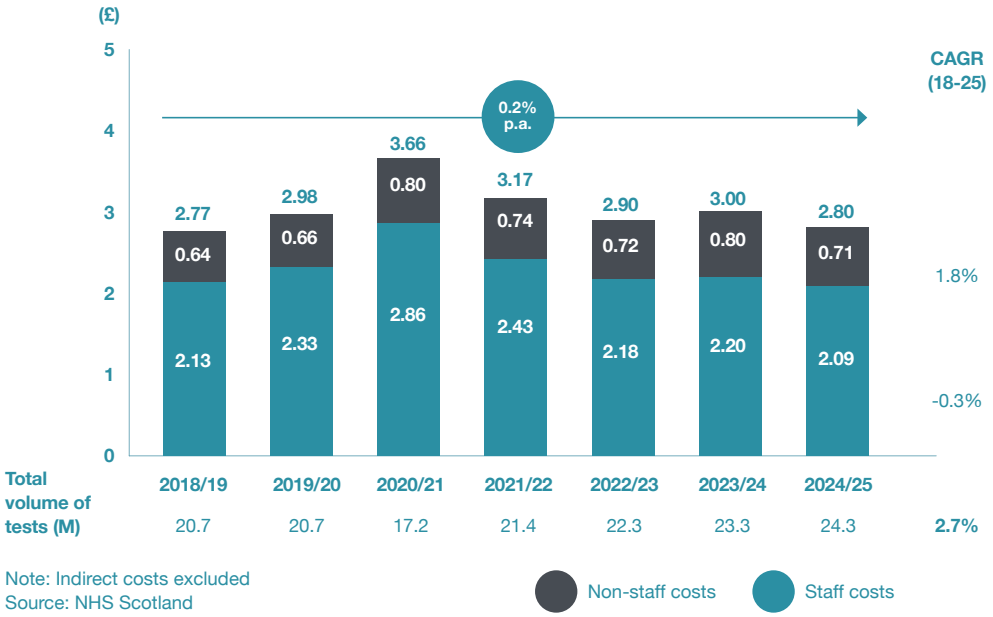
Scotland is not a low-pressure system, but nor is it a cost outlier. Despite test volume growth of around 17%, cost per test in 2024/25 is only marginally above the 2018/19 baseline. Rising non-staff cost per test has been broadly offset by a slight reduction in staff cost per test, leaving overall unit cost relatively stable.

Discipline-level patterns are uneven. In blood sciences, cost per test has fallen as volume has risen, while overall cost pressure is driven more by histopathology. Scotland has therefore absorbed rising demand with greater cost stability than Wales, but without resolving the underlying structural pressures in the service.

Cost per test has flatlined despite a ~17% growth in test volumes, suggesting service efficiency

SCOTLAND | **COST PER TEST**

Pathology costs per test in Scotland; 2018-2025



Note: Indirect costs excluded
Source: NHS Scotland

Commentary

- **Total cost per test is only ~1% higher** in absolute terms than 2018, despite a ~17% growth in test volumes, demonstrating efficient scaling of services
- **Non-staff cost growth has been largely offset by a reduction in staff costs**, which may have been driven by:
  - **Automation** enabling greater volume of testing to be completed
  - **Greater workforce availability** and reduced reliance on Locums
- **Further opportunity** to:
  - **Share practice** within Scotland and other Devolved Administrations
  - **Control non-staff cost growth** and benefit from scale advantage

Workforce profile

The Scottish pathology workforce has grown by around 6% since 2018/19, or about 1% a year, more slowly than in Wales or Northern Ireland. Scientists and senior scientists account for about 42% of the workforce, clinical support and non-clinical or management roles about 41%, and medics and consultant pathologists about 17%.

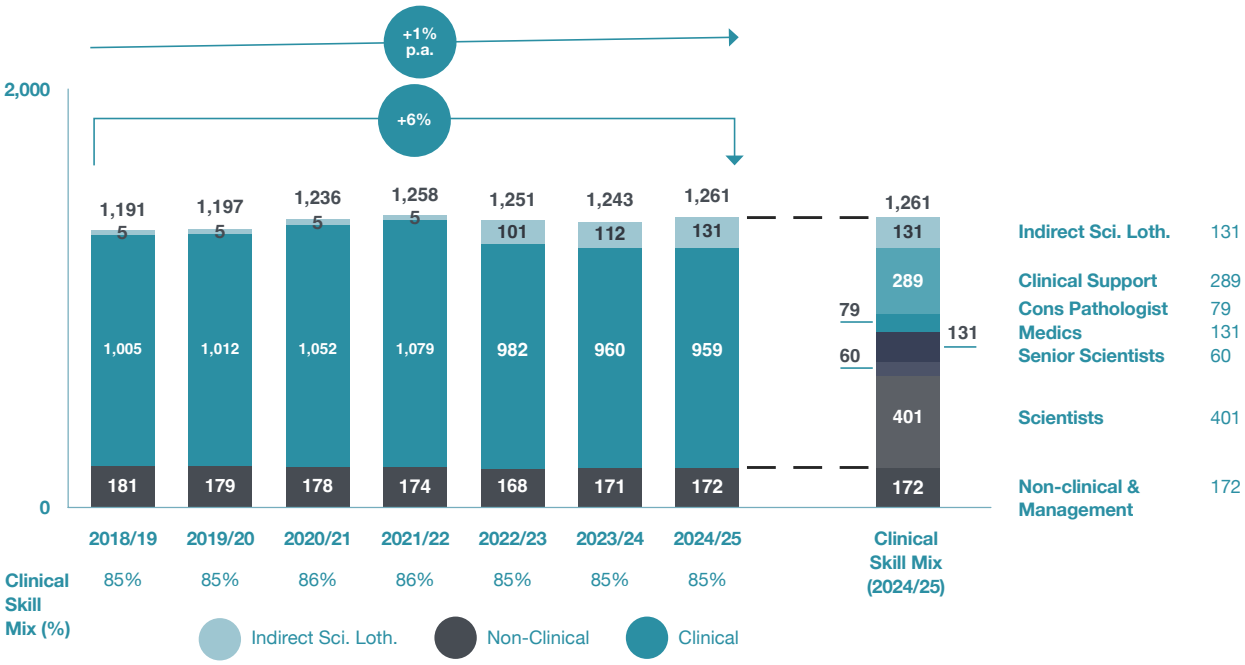
Medical workforce growth is marginal and remains concentrated in a small number of boards, particularly Greater Glasgow & Clyde and Lothian. Apparent contraction in scientist and support roles should be treated cautiously. In Lothian in particular, changes in the way indirect staff are recorded appear to account for much of the movement. Once that is taken into account, the underlying trend is one of modest growth rather than decline.

The overall picture is one of slow but sustained workforce expansion alongside rising demand. Fragmented delivery, regional concentration of the medical workforce and uneven digital maturity nevertheless remain unresolved.

Scottish Pathology workforce has grown steadily at 1% p.a., slower than other areas in UK & N.I.

SCOTLAND | WORKFORCE

Pathology workforce growth and clinical skill mix (substantive), FTE[1]



Note: [1] Total workforce includes Substantive, Bank & Agency Staff
Source: NHS Scotland

Commentary

- **Workforce has expanded ~6% since 18/19**, growing at +1% p.a., with consistent expansion once Indirect Staff from Lothian are correctly attributed as Scientists
- **Skill mix**:
  - Scientists & Senior Scientists account for 42% of the workforce
  - Clinical Support and Non-clinical & Management at 41%
  - Medics and Consultant Pathologists at 17%
- **Sustained growth alongside rising demand** suggests improving workforce sustainability, though continued investment in training and advanced may be required to maintain momentum

Northern Ireland

Operating context and activity

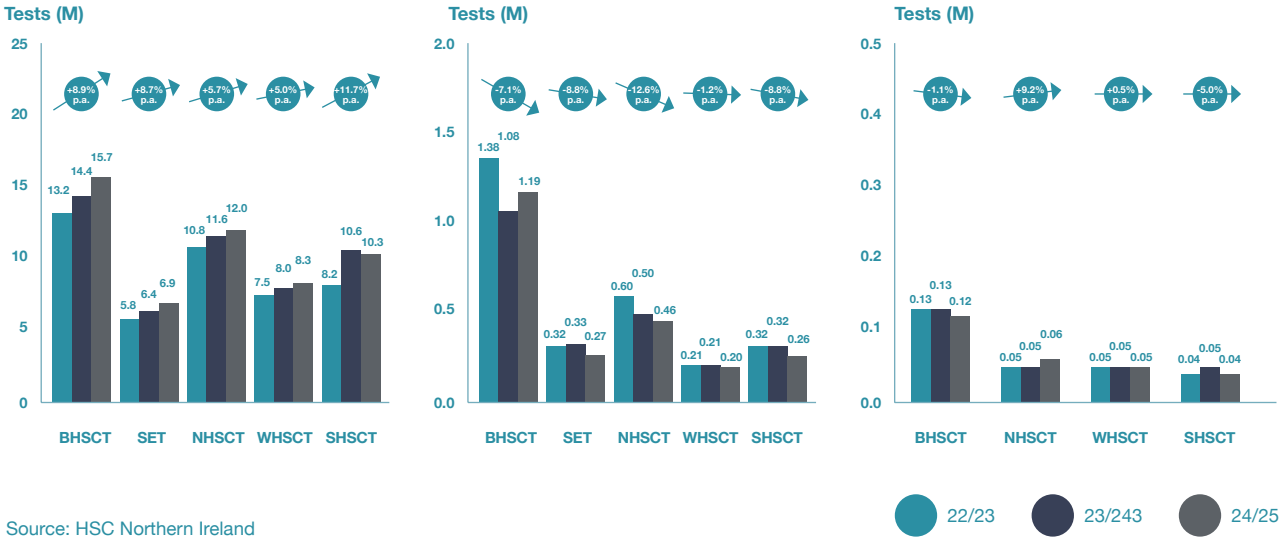
In Northern Ireland, pathology services remain largely organised and managed at Trust level across the five HSC Trusts, with progress towards more integrated pathology service models remaining limited and uneven. Operational and business functions continue to sit mainly within individual Trusts, and staffing and workload vary markedly between regions.

Activity is above the post-pandemic baseline, but the recent pattern is uneven rather than consistently rising. Total test volume increased from 48.7 million in 2021/22 to 55.8 million in 2023/24, before easing to 53.0 million in 2024/25. Growth is concentrated in blood sciences, while microbiology has declined and histopathology is broadly stable. Geography and regional variation continue to shape how services are organised and sustained across Northern Ireland.

Blood Sciences is experiencing significant test growt, on a sizable baseline, supporting efforts to benefit from automated technology and scal

NORTHERN IRELAND | ACTIVITY

Blood Sciences: ~8% p.a. test growth **Microbiology:** ~8% p.a. test reduction **Histopathology:** ~1% p.a. test growth



Source: HSC Northern Ireland

Cost profile

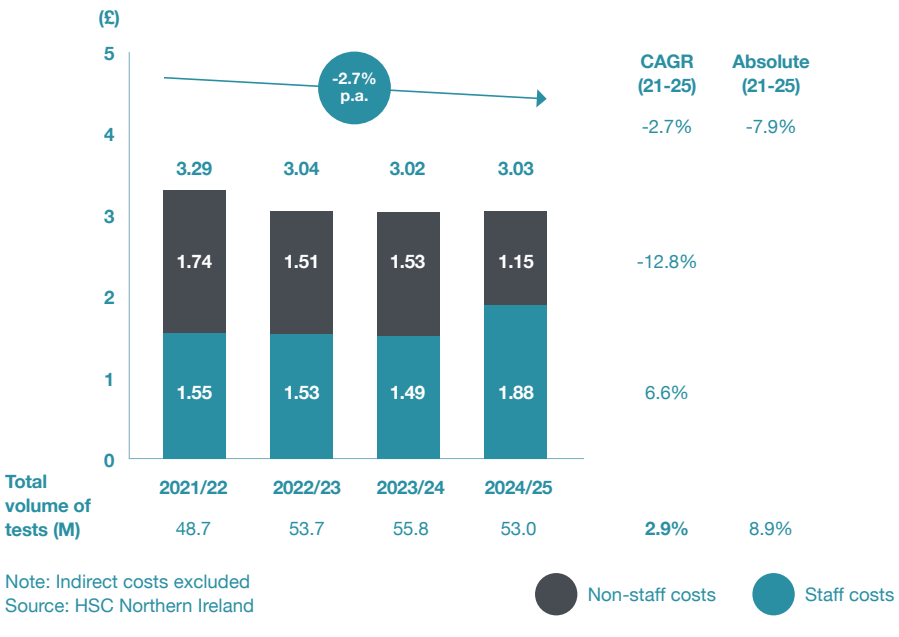
Cost per test in Northern Ireland has fallen from £3.29 in 2021/22 to £3.03 in 2024/25, a reduction of around 8%, despite overall test-volume growth of about 9% across the period. The reduction has been driven by lower non-staff cost per test, while staff cost per test has risen. Cost per test has also stabilised in the latest year, suggesting that recent improvement has moderated.

The evidence therefore points to some improvement from a high baseline, but not to uniformly falling cost pressure across all components. Granular cost-per-test data by discipline are not available for Northern Ireland, and corresponding regional test data are not available, so the evidence supports the overall trajectory but not a more detailed specialty-level or regional causal reading.

Cost per test have declined by ~8%, despite a ~9% growth in test volumes primarily driven by non-staff costs reduction – albeit from a high baseline

NORTHERN IRELAND | **COST PER TEST**

Pathology costs per test in Northern Ireland; 2021-2024



Note: Indirect costs excluded
Source: HSC Northern Ireland

Commentary

- **Total cost per test is ~8% lower** in absolute terms than 2021, despite a 9% overall growth in test volumes
- **Cost per test has stabilised in the last year, driven by a reduction in non-staff cost per test**, highlighting efficient scaling, which can be achieved with:
  - **Reagent and non-staff cost negotiations** (influenceable through scale)
  - **Centralisation** of activities
- Staff costs rose across all Northern Ireland
- NB:
  - Granular Cost per Test data by discipline is not available for Northern Ireland
  - Corresponding regional test data is not available and therefore correlation & causation to staff cost per test increases is not discernible

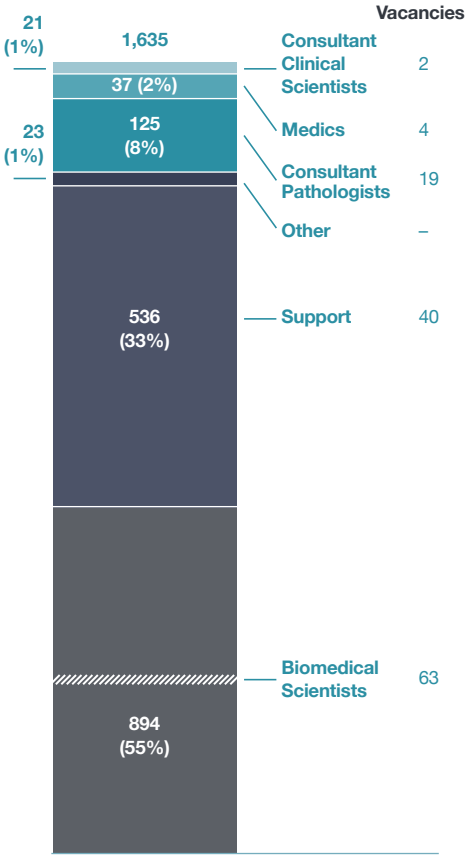
Workforce profile and service resilience

The Northern Ireland pathology workforce comprises around 1,600 whole-time equivalents, of whom biomedical scientists account for about 55%. Vacancies average 8–10% across Trusts, and consultant vacancies remain particularly acute, with 19 consultant pathologist posts unfilled, equivalent to about 15% of the current establishment. Current supply is not keeping pace with service need. Around 477 additional staff, equivalent to a 29% increase, are estimated to be required, while replacement and training output remain below the roughly 85 additional staff per year needed to offset growth and retirement. Cross-border recruitment and workforce mobility remain limited, and trainer availability has become a critical constraint, increasing the importance of domestic training capacity and longer-term service resilience.

Recruitment and development pressures are creating fragility in services, with regional disparities; Histopathology is an exemplar service

NORTHERN IRELAND | WORKFORCE | PREVIOUS ANALYSIS

N.I. Workforce Composition;
FTE 2023/2024



Commentary

- Northern Ireland's pathology workforce totals ~1,600 WTEs, with anticipated 5% growth in the next 5 years
- **Biomedical Scientists account for ~55% of the workforce**, alongside 16 Consultant Clinical Scientists
- **Significant regional variation**, with Belfast (BHSCT) operating at 3-5x higher staffing ratios per population than other Trusts
- **Advanced practice models are established in histopathology**, where consultant shortages have been partly offset through advanced biomedical scientist reporting
- Lessons are expected to inform **broader adoption of advanced roles** across other scientific disciplines, supported by **new funding for Clinical Chemistry (from 24/25)**
- **Supply has not kept pace with vacancies**, averaging **8-10% across Trusts**, with the highest gaps in specialist scientific and consultant roles
- **Estimated requirement of an additional 477 additional staff** (29% increase)
- **Replacement and training outputs** remain below the **~85 additional staff per year** required to offset growth and retirement (15% of senior staff retiring in 10 years, with 10–15-year training lead time)
- Cross-border recruitment and workforce mobility remain limited, constraining short-term capacity gains
- **Trainer availability has become a critical constraint**; limited assessor capacity must be balanced with an increase in trainee intake
- **Virtual learning tools and e-mentoring** have provided short-term relief, but a regional training framework is required to standardise and scale development pathways
- **Sustainability reportedly requires new, structured training and investment**, including funded regional rotations and post-registration qualifications aligned with future skill needs
- **Digital pathology and technology adoption are relevant enablers of resilience**
- Digital histopathology is now fully implemented, enabling regional workload distribution from March 2026
- AI and automation remain in integration phases for other disciplines. Blood sciences automation currently expanding capacity

Source: NI Strategic Workforce Review 2024

Histopathology in Northern Ireland provides the clearest example of resilience under pressure. Advanced biomedical scientist reporting has partly offset consultant shortages, and digital histopathology is now fully implemented, enabling regional workload distribution from March 2026. In other words, advanced practice, digital capability and service redesign are already functioning here as practical resilience measures, even though workforce gaps remain acute. In other disciplines, AI and automation are less developed, although blood sciences automation is expanding capacity.

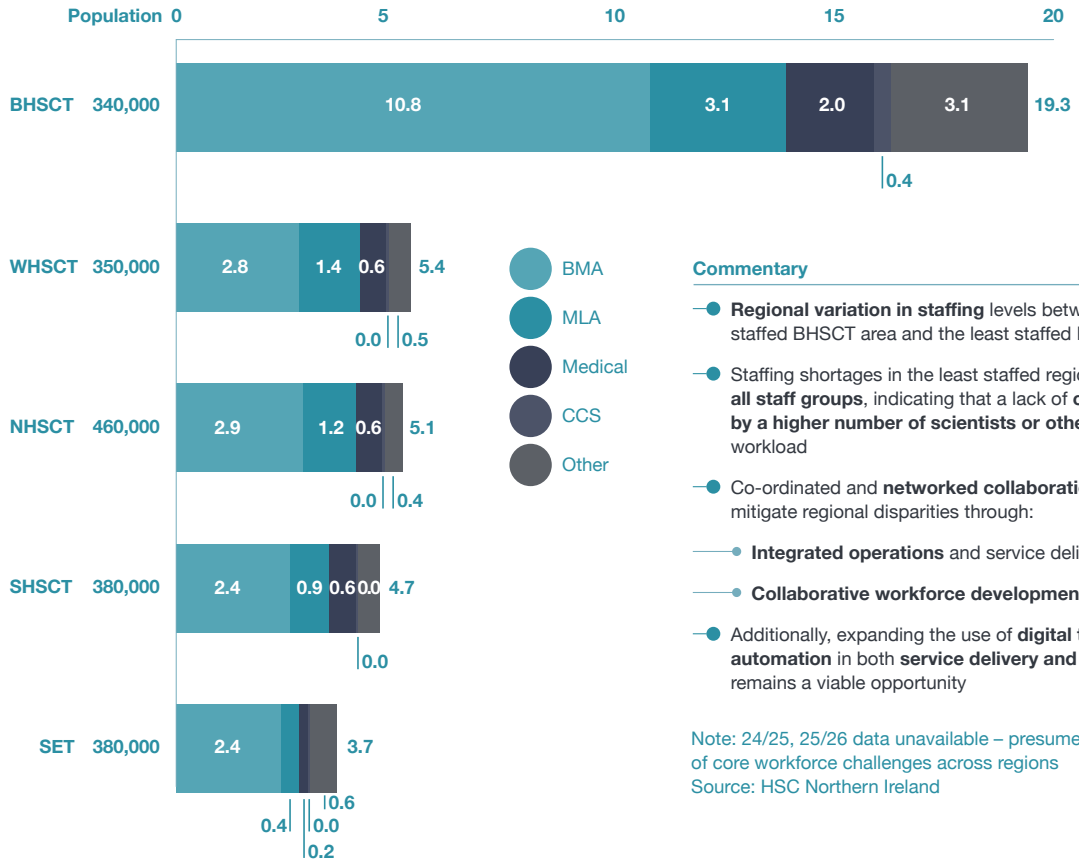
Regional disparity

Staffing ratios vary sharply between Belfast and the least well-staffed trusts. Shortages in the least well-staffed areas are evident across all staff groups, not only among consultants, indicating that the pressure is structural rather than confined to a single professional group. More integrated operations, collaborative workforce development, digital workload sharing and automation are the clearest practical responses in a smaller and more regionally uneven service landscape.

Regional disparities in workforce availability is likely driving service inequalities, partly addressable by collaborative, networked approaches

NORTHERN IRELAND | WORKFORCE | PREVIOUS ANALYSIS

Pathology workforce per 10k population, 23/24[1]



Commentary

- **Regional variation in staffing** levels between the most abundantly staffed BHSCT area and the least staffed NHSCT region
- Staffing shortages in the least staffed regions are **evident across all staff groups**, indicating that a lack of **consultants is not offset by a higher number of scientists or other roles** to share the workload
- Co-ordinated and **networked collaboration across regions could** mitigate regional disparities through:
  - **Integrated operations** and service delivery networks
  - **Collaborative workforce development** and training programs
- Additionally, expanding the use of **digital technologies and automation** in both **service delivery and workforce development** remains a viable opportunity

Note: 24/25, 25/26 data unavailable – presumed continuation of core workforce challenges across regions
Source: HSC Northern Ireland

Cross-cutting convergence

Across the devolved administrations, the differences are real but the underlying pressures are familiar. Wales shows the clearest combination of high unit cost, consultant scarcity and uneven progress towards more integrated delivery. Scotland shows that rising demand, relative cost stability and the strongest recent post-pandemic cost reduction can coexist, but without resolving fragmented delivery, dispersed geography or uneven digital maturity. Northern Ireland shows that recent cost improvement from a higher baseline can sit alongside acute workforce fragility, regional disparity and continued variation in how services and functions are organised across Trusts.

Taken together, the comparison points in the same direction across all three administrations. Scale matters most where activity is highest, particularly in blood sciences. Workforce configuration remains a major determinant of value, with consultant scarcity, advanced practice, support roles and skill mix all bearing directly on productivity, resilience and capacity. Smaller and more geographically dispersed systems face additional constraints in sustaining specialist cover, training capacity and equitable regional provision. Benchmarking remains partial, but it is now sufficiently developed in activity, value, productivity and workforce to support a more credible UK-wide view than has previously been possible.

The rest of the review provides the common framework for interpreting those differences. Quality is the assurance frame through which variation in structure and geography should be tested. Workforce is the most immediately applicable lens, because consultant scarcity, training capacity, advanced practice and regional deployment are already visible constraints across the devolved administrations. Access is the clearest frame for regional inequity, delay and fragility where specialist capacity cannot be assumed locally. Digital matters here as an enabler of resilience, interoperability and cross-site working. Value provides the clearest route to cost transparency, productivity and reinvestment in workforce, automation and service redesign.

Conclusion

The outcomes described in this review are relevant across the UK, but the route, sequencing and timescale for implementation will need to reflect each nation's governance, geography, service configuration and starting point. Evidence from Wales, Scotland and Northern Ireland shows that the pressures identified in this review are not confined to England. The national patterns differ, but the underlying drivers are consistent: scale, workforce configuration, automation, digital capability and cost structure all shape resilience and value. Direct comparison remains more limited for quality, access and full digital maturity than for activity, cost, tests per FTE and workforce, particularly where coverage and year-by-year granularity differ between administrations. Taken together, the evidence supports a UK-wide reading of pathology performance and improvement, while recognising that implementation will need to proceed differently in each nation.

PART 3: QUALITY

Executive summary

Pathology sits at the heart of the healthcare system. It delivers more than 2 billion tests each year and supports 95% of patient pathways. At its core, pathology quality is about protecting patients: ensuring that the right test is performed, interpreted and communicated safely, wherever a patient enters the system.

When pathology quality and governance are weak, the whole healthcare system is weakened. Delays, uneven access, fragmented oversight and variable operating model maturity do not stay within laboratories; they affect diagnostics, waiting times, cancer pathways, resilience and wider system flow.

The Barnes Quality Assurance Review in 2014 reinforced this patient perspective, noting that variation between systems is unacceptable and that more should be done to ensure patients and clinicians have access to high-quality services irrespective of location.

If pathology services are to keep pace with rising demand and protect patients from avoidable delay, variation or risk, the following quality findings need to sit at the heart of future service planning.

Pathology services in England generally deliver high standards of laboratory quality, but the assurance model has not kept pace with changing service models, newer technologies and testing outside traditional laboratory settings.

Formal accreditation remains strong, with more than 90% of laboratories accredited to ISO 15189. However, the proportion of trusts reporting at least one test outside accredited scope has risen, creating a visibility gap in some of the most complex and innovative pathways.

What are the key challenges?

- **Transition creates a governance risk state.** Fully integrated service models appear to provide a stronger platform for consistent quality governance in the long run, but partial transition is associated with higher unresolved incident backlogs. In 2025, partially integrated service models reported around 37 Datix incidents open for more than 30 days per million tests, compared with around 8 in fully integrated service models.
- **High-complexity testing is losing visibility.** By 2025, roughly two-thirds of trusts reported at least one non-accredited test type, with the highest numbers concentrated in major teaching and tertiary centres. This does not imply that these tests are unsafe; it shows that assurance frameworks are not consistently designed to accommodate rapid innovation, specialist diagnostics and test development.
- **Innovation sits at the edge of assurance.** POCT, digital pathology and direct-to-patient models often fall partly outside current governance, accreditation and incident reporting arrangements, with wide variation in training, quality control, connectivity and escalation. These blind spots become more material as their activity grows.
- **Levers are weaker than in comparator systems.** France, Germany and Australia define clearer quality floors, escalation triggers and consequences for persistent non-compliance. England relies more heavily on professional norms and contractual expectations, with less predictable consequences for sustained quality failure.

How can these challenges be addressed?

The response should be a single, clearer assurance model: aligned roles for UKAS, CQC, NHS England, commissioners and the relevant devolved nation equivalents where applicable; defined escalation triggers; service model-level quality leadership; and a minimum dataset covering accreditation scope, non-ISO testing, incidents, Datix backlogs, External Quality Assessment (EQA) signals and key turnaround time (TAT) measures.

Priority actions should be to:

- **Create a coherent national framework** by aligning the roles of UKAS, CQC, NHS England, commissioners and the relevant devolved nation equivalents where applicable, with a designated senior accountable leader in each service model responsible for pathology quality and escalation.
- **Link accreditation to proportionate escalation** by making ISO 15189 accreditation a consistent commissioning and contractual requirement, supported by clear national triggers such as repeated EQA failures, sustained Datix backlogs or unresolved non-conformities.
- **Extend governance to the edge of the system** by bringing POCT, digital pathology, community and direct-to-patient testing explicitly within the pathology service model for quality governance.
- **Drive transparency with data and refresh the maturity assessment** by publishing a minimum national dataset and using objective outcomes, not only process completion, to assess maturity.

What improvements would further integration bring?

Completed operational integration would allow quality to be managed across the whole service model rather than trust by trust. It would support harmonised QMS, common SOPs, shared incident management, clearer POCT and digital governance, and faster identification of services needing targeted support.

Core conclusion

Quality improvement will not come from accreditation alone. It depends on using integrated service models to make quality visible, accountable and manageable across the full diagnostic pathway.

Introduction

This chapter focuses on quality and assurance: how safe, accurate and reliable pathology services are, and how the national framework for quality needs to evolve as service models mature.

At its core, pathology quality is about protecting patients. Every result carries a clinical consequence: a diagnosis made or missed, a treatment started or delayed, a cancer pathway progressed or stalled, reassurance given or withheld. Quality in pathology is therefore not an internal laboratory concern; it is a patient safety issue, a clinical decision-making issue and a public confidence issue. The purpose of assurance, accreditation, governance and service design is to make sure that patients can rely on the right test being performed, interpreted and communicated safely, wherever they enter the system.

The following sections set out where quality stands in 2025, why performance varies between service models, how comparator countries regulate quality, and what options are available to create a more coherent assurance framework for England.

Against this backdrop, the central question is how to move from a patchwork of local quality systems and a largely process-based maturity matrix to an outcomes-focused national framework: one based on clearly defined objective indicators, targeted support and proportionate escalation where risks are highest.

The question is not whether to reorganise pathology again, but how to make existing service models operate as single managed services for quality: with shared standards, transparent data, defined escalation and end-to-end governance across laboratory, POCT, digital and community testing.

Methods and definitions

This chapter is England-weighted and draws primarily on data from 2020–21 to 2024–25. Most trend analyses use National Annual Pathology Data Collection (NAPDC) returns from 2020–2025, with quality indicators and incident data taken from NHS England's PQAD returns for 2024 and 2025. Where specific years differ, this is stated in the text and figure captions.

Data are reported at trust and service model level. Two service models and 18 trusts are excluded from selected analyses where NAPDC submissions are incomplete or inconsistent. These exclusions follow the refinements applied across the wider review and primarily affect time-series comparisons rather than single-year snapshots.

Where incident analyses exclude exceptional outliers or incomplete submissions, this is stated in the relevant figure note and should not be treated as a substantive finding.

Data sources

- **NAPDC** – Activity and related returns submitted using a national template, providing test volumes and workload across disciplines. These data underpin service model-level activity and denominators for incident rates.
- **PQAD** – Trust-level quality indicators, including serious incidents, Datix incidents over 30 days and tests reported outside ISO 15189 scope. PQAD 2024 is used for serious incidents; PQAD 2025, aligned with NAPDC volumes, is used to calculate Datix over 30 days per million tests.
- **Regulatory and accreditation sources** – UKAS publications and related documentation are used to interpret accreditation coverage and regulatory context.

Chapter-specific definitions

- **Tests outside ISO 15189 scope** – Tests reported by trusts as not covered by their accredited ISO 15189 schedule.
- **Clinician-led direct-to-patient testing** – Testing provided directly to patients as part of a governed clinical pathway, where requesting, interpretation, follow-up or oversight remains connected to clinical governance. This does not refer to retail or privately purchased self-testing outside NHS clinical governance.
- **Serious incidents** – Incidents recorded under the NHS incident reporting framework in PQAD returns. Results are presented per trust and grouped by operating model segmentation.
- **Datix over 30 days** – Incidents remaining open for more than 30 days. Calculated per million tests using PQAD 2025 returns and NAPDC activity volumes.
- **Pathology Network Maturity Assessment indicators** – Quality indicators referenced in the Pathology Network Maturity Assessment are analysed using objective dataset measures rather than self-assessment scoring.

Where quality stands in 2025

This section sets out current accreditation coverage, non-ISO testing and incident patterns, and highlights where blind spots are emerging in POCT, digital pathology and direct-to-patient testing.

Accreditation coverage and non-ISO testing

The starting point is a high level of formal accreditation. Since 2013, UKAS has accredited NHS pathology laboratories to ISO 15189, and all laboratories should have transitioned to the updated 2022 standard by December 2025. ISO 15189 accreditation is designed to assure quality, reliability and patient safety across staff competence, test validation and reporting.

Within that high baseline, the volume and range of testing reported outside ISO 15189 scope has grown. The proportion of trusts reporting at least one non-accredited test has increased from around 45% in 2020 to approximately 66% in 2025.

By 2023/24, more than half of those trusts were reporting over 30 non-ISO test types, indicating a shift towards higher volumes of activity not yet covered by formal accreditation.

Several factors are likely to be driving this trend. The transition timetable to ISO 15189:2022 means some tests are temporarily out of scope while laboratories update validation and documentation. At the same time, test menus are expanding, including recovery of research and clinical trial activity after the acute phase of the COVID-19 pandemic. Large teaching and tertiary centres have the highest concentrations of non-ISO test types, reflecting service complexity, specialist diagnostics and research intensity.

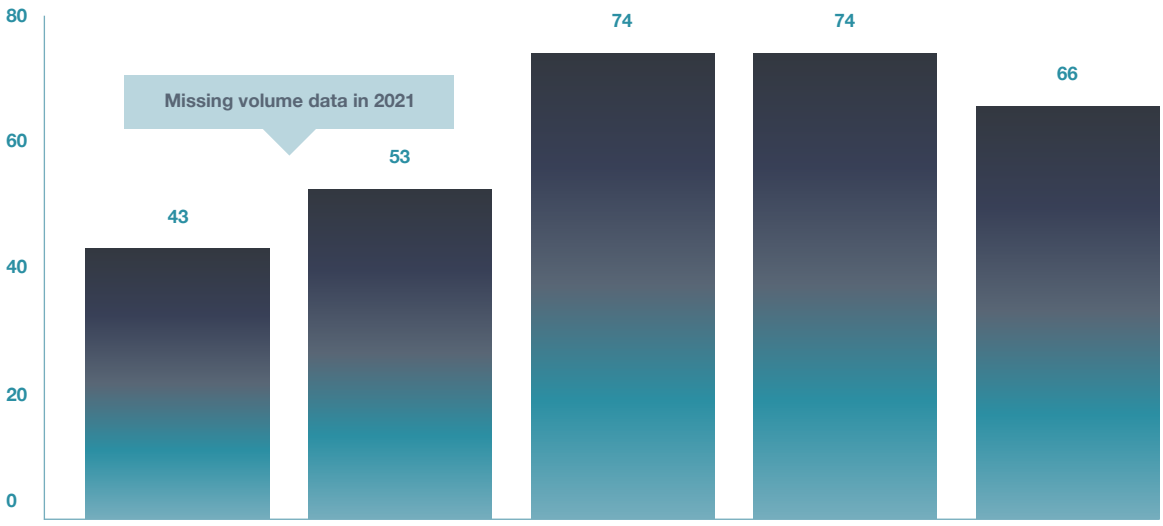
Taken together, these patterns mean that although overall accreditation coverage remains high, a growing share of testing is taking place outside the accredited schedule. This does not imply that these tests are unsafe, but it does create an assurance gap: national bodies have less consistent visibility of quality management processes, and local governance arrangements vary in how explicitly they manage out-of-scope activity.

In effect, an inverse assurance model has emerged: the most complex and innovative patient pathways often have the lowest visibility in the national accreditation framework. This is a visibility problem as much as an accreditation problem: the current model can confirm whether a test is within scope, but it does not consistently show how out-of-scope activity is governed, risk-assessed or brought into assurance over time.

QUALITY ACCREDITATION

Growing number of Trusts reporting non-ISO tests

% NHS Trusts reported tests without iSO accreditation (2020-2025, %)



	2020	2022	2023	2024	2025[1]
% Trusts reported <=10 test without ISO accreditation	36%	37%	26%	23%	25%
% Trusts reported >10 but <=30 test without ISO accreditation	36%	25%	20%	17%	23%
% Trusts reported>30 test without ISO accreditation	28%	37%	55%	61%	52%
Total # Trusts reported tests without ISO accreditation	47	51	66	66	61

Note: [1] Data available until July 2025; Trusts that have no test volume reported in the respective year are Excluded in this analysis;
Source: PQAD; NAPDC 2020-2025

Incident patterns and Datix backlogs by operating model segmentation

Datix is widely used across the NHS as the primary risk management and incident reporting software. In this analysis, Datix incidents open for more than 30 days are treated as a proxy for unresolved incident backlog, not as a direct measure of harm, diagnostic accuracy or incident severity.

Incident data show clear differences between operating models. In 2024, trusts in fully integrated service models reported on average around 0.1 serious incidents each, while partially and non-integrated trusts reported approximately twice that level.

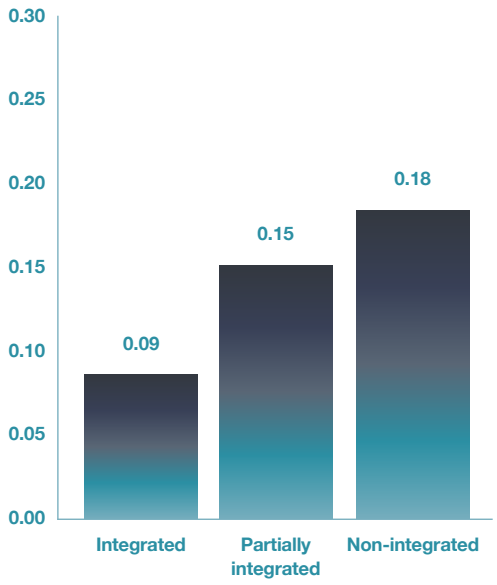
This suggests that fully integrated service models, when paired with effective governance, may be better able to identify, escalate and resolve serious quality issues than either non-integrated or partially integrated models.

The same pattern appears in unresolved incident backlogs. Using PQAD 2025 data linked to NAPDC activity, trusts in fully integrated service models recorded around 8 Datix incidents over 30 days per million tests. Partially integrated service models reported around 37 incidents per million tests, nearly four times the rate of fully integrated models, while non-integrated service models reported around 16 incidents per million tests..

QUALITY INCIDENTS

Serious incidents

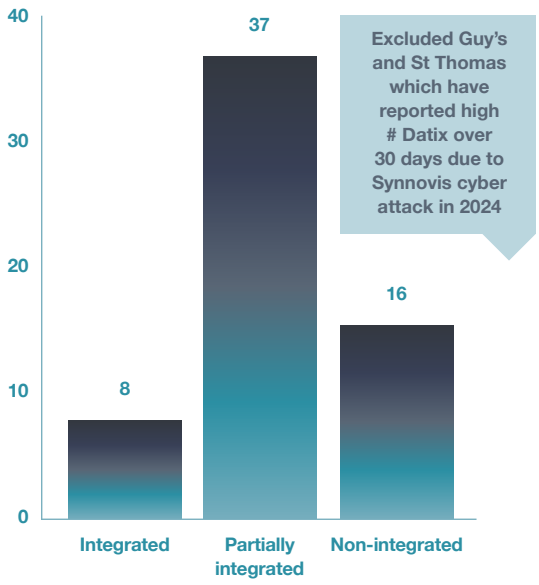
Average # of serious incidents across Trusts by integration status[1] (2024, #)



	Integrated	Partially integrated	Non-integrated
Avg. vol of tests performed by Trust (in M)	11	9	10
# Trusts reported serious incident	2	4	7

Datix over 30 days

Datix over 30 Days per million tests by integration status[2] (2025, #)



	Integrated	Partially integrated	Non-integrated
Total vol of tests performed by Trust (in M)	191	272	698
# Trusts reported 1 or more Datix over 30 days	13	27	55

Note: [1] Average number of serious incidents reported across NHS Trusts based on PQAD 2024 data grouped by integration status; 2024 data is used due to limited data availability for 2025; [2] Average number of Datix over 30 days across NHS Trusts based on PQAD 2025 data and volume activity from NAPDC, grouped by Trust integration status; Source: NAPDC; PQAD

These findings show a strong association between operating model and unresolved incident backlogs. They suggest that partially integrated models, where some activity is shared but quality systems and accountability remain fragmented, represent a specific governance risk state.

The most plausible interpretation is that fragmented accountability and incomplete operational integration drive risk during transition. Partially integrated service models have enough complexity to require robust cross-site governance, but do not yet enjoy the benefits of unified systems and leadership. The implication is not that integration itself is unsafe, but that service models need support to move through the transition quickly and complete the shift to fully integrated, well-governed models.

Service model size alone does not explain the observed variation. There is only a modest correlation between service model test volume and Datix backlogs (R = 0.23), and the strength of governance and maturity appears to be a more important driver of performance.

This is consistent with the maturity analysis, which finds limited alignment between self-assessed maturity and objective indicators such as incident rates and incidents over 30 days.

Quality blind spots in POCT, DTP, digital and genomics

Alongside accredited laboratory services, an increasing volume of diagnostic activity is delivered through POCT, digital pathology platforms, DTP models and advanced molecular testing. These services are integral to patient pathways, but they do not always sit within the same accreditation, data and assurance regime as core laboratory testing. Oversight can be dispersed between service models, commissioners, specialist networks and external providers.

POCT is a particular concern. While some POCT activity is covered under ISO 15189 or ISO 22870 accreditation, this is not universal. Training, connectivity, quality control and incident reporting arrangements vary widely, especially where devices are used in primary care, community settings or by external partners.

Digital pathology, genomics and DTP testing are newer but growing segments. Digital workflows can improve turnaround times and support remote reporting, but they raise questions about validation, image quality, algorithm performance and service model-level governance. DTP models can increase access, but they may sit outside routine laboratory governance and have limited integration into PQAD or established incident reporting routes.

Current national tools do not fully capture these risks. The Pathology Network Maturity Assessment tests whether regulatory arrangements exist, but it is less effective at distinguishing where services are operating within robust quality controls and where they rely on variable local practice. The highest-risk scenarios are often not the technology itself, but use outside established scope, for example POCT beyond the accredited laboratory environment, modified workflows introduced without clear validation evidence, or DTP pathways that are not digitally linked or connected to incident learning and quality monitoring.

A more consistent approach is therefore needed to bring POCT, digital pathology, community testing and DTP services within core quality expectations. Where testing sits outside manufacturer instructions or accredited scope, service models need clear validation, authorisation, quality control (QC), EQA where applicable, and incident review arrangements. Accountability should sit at service-model level, not only within individual laboratories.

This means the assurance gap is no longer confined to laboratory accreditation status. As testing moves closer to patients, into digital or distributed pathways, and across increasingly specialised molecular and genomic services, quality depends on whether service models can govern the full diagnostic pathway, not only the accredited laboratory component.

International benchmarking

France, Germany and Australia operate national pathology systems comparable in scale and complexity to England's, and all three combine accreditation or defined quality standards with clearer escalation levers. Their experience is useful not as a template for England to import, but as a test of where reliance on professional norms and contractual expectations leaves visible gaps.

Across the four systems the broad goal is the same: safe, reliable laboratory medicine with clear expectations on accreditation, quality control and competence. The mechanisms differ in one decisive respect. In France, Germany and Australia, accreditation or compliance with defined quality standards is tied to the right to operate, to be reimbursed, or to remain professionally compliant. In England, the focus of this analysis, accreditation is expected but not universally mandated in statute, oversight is shared across UKAS, CQC, NHS England and commissioners, and escalation relies more heavily on reputational and contractual pressure than on a single coherent lever.

QUALITY | BENCHMARKING

Lever	Relative performance	
Licensing & Accreditation	Partial coverage in accreditation as it is not required with reliance on market expectation	Obligatory statutory accreditation and 100% licensing coverage
Compliance & monitoring	Primarily self-monitoring, limited external audits	Regular surveillance, mandatory reporting
Enforcement & incentives	Weak / no enforcement; reliance on reputational pressure with no real sanctions	Direct consequence for non-compliance (e.g., legal / financial penalties)
Workforce	Less standardised oversight and reliance on self-regulation	Mandatory licensing and checks on competence

The mechanisms in each comparator system are distinct:

- **France**
  ISO 15189 accreditation, including requirements for POCT now incorporated within ISO 15189:2022, is a legal condition of operating, achieved across all medical biology laboratories through a phased rollout from 2013 to 2020. Comité français d'accréditation (COFRAC) delivers accreditation audits; Regional Health Agencies (ARS) license laboratories and can suspend or withdraw authorisation; EQA participation is mandatory.
- **Germany**
  Quality is anchored in Rili-BÄK guidelines, which set legally binding standards for QC and EQA across most analytes. Two consecutive EQA failures trigger mandatory reporting and can result in fines of up to €25,000 or test-level restrictions. ISO 15189 is optional.
- **Australia**
  Accreditation to ISO 15189 with NPAAC standards is required for any laboratory billing Medicare. NATA and RCPA conduct joint biennial reassessments; loss of accreditation removes the right to bill.

On workforce, the UK compares favourably. Biomedical scientists, clinical scientists and medical pathologists work within defined statutory, professional and training frameworks, with HCPC and GMC registration, specialist qualifications, continuing professional development and professional body standards providing strong safeguards for competence. The weakness is not the expertise of the workforce, but the extent to which the wider assurance model depends on that expertise to compensate for weaker system levers elsewhere. England relies heavily on skilled professionals to identify, manage and mitigate risk locally, rather than on a consistently aligned system of accreditation, monitoring, escalation and incentives that reduces the likelihood of risk arising in the first place.

France case study

The mechanics of escalation are easier to see in a worked example than in regulatory description. In 2012, an unannounced inspection of a private medical laboratory in Strasbourg by the regional health agency, ARS, was triggered by clinician and patient complaints about false-positive Lyme disease results. Inspectors found serious hygiene lapses, internal QC failures and poor result interpretation across several tests. ARS suspended the laboratory's authorisation, issued a corrective injunction with a defined remediation window, and redirected testing to neighbouring accredited providers to maintain patient access. A follow-up inspection found the non-conformities unresolved, and authorisation was withdrawn three months after the initial suspension.

Three features of this process are relevant for England. First, a short and specified remediation window. Second, clear escalation from temporary suspension to licence withdrawal, with each step underpinned by defined authority. Third, the operational ability to maintain service continuity by redirecting work while safety risks were addressed. None of these depends on the French ownership model. They depend on having a designated body able to act, defined triggers, and a graded set of consequences attached to them.

Implications for England

Three implications follow. First, comparator systems define a clearer minimum quality expectation across settings, including POCT and community testing, rather than relying on professional norms alone. Second, they specify triggers, including repeated EQA failure, unresolved non-conformities and serious inspection findings, that initiate graded intervention. Third, they align accreditation or quality compliance with a meaningful consequence: the right to operate in France, the right to bill in Australia, and professional or legal compliance in Germany.

England's professional and accreditation frameworks are strong, but the assurance model around them is softer and more fragmented. Expectations are less consistently defined, escalation powers are dispersed, and there is no transparent mechanism linking accreditation status, performance data and consequence. The options set out in the next section therefore concern not the wholesale import of another country's model, but the tightening of England's existing one: clearer minimum expectations, common escalation triggers, and alignment between commissioning, regulation and professional standards.

Key challenges

The evidence points to five system-level challenges. These are not primarily failures of individual laboratories, but weaknesses in how assurance, escalation, leadership and data operate across service models. The five challenges are: fragmented assurance, weak escalation, incomplete coverage of newer testing routes, inconsistent service model-level governance, and limited use of objective quality data.

Fragmented regulatory and assurance landscape

Responsibility for pathology quality is spread across UKAS, CQC, NHS England (and equivalents in devolved nations) and commissioners. Each plays a role, but there is no single point of accountability or unified assurance framework covering laboratories and service models, including newer delivery models.

This fragmentation is a core weakness in England's pathology assurance arrangements. Accreditation verifies technical competence, CQC inspects broader care quality and safety, and commissioners set contractual expectations, but these elements are not consistently aligned to give a holistic, service model-level view of performance.

As service models mature, the lack of a single, streamlined assurance framework makes it harder to compare services, identify where support is needed and ensure that operational integration is matched by higher standards of quality and governance.

Weak escalation and limited consequence for non-compliance

The current model offers limited, predictable consequences when quality problems persist. Enforcement mechanisms are relatively weak, with no mandated and consistently applied national escalation pathway or predictable consequence for persistent non-compliance.

Accreditation confirms that a laboratory meets ISO 15189 at the point of assessment, but there is no consistent national process that links repeated EQA failures, sustained Datix backlogs or serious incident trends to formal remediation timelines or interventions. In practice, escalation often relies on local reputational

pressure or ad hoc regional intervention rather than clearly defined triggers. This weakens the impact of accreditation and PQAD, even when problems are visible in the data.

Incomplete assurance coverage (POCT, DTP, digital)

Assurance is weakest at the edge of the traditional laboratory model, particularly for POCT, digital pathology and DTP testing. As the volume of these activities grows, the absence of clear national expectations on accreditation, EQA participation and incident reporting is becoming a material driver of variation and risk.

Inconsistent service model-level governance and leadership

Quality governance is uneven between service models and even between trusts within the same service model. The absence of clearly designated service model-level quality leads is a recurring issue.

Fully integrated service models with unified leadership and systems perform better on serious incidents and Datix backlogs than both partially integrated and non-integrated service models. “Halfway” models, with shared badges but fragmented operations and governance, show the highest incident backlogs, suggesting that poorly managed transition is the riskiest state, not integration itself.

Smaller histopathology services sometimes integrate activity into a wider integrated service model because maintaining local accreditation is costly and labour-intensive, reinforcing the point that governance and resourcing are unevenly distributed.

Without service model-level Quality Directors and harmonised QMS, SOPs and incident processes, operational integration can entrench variation rather than reduce it.

Limited transparency and data use (PQAD and the Network Maturity Assessment)

The NHS already collects rich quality data through PQAD and the Network Maturity Assessment, but these tools are not yet used in a way that consistently drives improvement or provides clear external visibility.

Analysis of current maturity scores against PQAD and other key performance indicators (KPIs) raises questions about the objectivity and consistency of the self-assessment process. The comparison shows clear disconnects between self-assessed maturity ratings and data-led performance indicators. There are examples of service models rated as “Developing” outperforming “Maturing” or “Thriving” service models on urgent TATs, and service models rated as “Leading” appearing in the bottom quartile for incident resolution. This suggests that the current matrix places more weight on process completion and narrative evidence than on operational safety and resilience.

Critically, key QA metrics such as non-accredited tests, escalation outcomes and incidents over 30 days are not built into the scoring. Use of PQAD insights is assessed in a non-tangible way rather than through embedded quantitative indicators.

At system level, there is limited transparency of quality performance, with no consistent service model-level view of accreditation status, EQA performance, or incident data. This reduces external accountability and makes it harder for commissioners, clinicians and patients to understand how service models compare and where support should be focused.

Overall, the maturity and PQAD frameworks have created a foundation for data-driven oversight, but their current design and use mean that variation in quality is not yet consistently identified or acted on as part of a national improvement framework.

Independent data-led NHSE network ranking compared to Maturity Matrix assessment

Data-led ranking	Self-assessed performance
Rank	Quality Self-assessment
1	Maturing
2	Maturing
3	Thriving
4	Developing
5	Maturing
6	Developing
7	Emerging
8	Maturing
9	Developing
10	Thriving
11	Maturing
12	Maturing
13	Developing
14	Maturing
15	Maturing
16	Developing
17	Maturing
18	Thriving
19	Thriving
20	Maturing
21	Emerging
22	Developing
23	Emerging
24	Maturing

How challenges can be addressed

Addressing these challenges requires a clearer assurance model, not another reorganisation of pathology services. The four main levers are:

- A coherent national assurance framework.
- A clearer link between accreditation and proportionate escalation.
- Stronger service model-level governance.
- Better use of data, including turnaround times, to drive transparency and improvement.

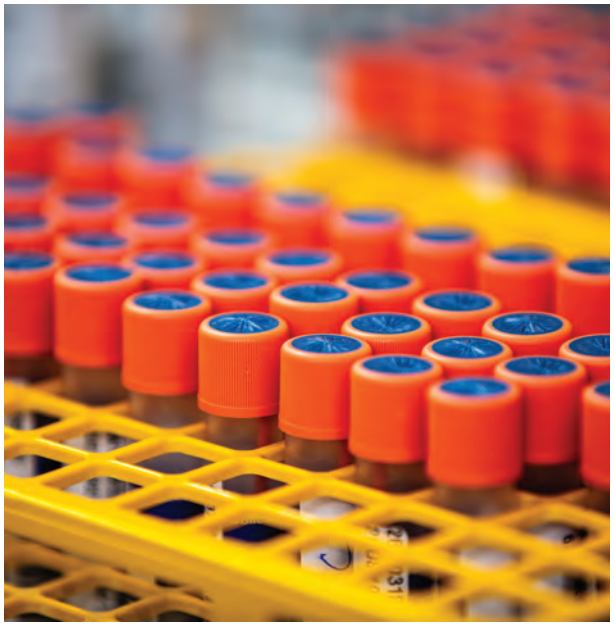
These levers sit within the broader outcomes/enablers model for service model maturity, where quality, access and value are underpinned by digital, workforce and leadership.

Creating a coherent assurance framework

The first requirement is a single, coherent framework that sets out who is responsible for pathology quality and how issues are escalated. The existing oversight roles of UKAS, CQC, NHS England (and equivalents in devolved nations) and commissioners need to be clarified and aligned under a single coherent assurance framework, rather than creating a new regulator.

Within this model, there should be a clearly designated senior accountable leader in each service model, working with national bodies through codified escalation pathways. Those pathways should include defined remediation timelines and the ability to restrict testing scopes or impose contractual consequences through commissioning where quality compliance is at risk, while protecting service continuity.

This framework would treat each service model as a single managed service across multiple sites, and would explicitly cover core laboratories, POCT, digital pathology, community testing and clinician-led direct-to-patient testing.



Linking accreditation to proportionate escalation

A second lever is to connect accreditation status more directly to escalation and commissioning. Making ISO 15189 accreditation a consistently applied commissioning requirement would create a clearer link between quality standards and contractual expectations. This should be matched by proportionate and timely assurance processes, including clearer expectations for reviewing evidence, extension-to-scope applications, new equipment, reconstituted kits and service changes.

Under this approach, commissioners would be expected to contract only with providers that hold appropriate accreditation (or are on a defined trajectory to achieve it), with clear expectations on scope coverage and transition plans. Persistent failure to meet standards would no longer rely solely on reputational pressure; instead, embedded escalation triggers would prompt formal review. Examples include repeated EQA failures, unresolved non-conformities or sustained Datix backlogs over agreed thresholds.

These triggers should automatically prompt review through the agreed national assurance framework, with set timelines for remediation and clear decision rights for escalation. They should also be linked to a menu of proportionate responses, from targeted support and improvement plans to temporary scope restrictions or, in extreme cases, suspension of specific services.

Making quality accountable at service model level

As service models move from non-integrated through partial to fully integrated configurations, this governance shift is essential to prevent the transition phase from becoming a prolonged high-risk state. Service model-level quality leads, for example a Quality Director, should be accountable for quality across all partner trusts.

These roles would be responsible for a harmonised quality management system across the service model, including common SOPs, standardised QC processes, single incident logging and escalation pathways, and a shared approach to EQA participation and response.

Converged LIMS and digital pathology platforms are essential enablers for this model, allowing service models to capture and share quality data consistently, apply common SOPs, monitor incidents and TAT in real time, and extend robust governance to POCT, community and digital services.

Peer-review audits between service models are proposed as a further mechanism to surface systemic risks early and share learning. These could be structured around agreed national indicators, including accreditation coverage, non-ISO test volumes, serious incidents and Datix over 30 days.

Embedding these roles and systems would also support the wider maturity model's emphasis on strong leadership, clear shared accountability and regular KPI-driven reporting to boards.

Treating TAT as a quality signal

TAT should be treated as a quality and safety signal where delays affect clinical decision-making, cancer pathways or urgent care. Definitions should be standardised so service models can be compared on a like-for-like basis (detailed patient-facing TAT methodology is addressed in the Access chapter).

Within the quality framework, selected TAT measures should sit alongside incident, accreditation and EQA indicators to show whether services are safe, timely and resilient.

Indicative components for future iterations of the maturity matrix[1]

Outcomes	Quality	**Ensuring safe, consistent, and high-performing diagnostic services** — Quality lead, UKAS accreditation coverage, incident rates and resolution — EQA performance and training, competency compliance
	Access	**Delivering timely and equitable diagnostic provision** — Turnaround times benchmarked against urgent, routine, and cancer targets — Electronic order-comms and end-to-end barcode interoperability with LIMS uptake
	Value	**Driving efficiency and reinvesting in better care** — Cost per test, productivity — Target savings and savings delivered, reinvestment in service improvement
	Workforce	**Building a skilled, sustainable and satisfied workforce pipeline** — Skill mix, adoption of advanced roles, trainee pipeline — Vacancy and attrition rates, staff satisfaction
Enablers	Digital	**Using modern, connected systems to power diagnostics** — Age and interoperability of LIMS systems (with order-comms) — Adoption of digital pathology, automation
	Leadership & Governance	**Strong leadership and clear, shared accountability** — Single accountable officer and joint governance across trusts — Regular KPI-driven board reporting and evidence of action resolution

Note: [1] Non-exhaustive

Making quality visible through comparable data

Finally, the system needs better use of data to support accountability and learning. There is currently limited transparency of quality performance, with no simple public view of accreditation status of services, EQA performance, or incident data. This could be counteracted by publishing national quality metrics to strengthen accountability and peer learning.

Publishing comparable metrics also creates a practical improvement lever, by enabling open benchmarking, strengthening board-level focus, and making it easier to identify service models that need targeted support.

A minimum dataset could include:

- accreditation status and scope for each service model
- non-ISO test types and volumes, where available
- serious incident rates and Datix incidents over 30 days
- key TAT measures for urgent, routine and cancer pathways
- high-level EQA participation and performance signals.

These data should feed into an updated, outcomes-focused maturity assessment, with quality, access, value and digital performance assessed alongside workforce and leadership enablers. For quality, the maturity framework should draw on service model-level quality leadership, accreditation coverage, non-ISO activity, incident rates, Datix over 30 days, EQA signals and selected TAT measures. This would move the matrix from a largely narrative, self-assessed tool to a clearer view of operational performance.

Together, these options describe how England could move from a fragmented, largely process-based assurance model to a more coherent, outcomes-driven framework, while using the existing roles of UKAS, CQC, NHS England (and equivalents in devolved nations), commissioners and service models more effectively.

What improvements would further integration of service models bring?

Further integration would not remove quality risk by itself, but it would create the operating model needed to manage it consistently. The strongest evidence for this is the pattern in unresolved incident backlogs.

Partial integration is the risk state. Services that share activity without unified governance, data and leadership carry the complexity of integration without yet realising its assurance benefits. Completed operational integration changes that operating model: quality can be managed across the whole service model rather than trust by trust.

A more integrated quality model would:

- reduce variation in SOPs, Quality assurance and incident management across sites
- give service model leaders clearer visibility of non-ISO activity, POCT, digital pathology and direct-to-patient testing
- support faster escalation where EQA failures, with elements of national co-ordination if required, unresolved non-conformities or Datix backlogs persist
- allow quality, access and digital resilience to be managed together rather than through separate local processes
- make it easier to identify services that need targeted support.

The improvement from integration is therefore not accreditation in itself. It is the ability to make quality visible, accountable and manageable across the full diagnostic pathway

Next steps

Years 1–2: agree the framework and test it

- Agree a minimum national quality dataset covering accreditation scope, non-ISO testing, serious incidents, Datix over 30 days, EQA signals and selected TAT measures.
- Define national escalation triggers and remediation expectations for repeated EQA failure, unresolved non-conformities and sustained incident backlogs.
- Map roles and decision rights across UKAS, CQC, NHS England, commissioners and service model leadership.
- Pilot the assurance model in selected service models, including the role of a named service model-level Quality Director.

Years 2–3: embed service model-level assurance

- Make ISO 15189 accreditation and scope management a consistent commissioning requirement, with clear trajectories for out-of-scope activity.
- Require service models to harmonise QMS, SOPs, QC processes, incident logging and escalation.
- Bring POCT, digital pathology, community and direct-to-patient testing explicitly within service model quality governance.
- Use the refreshed maturity assessment to test outcomes, not only process completion.

Years 4–5: make quality transparent and self-improving

- Publish comparable service model-level quality metrics to support peer benchmarking and targeted improvement.
- Link persistent underperformance to defined support and intervention, while giving consistently strong performers greater flexibility within agreed standards.
- Align quality assurance with wider funding, workforce and digital reforms, so that quality data informs investment and resilience planning rather than sitting in a separate assurance process.

PART 4: WORKFORCE

Executive summary

Pathology laboratories deliver over 2 billion tests each year and underpin around 80% of diagnostic interactions. Demand and case complexity are rising faster than current staffing models can absorb. Capacity is tight, skills are under-used, and adoption of digital tools and automation remains uneven.

What is the current state of the workforce?

Based on available NHSE workforce returns, pathology services in England are delivered by a multiprofessional workforce of at least 28,000 full-time equivalent staff, with around 90% in clinical roles. Scientists form the largest group, supported by substantial medical and clinical support workforces. Although staffing has grown since 2018–19, workforce capacity has not kept pace with rising demand and service complexity.

What are the key challenges?

- **Medical pipeline fragility:** growth in the training pipeline has slowed to around 1.1%, constraining future supply. It takes 8–10 years to train a pathologist. Around 20% of trainees are not expected to join the National Health Service (NHS) workforce on completion, 38% train less than full time, and 40% of consultants want to reduce their hours within five years. 84% of trusts report at least one consultant vacancy, averaging 2.9 vacancies per trust, including rates of 37% in paediatric and perinatal pathology (PPP) and 12% in histopathology. In some specialties, consultant numbers are now so low that services are at significant risk of failure or becoming unsustainable in their current form. This is a reflection of the current state of the service; the future service demands will be greater due to the higher proportion of over-65s in the population with multiple long-term conditions. In addition, the complexity of cancer treatment will place even greater demands on genomics and histopathology..
- **Scientific training bottleneck:** scientific training is constrained by two different funding models. Clinical scientist posts are centrally commissioned through the Scientist Training Programme (STP) and limited by national commissioning and placement capacity. Biomedical scientist training is not supernumerary and depends on local service budgets, plus trainer and assessor time within service. Recent growth in scientific roles has been helped by additional funding and new roles, but biomedical scientist growth has levelled off and the underlying bottleneck remains one of training capacity rather than demand.
- **Fragmented planning and structural instability:** workforce planning remains reactive and based on current pressures rather than future demand. Reliance on bank and agency staffing has become structural, accounting for around 4% of the workforce and costing £69 million in 2024–25. Outsourcing is massively increasing, especially for histopathology, with concern that reporting will be sent overseas where quality and qualifications may not maintain the standards within the UK.
- **Under-use of skills and retention pressure:** uptake of advanced and consultant scientist roles remains uneven. Burnout is widespread: 60% of consultants regularly work beyond contracted hours and 54% report insufficient time to complete their daily workload.

How can these challenges be addressed?

Pathology's workforce problem is not simply one of vacancies or headcount; it is one of workforce design. Integrated service models are a critical enabler of that redesign because, when supported by training investment, sustainable funding, digital maturity and clear workforce planning, they organise scarce expertise, training capacity and flexible deployment at scale. Where pathology operates under a single integrated management structure across multiple sites, services are better able to:

- attract and retain staff through clearer career pathways and shared supervision
- expand advanced and consultant scientist roles under clear governance to release medical consultant time
- create protected training time, pool assessors and align placements to forecast demand
- deploy staff flexibly, standardise scopes of practice, and plan the workforce across the whole service rather than piecemeal
- make standardisation of pathology messaging and interoperability goals more achievable.

What improvements would further integration of service models bring?

A more integrated workforce model would:

- improve resilience in fragile specialties through better deployment of scarce expertise across sites
- release medical consultant time for more complex diagnostic work
- strengthen training pipelines and supervision capacity
- reduce avoidable dependence on temporary staffing
- support clearer progression and better retention
- create a more sustainable workforce over the next five years.

Core conclusion

Workforce resilience will not come from expansion (vacancy filling and creation of new posts) alone. It depends on using integrated service models to organise the workforce more effectively, strengthen training and progression, and align staffing to future demand.

Introduction

Pathology underpins most diagnostic care, yet demand and case complexity are rising faster than current capacity, resources and ways of working can accommodate. Skills are not always deployed to best effect, and adoption of digital and automation remains uneven and slow.

This chapter examines the pathology workforce and the pressures affecting its ability to sustain current services. It sets out the current state of the workforce, the main challenges facing it, how those challenges can be addressed, and the improvements that more integrated service models could bring. It considers workforce supply, training capacity, deployment, scopes of practice, retention and workforce planning, and explains how workforce redesign can support service resilience, diagnostic capacity, productivity, cost-efficiency and the timely delivery of elective and cancer pathways.

Integrated service models are used throughout the chapter to illustrate the benefits of organising pathology as a single managed service across sites: clearer deployment of scarce expertise, stronger training and supervision, more consistent scopes of practice, and better alignment between workforce planning and future demand.

The aim is to provide system leaders, commissioners and providers with a concise assessment of workforce pressures, a practical account of how they can be addressed, and options to build a more sustainable pathology workforce over the next five years.

Methods and definitions

This chapter is England-weighted and covers 2018–19 to 2024–25. Sources include national workforce returns, Institute of Biomedical Science (IBMS) training datasets, the Royal College of Pathologists (RCPath) Workforce Census 2025, specialty workforce reports and provider submissions. Figures are expressed as full-time equivalent (FTE). Workforce figures should be read as a minimum estimate. NHSE data collection captures reported FTE through available workforce returns, but may undercount staff working partly in pathology, staff mapped inconsistently across services, and roles not recorded consistently across local systems. Where cost comparisons are presented, London weighting is removed where stated.

Data are analysed at trust and service model level. Minor rounding has been applied.

Chapter-specific definitions

- **Weighted activity** adjusts test volumes for effort and complexity so tests-per-FTE can be compared across disciplines.
- **Advanced scientist** refers to biomedical or clinical scientists practising at the top of their scope within defined governance arrangements, including dissection, defined reporting, validation and service leadership functions.
- **Vacancies** compare funded establishment with staff in post and may understate underlying demand.
- **Temporary staffing** includes bank and agency FTE and associated spend where reported.

Role titles and Agenda for Change banding are not standardised across trusts and service models. Local titles have been mapped to a common taxonomy to enable comparison at service model level. Residual variation limits fine-grained band-level analysis and reinforces the need for greater standardisation.

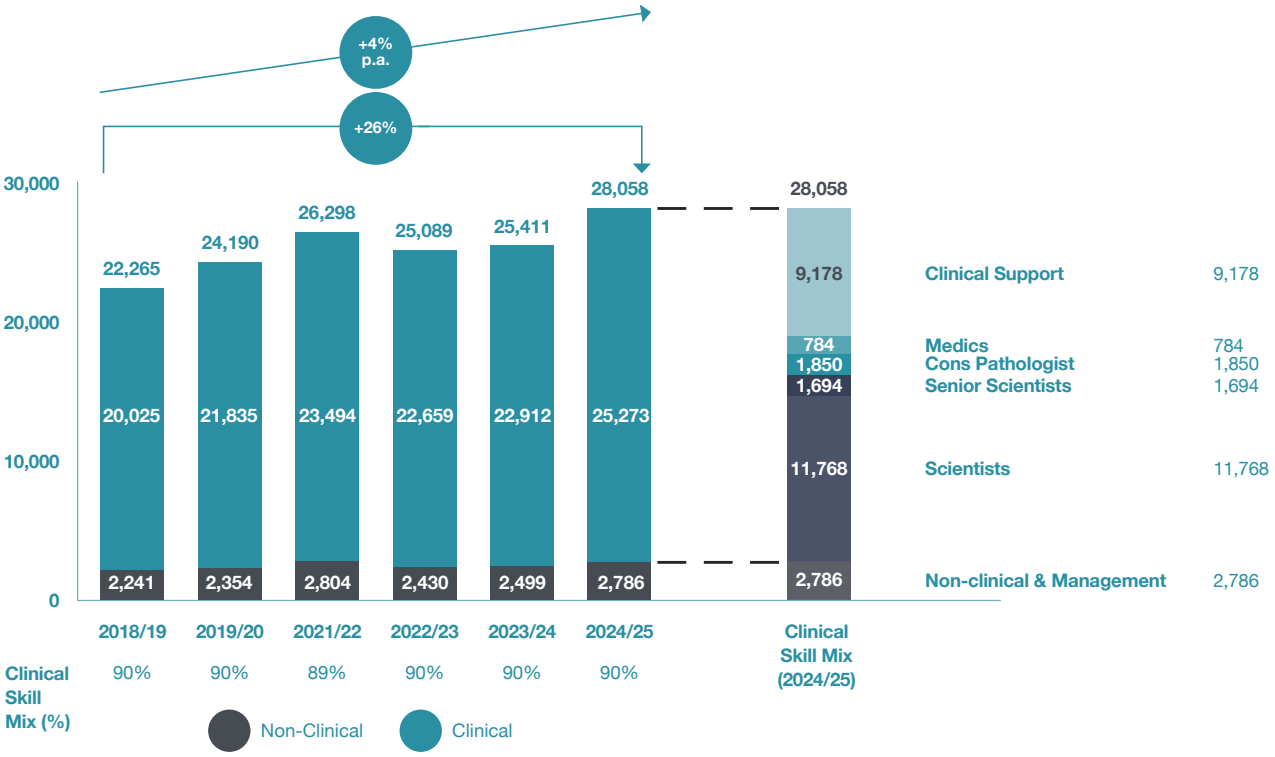
The pathology workforce

Pathology services in England are delivered by a multiprofessional workforce of approximately 28,000 full-time equivalent staff, around 90% of whom work in clinical roles. The workforce includes medical pathologists, biomedical and clinical scientists, and a substantial clinical support workforce including associate practitioners and medical laboratory assistants.

Using NHS England data, scientists form the largest single professional group, accounting for around 42% of the pathology workforce, **all regulated by statute**, while medical staff account for approximately 9.3% across all grades, including approximately 6.6% consultant pathologists.

WORKFORCE OVERVIEW

Pathology workforce growth and clinical skill mix (substantive), FTE[1]



Note: [1] Total Staffing numbers without data exclusions
Source: NAPDC data

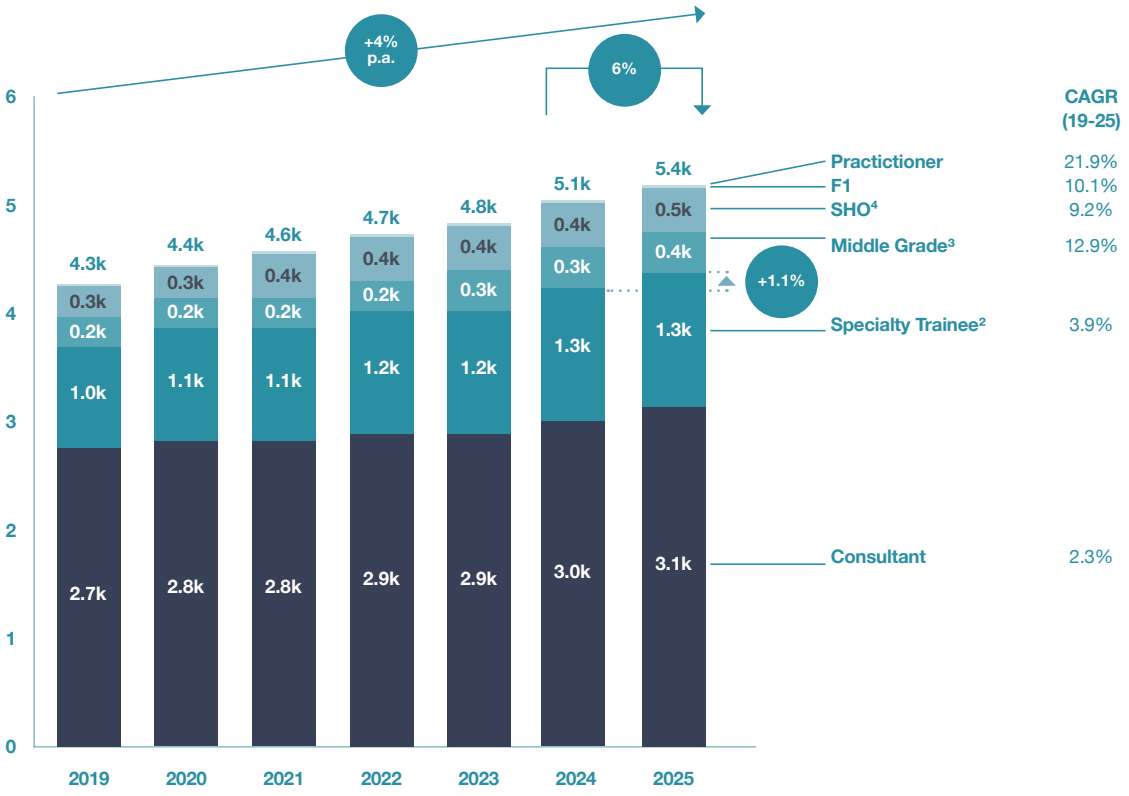
Clinical support staff account for a further 9,200 FTE, reflecting the scale of routine, preparatory and automated work required to sustain diagnostic services. This broad skill mix has remained relatively stable over time.

Using NAPD data it can be seen that pathology staffing has expanded steadily since 2018/19, rising by around 26% overall while maintaining a stable clinical skill mix of roughly 90%. Growth has averaged around 4% a year across both clinical and non-clinical groups, indicating broad-based expansion rather than a major shift in workforce composition. Despite this growth, workforce capacity has not kept pace with rising demand and service complexity.

How this workforce is structured matters as much as its size. Medical, scientific, technical and support roles are interdependent parts of a single service model, and the way they are organised shapes where capacity pressure sits, how scarce expertise is deployed, and where workforce interventions can have the greatest impact.

WORKFORCE OVERVIEW

Medical Pathology Workforce, FTE numbers[1]



Note: [1] NAPDC and NHSE dataset does not align as NHSE dataset includes staff allocated to Pathology, which differs from FTE committed to Pathology work [2] Specialty Registers are Pathology Trainees and are therefore classified as Specialty Trainees. [3] Middle Grade is defined as non-training, Middle Tier doctors (SAS, Specialty Doctor, Staff Grade). [4] SHO includes Core Trainees and Foundation Year 2 Doctors i.e. Trainees not in Pathology-specific training. Source: NHS England

Medical workforce

The medical pathology workforce includes doctors working across histopathology, microbiology and virology, haematology, chemical pathology and other specialist disciplines, contributing to diagnosis, clinical advice, multidisciplinary decision-making and service governance.

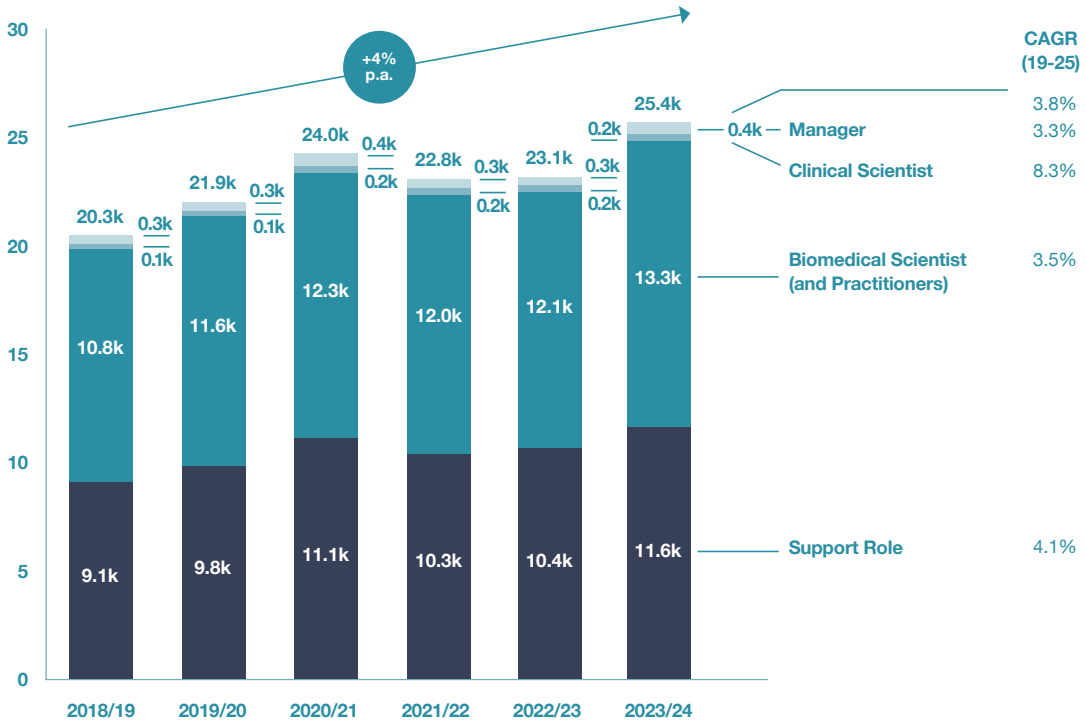
Although the overall medical pathology workforce increased by around 6% between 2024 and 2025, growth in the training pipeline slowed to around 1.1%, below the wider medical rate and constraining future supply.

Consultant growth has not kept pace with the wider medical pathology workforce, meaning recent expansion has not necessarily relieved the roles that create the greatest diagnostic bottlenecks. While this deals with overall medical numbers, the variation between specialties is wide. **So-called "fragile services", such as PPP, immunology, neuropathology and forensic pathology, are facing service collapse and will need different solutions to rescue them, with greater emphasis on training more and retaining more pathologists.**

There is a slowing pipeline into consultant practice as earlier cohorts complete training and fewer new trainees enter the system. The result is a workforce that remains under pressure, particularly in smaller and harder-to-fill specialties. In histopathology a large amount of the work is now outsourced for reporting. The pathologists doing this work will not be counted in terms of basic workforce figures but has the net effect of effectively increasing the overall full time equivalent working in histopathology and reflects the increasing gap between demand and capacity. Increasing reliance on outsourcing should be regarded negatively as ultimately it will reduce the pool of 'permanent' established staff and hence capacity for training, research and management and national work.

WORKFORCE OVERVIEW

Scientific & Technical Workforce, FTE numbers



Note: Specialist and Consultant scientists are grouped into respective workforce groups
i.e. Biomedical Scientists; Biomedical Scientist and Healthcare Science Practitioners are grouped. Includes all data.
Source: NAPDC data

Scientific and technical support workforce

The scientific and technical pathology workforce has expanded substantially since 2018–19, rising by around 25% overall, with average annual growth of around 4% and a marked uplift in the most recent year. Part of that recent increase reflects additional non-recurrent funding and the NHS Long Term Plan's emphasis on scientific roles, but the underlying picture remains uneven. Biomedical scientists and practitioners remain the largest scientific workforce group, but growth has levelled off, reflecting training capacity limits and an ageing workforce. Clinical scientists have shown stronger recent growth from a smaller base, supported by STP places and the introduction of new roles.

Biomedical scientists, clinical scientists and technical support staff play distinct but complementary roles in service delivery. The multidisciplinary content of accredited biomedical science degrees and generic registration training provides services with a flexible core workforce that can adapt across pathology disciplines, while clinical scientists and consultant clinical scientists add specialist and reporting capacity. However, without sustained training opportunities, protected supervision time and clearer progression into advanced and consultant-level roles, the recent uplift will not be enough to stabilise long-term workforce supply. Higher Specialist Scientist Training (HSST) is also open to biomedical scientists, but current numbers progressing through that route remain very small as the number of commissioned places is low and access is competitive.

Workforce challenges

Medical workforce

The medical pathology workforce, across histopathology, microbiology and virology, haematology, chemical pathology and smaller specialties, is under sustained pressure from rising demand, increasing case complexity and a supply pipeline that is too slow and too fragile to replenish consultant capacity reliably. It takes 8–10 years for a medical graduate to complete training and enter consultant practice, so workforce planning must account for long lead times rather than respond only to current vacancies and service pressures. This risk is compounded by the age profile of the consultant workforce: 46% of pathologists are aged 50 or over, with nearly a quarter planning to retire earlier than expected.

Effective supply is reduced at several points along that pathway. Estimated attrition across training is around 12%, while 38% of medical residents train less than full time, extending time to completion. Destination intentions also dilute future NHS consultant supply; only 56% of trainees expect to work solely in the NHS on completion, while 13% expect to combine NHS and academic work, 12% expect to split time between the NHS and the private sector, and 8% are undecided. Retention within training regions is also uncertain, with 68% intending to stay, 7% planning to move, and 25% undecided. Throughout healthcare, and particularly medicine, there has been a strong shift towards the feminisation of the trainee workforce; the majority of pathology trainees are female, which will impact the future FTE workforce numbers.

Training capacity is further constrained by funding arrangements. Since 2023, more than 40 histopathology training posts have been lost in England because of difficulties funding the NHS trust contribution to salary costs and a lack of viable training locations. This reduces the headroom needed to meet rising demand, replace retiring consultants and stabilise fragile services.

The consequences are most acute in the smallest specialties, where consultant establishments are already very small. In these areas, shortages do not only weaken current service resilience; they also threaten the future pipeline itself, because there may soon be too few consultants available to supervise and train the next generation. PPP, immunology, neuropathology and forensic pathology are the clearest examples of this fragility.

Scientific workforce

The scientific workforce faces a structural training bottleneck rather than a lack of interest in entering the profession. Applications to IBMS training routes have slowed, and attrition is rising fastest in the post-registration Specialist Diploma route. Across both registration and specialist pathways, trainee progression is increasingly constrained by limited trainer, assessor and placement capacity, slowing the inflow of registered biomedical scientists and the progression of staff to specialist level.

The evidence suggests that the principal constraint is training capacity rather than the pace of the programmes themselves. Average completion times have shortened markedly since 2019, with the Registration Certificate of Competence falling from about 707 to 339 days and the Specialist Diploma from roughly 906 to 364 days. The bottleneck therefore sits in the availability of trainers, assessors and placements.

This bottleneck operates differently across the two main scientific routes. Clinical scientist training is centrally commissioned through the Scientist Training Programme and is limited by national commissioning decisions and placement capacity. Biomedical scientist training is not supernumerary and depends on local service budgets plus trainer and assessor time released from day-to-day service delivery. Recent non-recurrent funding may help explain a temporary uplift in parts of the scientific workforce, but it does not resolve this underlying structural constraint.

Senior scientific capacity is critical to workforce supply. Around 67% of scientific trainees train less than full time, and short-term erosion of Bands 7–8 further reduces the supervision, assessment and quality oversight on which training throughput depends. When senior scientific capacity is weakened, progression slows, training capacity contracts and reliance on temporary staffing increases.

A further constraint is the absence of a consistent funding model for biomedical scientist registration training. Graduates from IBMS Accredited degrees are often unable to secure laboratory training opportunities or remain in support roles because services cannot release the time and supervision needed for registration. This weakens the pipeline into the largest scientific staff group.

At the upper end of the pathway, advanced and consultant scientist roles remain underused despite being well established. These roles add specialist and reporting capacity and, within clear governance, can undertake defined areas of higher-volume and lower-

complexity work that release medical consultant time for more complex diagnostic activity. **They are not a substitute for medical pathologists, but a proven complement to them.** Expansion is further constrained by funding arrangements: HSST posts are fully employer-funded, whereas medical training numbers receive partial central funding.

Technical workforce

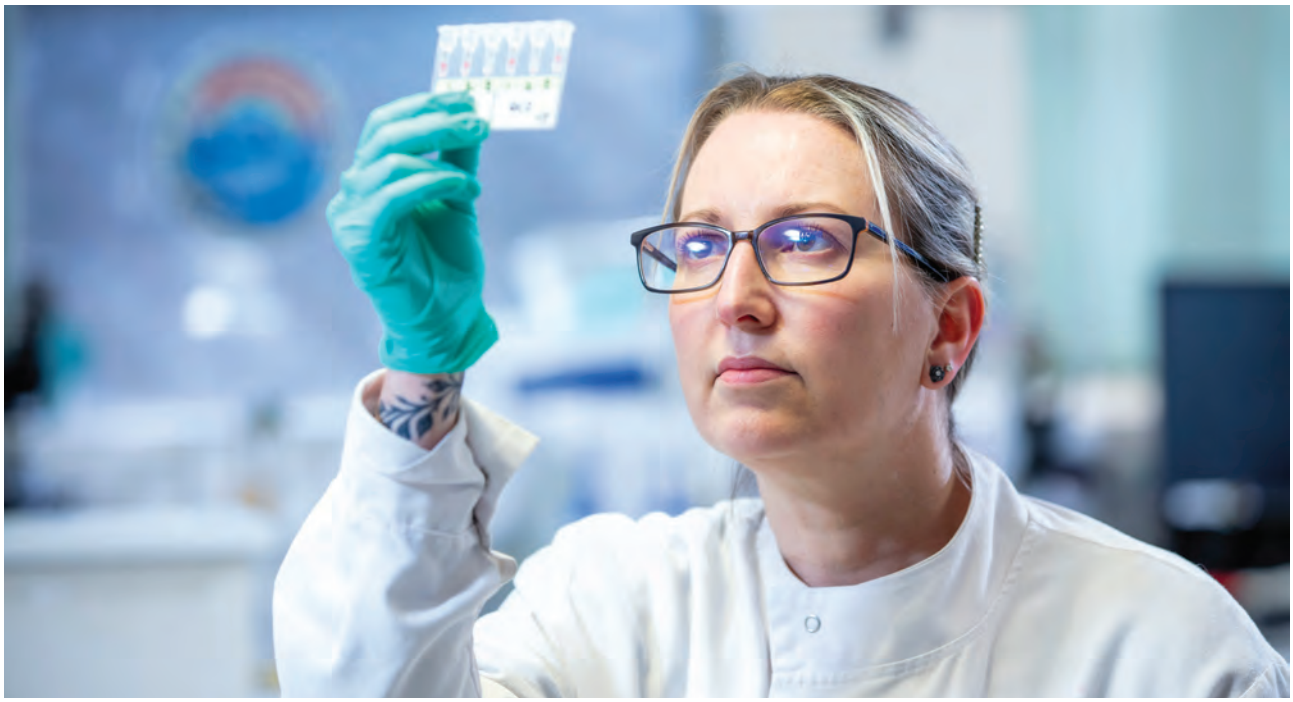
Technical support staff are a core part of the pathology workforce, sustaining routine, preparatory and automated activity across services. These roles are not simply a feeder grade into registered practice; they are essential in their own right, and retaining experienced Medical Laboratory Assistants and associate practitioners is critical to service stability. Their contribution is central to specimen reception, preparation, routine processing and automated workflows, making them a key part of operational throughput, productivity and service resilience.

At the same time, support roles also provide an important entry route into the wider scientific workforce. In many services, graduates are appointed into support posts while they complete workplace training towards registration. Where role profiles, banding, supervised placements and progression arrangements are inconsistent, services risk both losing experienced support staff and weakening a valuable route into biomedical scientist practice.

Vacancies and hard-to-fill roles

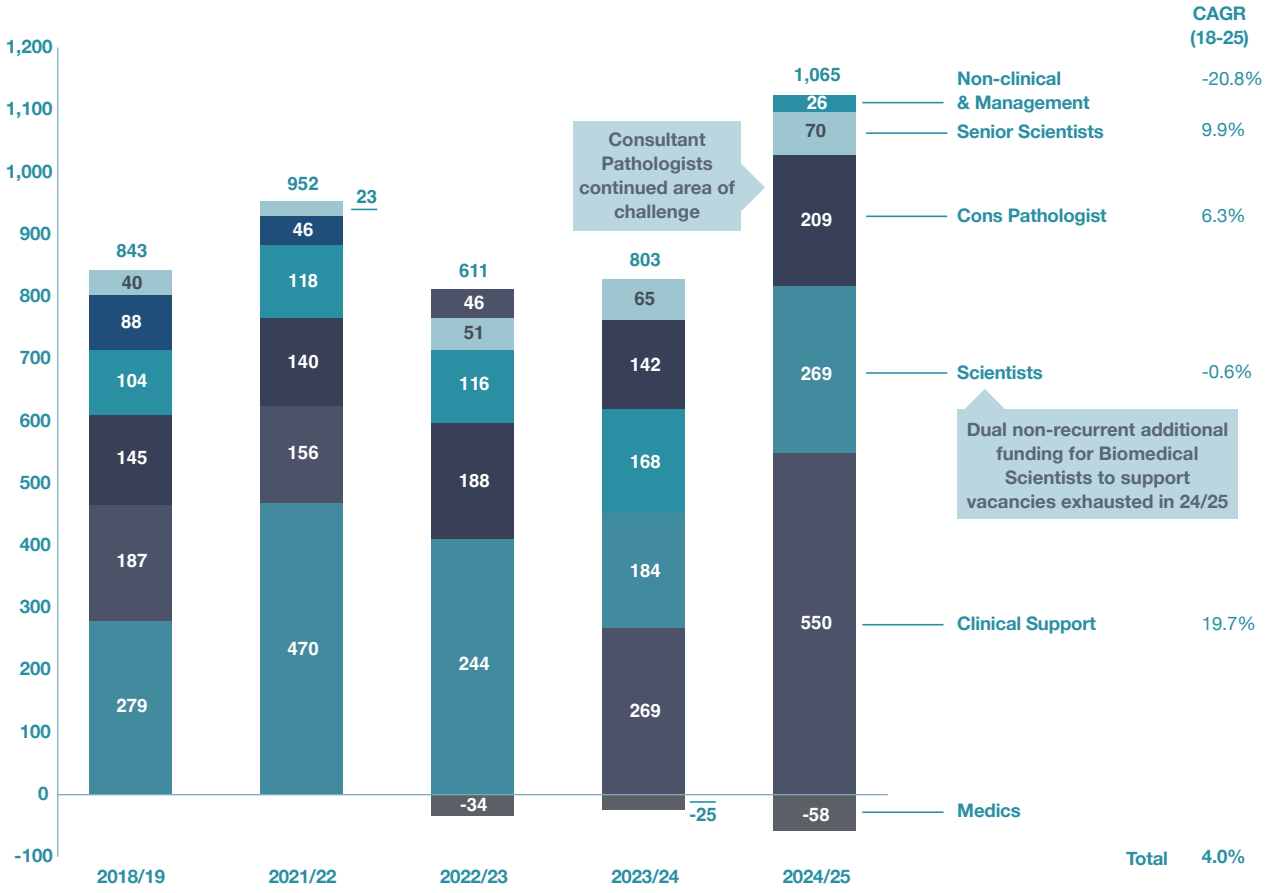
Substantive vacancies have become a material threat to service sustainability. After falling to 611 FTE in 2022–23, total vacancies rose to 803 in 2023–24 and 1,065 in 2024–25, equivalent to around 4% of the workforce. Earlier improvement was not sustained. Many vacancies are delayed or simply not advertised if chances of recruitment are low. In addition, with histopathology, vacancy money is being used to outsource work. As much as 30% of histopathology work may now be outsourced.

Vacancies in scientist roles narrowed while dual non-recurrent funding for biomedical scientist posts was available, but rose again in 2024/25 as that support ended. Clinical support vacancies increased most sharply, from 269 to 550 FTE in a year, indicating growing strain in the operational base of services.



WORKFORCE | VACANCIES

Vacancies per workforce group (substantive)



Note: Vacancies are calculated on FTEs in post vs. establishment and may therefore mask demand and capacity mismatches. 20/21 excluded due to data discrepancies. See "Data Exclusions" for further refinements to analysis
Source: NAPDC data

Consultant pathologists remain the clearest persistent pressure point. Consultant vacancies rose from 142 to 209 FTE between 2023–24 and 2024–25, and 84% of trusts with pathology services report at least one vacant consultant post, averaging around 2.9 vacancies per trust. RCPath data show particularly acute pressure in paediatric and perinatal pathology (37%), microbiology (16%) and histopathology (12%). Some other medical grades appear over-established rather than vacant, but this does not offset the consultant shortfall, which remains the key constraint on service resilience.

In the smallest specialties, vacancies at this level do not simply create rota pressure; they can make local services unsustainable and threaten the future workforce pipeline itself, because there may be too few consultants available to supervise and train the next generation. PPP is the clearest example of this fragility; there are no PPP consultants in Northern Ireland and none in some parts of the South West and Midlands, meaning cases must be transferred elsewhere and post-mortem results can be significantly delayed, in some cases to over a year.

The key issue is not vacancy in isolation, but the level of vacancy within an already understaffed service. Vacancy rates compare funded establishment with staff in post and may therefore mask wider demand and capacity mismatches. Effective availability is further reduced by sickness absence, annual leave, flexible working and time required for supervision and training. Under-availability is therefore a more meaningful indicator of operational resilience than vacancy alone, particularly in services already managing year-on-year increases in workload.

Benchmarking indicates that vacancy and skill-mix measures do not, on their own, explain operational performance; workflow, automation, premium cover and service configuration can mask underlying workforce fragility. Where shortages in key critical staff exist, such as paediatric and perinatal pathology and forensic path, an increasing amount of the work is done as private sector fee paying work, which will significantly increase costs.

Workforce planning

Workforce planning in pathology remains fragmented and reactive. The data that underpin it are often inconsistent, incomplete and insufficiently robust, making it difficult to model current capacity accurately or to forecast future workforce need with confidence. This weakens the link between investment, service redesign and sustainable workforce supply.

Planning is also too often based on current pressure rather than future demand. A realistic view of workforce need must take account not only of establishment and vacancies, but of projected retirements, attrition, less-than-full-time working, training capacity, under-availability and changes in service delivery. As diagnostic demand continues to rise year on year, and services take on new models of care and testing, the absence of joined-up workforce planning will continue to destabilise services and sustain reliance on temporary staffing.

Benchmarking also shows substantial variation in workforce availability between service models, reinforcing the need for demand-and-capacity planning at service-model level rather than relying on provider-level establishment alone.

Retention, flexibility and workforce sustainability

Workforce capacity, training pipelines and role design are only part of the pathology workforce challenge. **Retention is also being weakened by sustained workload pressure and by insufficient flexibility in how work is organised.** These are no longer peripheral wellbeing issues; they are factors affecting workforce stability and service resilience.

Recent RCPath evidence points to significant strain in the medical workforce. Around 60% of consultants report regularly working beyond their contracted hours, 37% report lower job satisfaction than a year ago, and 54% say they do not have enough time each day to complete their workload. Half report that excessive workload negatively affects their wellbeing, 4% report having taken concrete steps to leave the UK, and 77% believe current staffing levels are insufficient to sustain services or meet rising demand.

These pressures matter because they increase the risk of visible and invisible attrition. Services may retain staff in post but lose effective capacity through reduced hours, burnout, delayed retirement decisions, career breaks or withdrawal from training and supervisory roles. In an already stretched workforce, this can have a disproportionate effect on resilience.

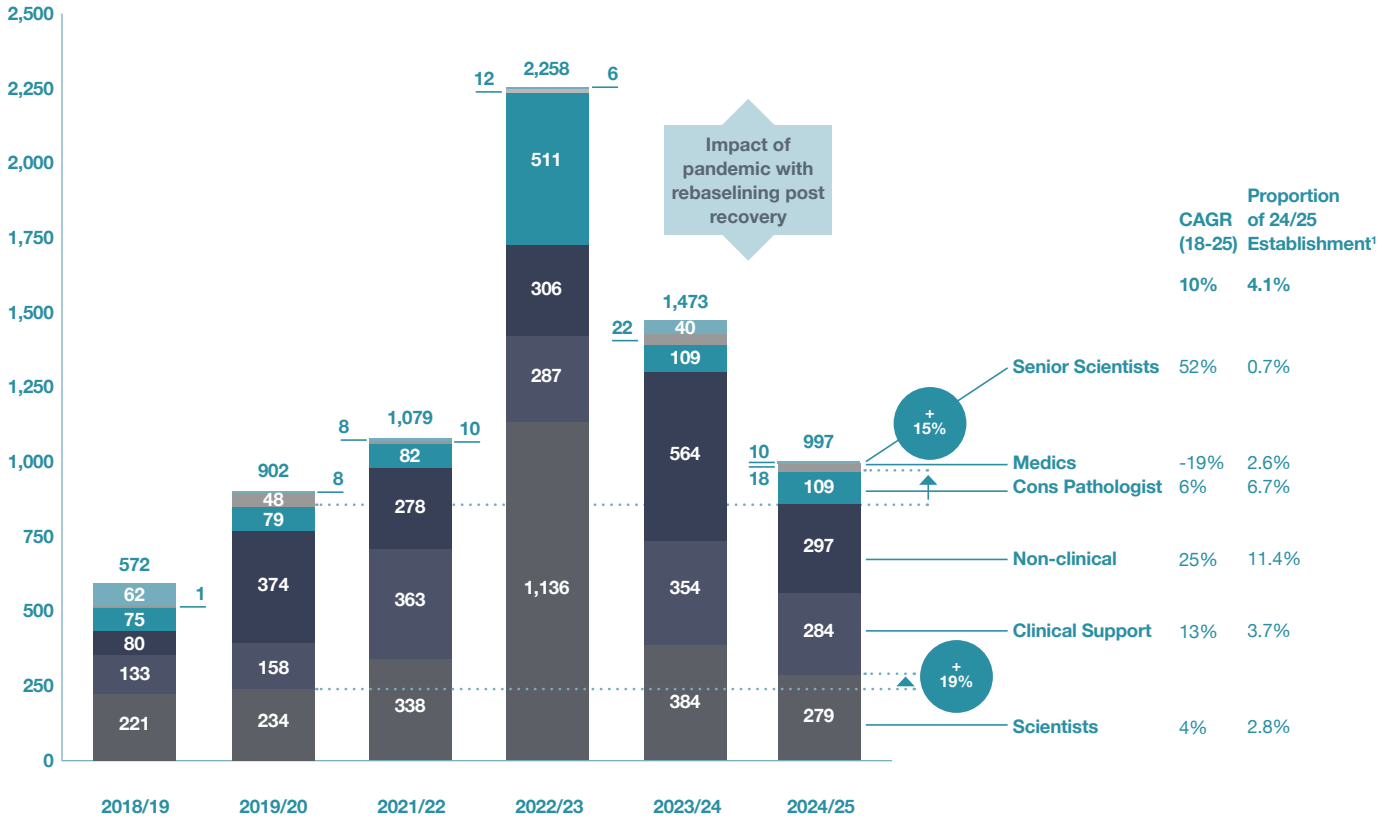
NHS sickness absence data point in the same direction: the overall sickness absence rate for NHS staff in England was 5.0% in September 2024, rising to 5.3% in September 2025, reinforcing that workforce pressure is also being felt through lost effective capacity, not only formal vacancy.

Flexibility is part of this picture. Where services cannot accommodate part-time working, caring responsibilities or more sustainable job design, they are more likely to lose experienced staff, particularly in hard-to-fill areas. This is a workforce sustainability issue rather than a peripheral employment matter.

Equity also matters where it affects progression, retention and access to development opportunities. If some staff experience less flexible working, weaker support or less consistent access to progression, workforce supply is reduced not only by vacancy but by uneven retention and underuse of capability. In that sense, wellbeing, flexibility and equity are part of workforce resilience, not separate from it.

WORKFORCE CHALLENGES

Bank and Agency, FTE



Note [1] Savings from underspending on established FTEs are at times utilised to cover costs associated with bank and agency staff.
See "Data Exclusions" for further refinements to analysis
Source: NAPDC data

Temporary staffing and spend

Temporary staffing has become a structural feature of pathology services rather than a short-term contingency. Bank and agency staffing peaked at 2,258 FTE in 2022–23, falling to 1,473 in 2023–24 and 997 in 2024–25, but this remains well above the pre-pandemic baseline of 572 FTE in 2018–19. In 2024–25, temporary staff still accounted for around 4.1% of establishment.

Reliance remains concentrated in staff groups under greatest pressure. Compared with 2019–20, bank and agency use in 2024–25 was around 15% higher for consultant pathologists, with a major shift towards the outsourcing of reporting. The bank and agency rate was 19% higher for scientists, indicating that temporary cover is still being used to manage persistent gaps in substantive capacity. In practice, this reflects the combined effect of consultant shortages, constrained scientific supply and year-on-year increases in workload.

Cellular Pathology appears particularly exposed, with temporary staffing spend rising despite the overall fall from the pandemic peak, indicating that temporary cover is increasingly concentrated in reporting-constrained services. The data may not reveal the true extent of this challenge with the rise in outsourcing, which is a lever used to support such services.

Temporary staffing can help sustain day-to-day service continuity, but it does not create durable workforce capacity. It can mask underlying understaffing, weaken

continuity and reduce the headroom needed for training, supervision and service development. Where bank arrangements retain experienced staff approaching retirement or working reduced hours, they may preserve expertise better than agency use, but they still do not substitute for a stable substantive and resilient workforce.

Addressing the challenges

Addressing these pressures will require action across recruitment, training capacity, retention and workforce planning. **For the medical workforce, the first priority is to strengthen the pipeline into pathology and protect future consultant supply.**

Attracting more pathologists to the profession

Fill rates in most pathology disciplines has massively improved over the last 5 years. The exceptions are the smaller specialist histopathology disciplines paediatric and perinatal pathology, neuropathology and forensic pathology. Despite rising competition for specialty training overall, some pathology training posts remain unfilled. This points to a recruitment problem within the specialty rather than a simple lack of interest in postgraduate training. Targeted action is needed to improve recruitment in underrepresented regions, particularly outside London, and to make pathology a more visible and attractive career choice earlier in training.

Limited exposure to pathology within undergraduate medical education continues to reduce uptake. The decline in clinical academic posts has further narrowed opportunities for students and trainees to encounter the specialty, while service pressure leaves NHS consultants with limited time to support teaching, outreach and career engagement. More dedicated, ring-fenced trainer time and facilities are needed to address this issue.

Future consultant supply is also affected by changes in working patterns, not only by retirement. RCPath census responses indicate that 40% of consultants would like to work fewer hours within the next five years. Workforce modelling therefore needs to account not only for retirements and vacancies, but also for reduced whole-time contribution across the consultant workforce.

Strengthening the medical pipeline will require a combination of earlier specialty exposure, more targeted regional recruitment, and workforce planning that reflects realistic future participation in NHS practice.

Increasing the use of advanced scientist roles

Advanced and consultant scientist roles should form a larger part of pathology's workforce response to consultant shortages. Where they are formally embedded, particularly in histopathology, they add reporting and specialist capacity and help services sustain delivery under pressure. **They are not a substitute for medical pathologists, but a proven complement to them when deployed within clear governance and defined scope of practice.**

These roles are already established. The IBMS and the RCPath have run joint histopathology programmes for around two decades, covering specimen dissection and, more recently, defined areas of reporting. To date, 42 individuals have been awarded an RCPath Certificate of Completion of Training (CCT) across gynaecological, gastrointestinal (GI) and dermatopathology, with around 60 currently in training. Limited-scope reporting qualifications have also been developed for bowel and cervical screening to support high-volume, lower-complexity work and release medical consultant time for more complex cases.

The main barrier is not regulation or professional capability, but inconsistent implementation. Some qualified scientists are not permitted to work to the full scope of their training, and uptake remains uneven across trusts. Interview evidence suggests that some advanced-trained histopathology biomedical scientists do not fully use their advanced qualifications because local scope-of-practice restrictions persist. Titles, scopes of practice and banding are not standardised, making workforce data less reliable, weakening the case for sustained investment, and complicating succession planning. Capability can therefore be lost when experienced staff leave or retire.

Training and service alignment are also inconsistent. Expansion depends on trainer capacity, local endorsement and structured pathways into advanced and consultant-level practice. Without these, advanced practice remains dependent on local champions rather than being embedded as a routine element of workforce design.

A more systematic approach is needed. Services should expand advanced and consultant scientist roles under clear protocols, standardised governance and consistent workforce planning, so that higher-volume and lower-complexity activity can be undertaken safely by the wider reporting workforce while medical consultants focus on the most complex diagnostic work. This is particularly important in histopathology and other pressure specialties, where demand is rising and consultant capacity is unlikely to expand quickly enough through medical recruitment alone.

Protected training time

Protected training time is a necessary workforce investment, not an optional release valve for service pressure. **Across pathology, one of the main constraints on workforce growth is the limited time available to train, supervise and assess staff within already stretched services.**

For biomedical scientists, the bottleneck is not a lack of interest in entering the profession. Services continue to face strong demand for registration training, but progression is constrained by the absence of supernumerary training capacity and by the difficulty of releasing senior staff time for supervision and assessment within day-to-day service delivery. This slows the route to registration, restricts trainee numbers and contributes to attrition among staff who experience slow or uncertain progression.

The same issue applies further up the workforce pathway. Expansion of advanced and consultant scientist roles depends on the availability of medical pathologists and senior scientists to provide structured supervision, workplace training and sign-off over programmes that can take several years to complete. Without that training capacity, services cannot expand advanced practice safely or at scale.

Addressing this requires protected training time, supernumerary trainer capacity where needed, and consistent job planning that recognises supervision, assessment, continuing professional development and professional leadership activity as part of core service capacity rather than as activity to be fitted around operational pressure.

What improvements would further integration of service models bring?

Of all the service aspects considered in this report, it must be made clear that service improvements achieved through the adoption of an integrated service model cannot be attributed to a single factor. Rather it the sum of the individual elements that leads to improvements, not one factor.

Fully integrated service models are better able to convert staffing into usable service capacity because they operate with clearer role definitions, shared rotas, stronger supervision arrangements and more consistent deployment across sites. Further integration can improve pathology workforce resilience by enabling services to organise scarce expertise, training capacity and role design at scale, but services also need capacity in order to integrate. Successful implementation cannot depend on adding further burden to an already overstretched workforce.

This matters for workforce design. Integrated services can make better use of the full skill mix: routine, preparatory and automated work can be undertaken by Medical Laboratory Assistants and support staff; biomedical and clinical scientists can work at the top of their scope, progressing into advanced and consultant scientist roles where they can undertake defined areas of higher-volume and lower-complexity activity under clear governance, releasing medical consultant time for the most complex diagnostic work.

The evidence suggests that mature integrated models are also better able to embed advanced practice consistently. Their share of advanced scientists has risen from around 6.3% to 7.2% of substantive staff since 2022–23, while partially integrated and non-integrated models have remained flat or declined. Fully integrated service models also appear to use advanced scientists more effectively, delivering around 1,018 weighted activity units per advanced scientist compared with roughly 851–855 elsewhere. This suggests better deployment, clearer protocols and stronger alignment between workforce structure and service need.

The evidence supports integrated operating models, not for structural integration alone: the workforce benefit depends on standardised roles, consistent governance, digital maturity and redesigned workflows.

The benefit is not simply higher output. More integrated models can also strengthen resilience by widening access to supervision, training and progression across a larger service footprint, reducing the dependence on local workarounds and making it easier to retain scarce expertise in fragile specialties. **In that sense, integration is not a substitute for workforce investment; it is the organisational model that allows workforce investment to translate more reliably into sustainable capacity.**

The point is not that integration removes workforce shortages by itself, but that it creates the operating model through which scarce expertise, training capacity, automation, digital workflows and expanded scopes of practice can be organised consistently across a larger service footprint.

For the workforce, the implication is clear: recruitment alone will not resolve current pressures. Services need models that use scarce expertise more effectively, support structured progression, expand training capacity and reduce reliance on temporary staffing. Further integration offers the clearest route to doing that consistently.

Next steps: what the workforce needs over the next five years

The path to fully integrated service models will not be easy or swift and it will require investment. However, although the below indicative timeline is ambitious, it is also achievable, but ultimately it is up to the respective health services to determine their own pace of change.

Years 1–2: stabilise services and build the foundations

- Complete operational integration within each service model so pathology operates as a single managed service across sites, with shared leadership, rotas, standard operating procedures and quality oversight. This should create the basis for more flexible deployment, clearer supervision and more consistent use of advanced practice.
- Stabilise capacity in the most pressured services while training and redesign are expanded. Prioritise fragile and hard-to-fill specialties, preserve scarce expertise through phased retirement, mentorship and cross-site deployment, and reduce avoidable reliance on ad hoc workarounds where more stable cover can be secured.
- Adopt a comparable pathology dataset and publish an annual workforce plan for each service model, covering vacancies, under-availability, trainer capacity, placements, projected demand and demand-and-capacity modelling across sites.
- Rebuild trainer capacity by protecting supervision and assessment time, restoring senior scientific trainer roles, and pooling assessors across sites where appropriate.
- Introduce immediate retention measures in hard-pressed services, including flexible working, phased retirement and structured mentorship, so that effective capacity is not lost while longer-term pipeline measures take effect.

Years 2–3: expand capacity and progression

- Fund additional medical training posts in line with population need, with sufficient educator and deanery capacity, flexible training pathways, training facilities and consultant support to maintain training quality.
- Plan biomedical scientist and clinical scientist pipelines coherently, recognising that these are distinct and complementary professional routes rather than interchangeable workforces, with clearer progression into advanced and consultant-level practice under defined governance and with training aligned to service need.
- Sequence automation, digital pathology and role redesign together, so routine and preparatory work is assigned safely to support roles, scientists work at the top of scope and consultants focus on judgement-dependent diagnostic work.
- Strengthen support-to-registration routes through supervised placements, apprenticeships and clearer local role profiles, recognising support staff both as an essential workforce group in their own right and, where appropriate, as a route into registered practice.
- Use regional digital learning and virtual mentorship to widen access to supervision and reduce variation in trainee experience, while protecting the in-laboratory assessment capacity required for registration and specialist progression.
- Target workforce investment and training capacity at smaller and harder-to-fill specialties where shortages now threaten both current service delivery and the future training pipeline.

Years 4–5: embed consistency and long-term resilience

- Standardise role frameworks, banding and scope of practice more consistently across services so that vacancies, productivity and progression can be measured and improved more reliably.
- Embed advanced practice, structured supervision and service model-level workforce planning as routine features of pathology delivery, rather than relying on local champions or temporary arrangements.
- Use workforce, training, competence, scope-utilisation and service data to align future investment to projected demand, under-availability and fragile specialty risk, so that workforce planning reflects future service need rather than current pressure alone.

PART 5: ACCESS

Executive summary

Pathology turnaround is now a patient access issue, not simply a laboratory productivity measure. Delays across requesting, collection, transport, accessioning, analysis, reporting and release of results affect urgent care, cancer pathways and the consistency of diagnostic access across the NHS.

The core finding is that access is deteriorating, variation is widening, and current measures may understate the patient-facing experience because turnaround clocks often start only once samples are registered in LIMS. Integrated service models can support more reliable turnaround, but only where they create end-to-end operational control across workflow, logistics, reporting capacity, digital visibility and accountability.

What is the current state of access?

- Fewer than half of trusts meet acute turnaround standards in blood sciences.
- Fewer than 10% of trusts meet 7-day or 10-day targets in histopathology. Histopathology is particularly fragile: 10-day performance has fallen from 14% of trusts meeting target in 2020 to 2% in 2025.
- Routine potassium turnaround has also weakened, with the share of trusts meeting targets falling from 91% in 2020 to 70% in 2025.
- Variation between trusts is widening. The share of trusts achieving over 90% compliance has fallen sharply, while the share below 50% compliance has increased from 23% to 64%.

This is an access and equity concern. Patients in underperforming areas face longer diagnostic waits, with knock-on risks to urgent care, cancer pathways and clinical decision-making.

What are the key challenges?

The access problem differs by discipline.

- In blood sciences, the main risk is urgent-flow reliability. Turnaround depends on timely movement of samples through collection, transport, accessioning, analysis and result release.
- In histopathology, access is constrained more directly by reporting capacity, manual workflows, case complexity and limited digital maturity.
- In cancer pathways, patient-facing turnaround may extend beyond histopathology reporting alone, particularly where molecular or genomic testing is required before treatment decisions can be made.

Current measurement also weakens accountability. Many turnaround clocks start at LIMS registration rather than sample collection or request. This excludes pre-analytical delay from reported performance and can understate the patient-facing experience.

How can these challenges be addressed?

Access improvement requires end-to-end pathway management. Services need:

- standard patient-facing and laboratory turnaround definitions
- clear ownership of delays across the whole pathway
- reliable pre-analytical processes, including collection, transport and accessioning
- active operational management of flow, backlogs and exceptions
- resilient reporting models, particularly in histopathology
- digital visibility across requesting, tracking, reporting and result release.

Digital infrastructure is an enabler, not the whole solution. LIMS interoperability, digital requesting, barcoding, sample tracking, dashboards and digital pathology can make turnaround visible and manageable, but benefits depend on workflow redesign, adoption discipline and clear operational accountability.

What improvements would integration bring?

Integrated pathology service models can support more consistent turnaround by enabling shared standards, common workflows, coordinated logistics, cross-site reporting capacity and clearer escalation across sites. Services operating within integrated models show stronger median acute biochemistry turnaround than partially integrated or non-integrated services, and fewer extreme underperformers.

However, structure alone is not enough. High performers exist across different service models, and histopathology remains below target across all models. Integration improves access only when it creates end-to-end operational control. Where accountability remains split, partial integration can add coordination complexity without delivering patient-facing turnaround gains.

Core conclusion

Access will not improve through laboratory productivity measures alone. It depends on using integrated service models to manage the whole diagnostic pathway: standardised patient-facing turnaround, visible flow, reliable pre-analytical processes, resilient reporting capacity and clear accountability from request or collection through to result.

Introduction

This chapter assesses whether pathology services are providing timely diagnostic access for patients and clinicians, and what explains the widening variation in turnaround performance across trusts and service models. It draws on national benchmarking across blood sciences and histopathology, using these measures as practical indicators of service resilience and the system's ability to support urgent care and cancer pathways.

An end-to-end view of turnaround is taken, considering where delay arises across requesting, sample collection and transport, accessioning, analysis, reporting and release of results. This is important because many current turnaround measures begin only once samples are registered in LIMS, excluding earlier parts of the pathway and potentially understating patient-facing delay. In cancer pathways, the relevant diagnostic interval may also include molecular and genomic testing where these steps are required before treatment decisions can be made.

The analysis tests the extent to which variation reflects service model, workload scale, operational maturity, workforce constraints and adoption of digital and automation. It then identifies the practical levers available to system leaders to improve access, reduce unwarranted variation and strengthen accountability in ways that are measurable and comparable nationally.

Methods and definitions

This chapter is England-weighted and draws primarily on trust and service model data from 2020–21 to 2024–25, with partial 2025 reporting from January to July 2025 included where stated. Data are analysed at trust and service model level.

Data sources

- **NAPDC** – Activity returns used for trend and comparative analysis.
- **PQAD** – Turnaround time (TAT) performance and pathway indicators.
- **Stakeholder inputs** – Interviews and literature used to contextualise performance patterns and improvement levers.

Turnaround definitions

This chapter distinguishes between two types of turnaround measure:

- **Patient-facing turnaround:** the time from request or sample collection to result communication.
- **Laboratory turnaround**: the time from laboratory receipt or LIMS registration to report release or authorisation.

This distinction matters because national turnaround clocks commonly begin once samples are received or registered, excluding parts of the pre-analytical pathway where delay may occur. Laboratory TAT is therefore a necessary but incomplete indicator of diagnostic access. A standardised timepoint framework is referenced later in the chapter to support more consistent measurement.

Turnaround time measures

Nationally reported TAT indicators are expressed as the proportion of tests or cases reported within defined standards. The chapter uses the following measures:

- **Blood sciences**
  - Acute haematology, measured by FBC reported within 1 hour.
  - Routine haematology, measured by FBC reported within 6 hours.
  - Acute biochemistry, measured by potassium reported within 1 hour.
  - Routine biochemistry, measured by potassium reported within 6 hours.
- **Diagnostic histopathology**
  - Reporting within 7 days and 10 days, based on the annual average of monthly reporting. Partial-year 2025 data are treated consistently where used.
- **Cancer investigation proxy**
  - Where no cancer-specific PQAD TAT measure exists, a threshold of more than 90% of cases reported within 7 days, aligned to the gynae-cytology benchmark, is used as a working comparator.

Data Exclusions

Two service models and 18 trusts are excluded from selected analyses where submissions are incomplete or inconsistent. Trusts without TAT reporting for 2025 are excluded from relevant comparisons. Exclusions are applied consistently with the wider review.

Volume and TAT analysis

Where activity volume and performance are tested, volumes are based on total individual test counts for the relevant period, with low-volume trusts excluded where appropriate. For histopathology, NAPDC counting rules treat each slide as one test rather than each case, reflecting workload complexity.

Current state: access is deteriorating and variation is widening

Reported turnaround performance indicates a sustained access problem across both high-volume blood sciences and reporting-constrained histopathology. The pattern is not limited to isolated outliers: performance has weakened since 2020, and variation between trusts has widened.

Blood sciences turnaround (acute vs routine), 2020–2025

National guidance sets high expectations for blood sciences turnaround, with a focus on timely reporting for both acute and routine testing.

The reported data show a sustained and widening gap between routine and acute performance, alongside an overall decline since 2020.

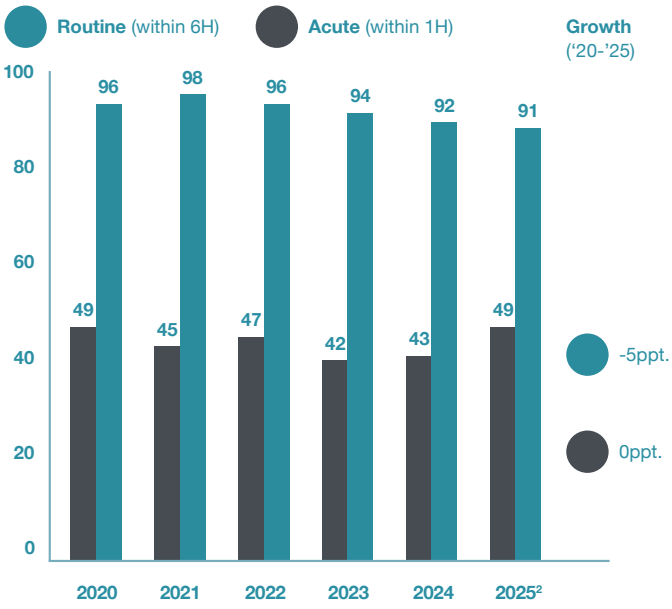
Key trends:

- **Routine performance is deteriorating**
  Routine potassium turnaround declined by 21 percentage points, from 91% of trusts meeting targets in 2020 to 70% in 2025, based on 2025 reporting to date.
- **Acute performance remains weak**
  Fewer than 50% of trusts consistently meet turnaround targets for acute haematology, and fewer than 20% meet targets for acute biochemistry.
- **Urgent pathways are most exposed**
  The gap between routine and acute performance suggests that blood sciences access is most fragile where rapid flow is required.

Taken together, this indicates that the blood sciences access issue is not only analytical speed inside the laboratory. It is also the reliability of sample flow from collection and transport through to accessioning, analysis and release of results.

Haematology – Full Blood Count

% Trusts meeting turnaround targets[1] (2020-2025, % of total reported trusts)



% Trusts average TAT within 90-100%:

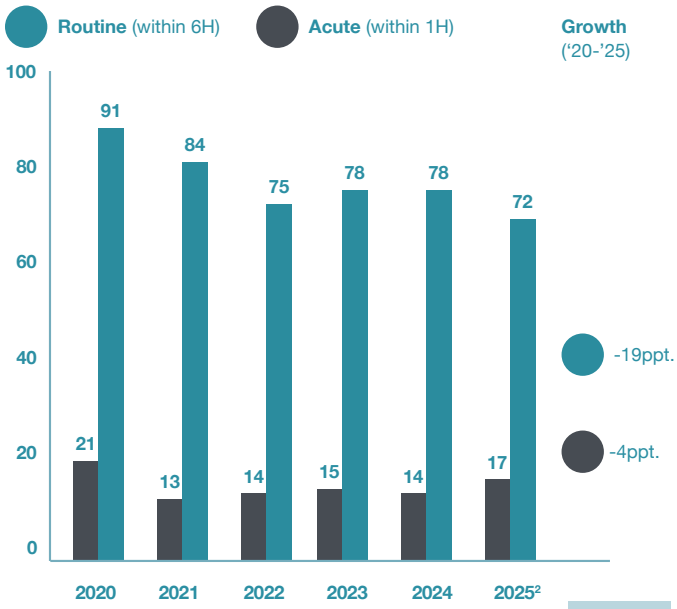
	2020	2021	2022	2023	2024	2025²
Routine (within 6H)	87%	85%	80%	81%	80%	78%
Acute (within 1H)	100%	100%	100%	99%	97%	96%

 # Reported Trusts

	2020	2021	2022	2023	2024	2025²
Routine (within 6H)	69	80	85	102	100	100
Acute (within 1H)	25	42	50	96	97	92

Biochemistry – Potassium

% Trusts meeting turnaround targets[1] (2020-2025, % of total reported trusts)



% Trusts average TAT within 90-100%:

	2020	2021	2022	2023	2024	2025²
Routine (within 6H)	62%	52%	50%	43%	44%	39%
Acute (within 1H)	100%	92%	89%	88%	88%	82%

 # Reported Trusts

	2020	2021	2022	2023	2024	2025²
Routine (within 6H)	68	79	84	102	101	100
Acute (within 1H)	64	74	81	98	98	92

Majority of Trusts are above 70% TAT within 1H for acute tests

Histopathology turnaround, 2020–2025

Diagnostic histopathology turnaround shows severe underperformance against national targets across the time series.

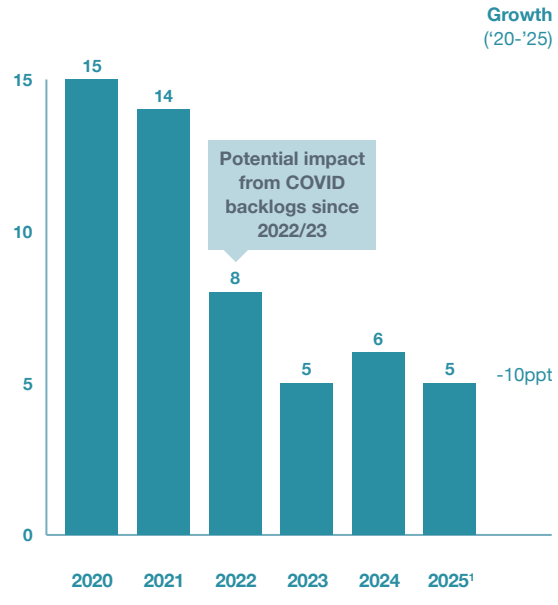
Key trends:

- Fewer than 10% of trusts meet the 7-day and 10-day turnaround targets.
- 10-day performance has collapsed. The proportion of trusts meeting the 10-day target fell from 14% in 2020 to 2% in 2025.
- **Histopathology is the most fragile access point** Turnaround depends on reporting capacity, manual case preparation, case complexity and the maturity of digital workflow.
- **Reporting capacity is a visible constraint** Consultant vacancies are reported in 84% of departments, reinforcing the conclusion that histopathology access is constrained by scarce specialist capacity.

The implication is that histopathology delays are not intermittent performance issues. They represent a persistent access risk in a pathway that underpins cancer diagnosis and other time-critical clinical decisions.

Diagnostic Histopathology in 7 days

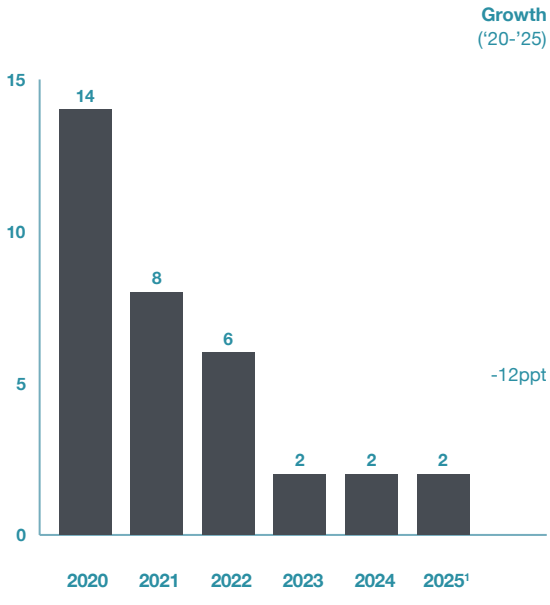
% Trusts meeting turnaround targets[1] (2020-2025, % of total reported trusts)



	2020	2021	2022	2023	2024	2025[1]	
TAT>90%	17%	12%	7%	4%	5%	4%	
70%<TAT <=90%	35%	21%	19%	8%	11%	12%	NHS target >70%
50%<TAT <=70%	25%	27%	20%	22%	16%	20%	
<=50%	23%	39%	55%	66%	68%	64%	
# Reported Trusts	48	66	75	116	123	123	

Diagnostic Histopathology in 7 days

% Trusts meeting turnaround targets[1] (2020-2025, % of total reported trusts)



	2020	2021	2022	2023	2024	2025[1]	
TAT>90%	49%	30%	17%	9%	11%	10%	
70%<TAT <=90%	42%	42%	37%	22%	20%	24%	NHS target >70%
50%<TAT <=70%	7%	20%	30%	29%	28%	25%	
<=50%	3%	8%	15%	41%	41%	41%	
# Reported Trusts	72	86	92	116	123	123	

Note: TAT = Turnaround Times; [1] Weighted average of monthly reported % turnaround times for Jan - July 2025 histopathology within 7 days and within 10 days; [2] 2025 data reported from Jan to July 2025; Trusts without TAT reporting in 2025 are excluded, see "Network Consolidation Status" and "Data Exclusions" for refinements to analysis;
Source: NAPDC 2024/2025; PQAD

Cancer-related turnaround (gynae-cytology benchmark)

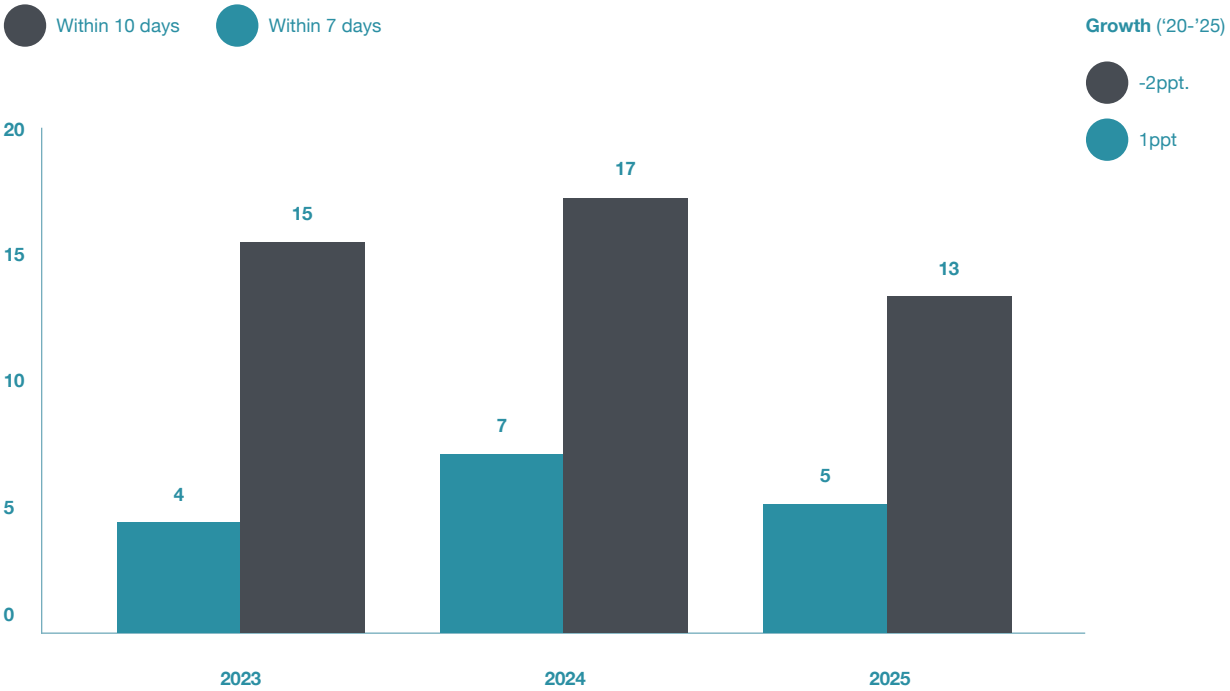
For cancer-related turnaround, this chapter uses the diagnostic gynae-cytology benchmark as a working proxy because there is no equivalent cross-cancer pathology TAT indicator in PQAD.

The reported pattern is consistent with the wider histopathology access problem, but should be read as an access signal rather than a definitive measure of cancer-pathway turnaround. Significant variation between trusts suggests uneven diagnostic resilience, with only a small minority consistently meeting turnaround targets.

For an increasing share of cancers, patient-facing diagnostic turnaround extends beyond histopathology reporting alone. Where molecular or genomic testing is needed before treatment decisions, the relevant interval may run from biopsy through specimen preparation, referral, molecular processing, integrated reporting and MDT decision. These steps are not consistently visible in standard histopathology TAT measures.

Reported cancer cases

% Trusts meeting turnaround targets[1] (2020-2025, % of total reported trusts)



 # Reported Trusts:

	104	112	111
	104	112	111

Note: TAT = Turnaround Times; [1] No formal cancer-specific TAT is defined in PQAD, 90% is used as a working benchmark similar to Gynaecology targets; [2] 2025 data reported from Jan to July 2025; See "Network Consolidation Status" and "Data Exclusions" for refinements to analysis
Source: PQAD data; NAPDC data; Market participant interviews;

Variation and equity

Variation between trusts is widening across turnaround measures, indicating an access and equity problem alongside the national decline.

The reported distributional shift is stark:

- Trusts achieving >90% compliance have fallen sharply, while those below 50% compliance have more than doubled, increasing from 23% to 64%.

This matters because it suggests that the system is diverging into areas where timely diagnostics remain achievable and areas where patients face sustained delay, with knock-on risks to urgent care and cancer pathways.

Equity means consistent access to timely diagnostics regardless of where a patient enters the system. The widening distribution of turnaround performance is therefore an equity risk. Services should use standardised TAT data to test whether delay is concentrated by geography, deprivation, rurality or pathway type.

Reasons for access variation

Scale does not explain variation on its own

In blood sciences, the relationship between activity volume and reported turnaround performance is weak. This suggests that variation is driven less by the volume of testing itself and more by operational factors such as workflow design, pre-analytical handling, equipment utilisation, staffing models and the reliability of urgent sample flow.

In histopathology, volume appears to have a stronger relationship with turnaround, particularly for 7-day performance. However, this relationship is best understood as a capacity and workflow issue rather than a scale issue alone. As case volumes and complexity rise, services with constrained reporting capacity, manual workflows or limited digital maturity are less able to absorb demand.

The implication is that access improvement cannot rely on consolidation or scale alone. It depends on whether service models have the operational capability to manage work consistently across sites.

Current measurement starts too late in the pathway

Current turnaround measures can understate the patient-facing experience. Many reported TAT clocks begin once a sample is received or registered in LIMS, rather than at request, collection or procedure. This excludes important pre-laboratory parts of the pathway, including sample collection, transport, receipt and accessioning. Services may therefore appear to meet laboratory turnaround expectations while patients and clinicians still experience avoidable delay. It also weakens accountability, because delays before registration can sit outside routine performance reporting.

For cancer pathways, the measurement challenge is wider. Where molecular or genomic testing is required before treatment decisions, standard histopathology TAT may not capture the full diagnostic interval from biopsy to integrated report and MDT decision.

The core challenge is therefore to distinguish clearly between laboratory turnaround and patient-facing turnaround.

Accountability is fragmented across the pathway

Turnaround depends on multiple steps: requesting, collection, transport, accessioning, analysis, reporting, authorisation and result communication. In many services, accountability for these steps is split across teams, sites or organisations. Where no single service model owner has visibility and authority across the full pathway, delays are harder to identify and harder to resolve.

This risk is greater where integration is partial. Work may move across sites without equivalent control over transport, digital routing, reporting capacity or escalation. In those circumstances, integration can add interfaces without improving patient-facing turnaround.

The central accountability question is practical: who owns the test from request, collection through to result release? If ownership is unclear, performance management tends to focus on retrospective reporting rather than active control of flow, backlogs and exceptions.

Pre-analytical workflows and specimen transport are inconsistent

Pre-analytical delay is part of access. Delays in collection, movement of samples, receipt or accessioning may be invisible in reported laboratory TAT, even though they shape the patient and clinician experience, as well as outcome.

Manual and inconsistent workflows also increase operational risk. Paper-based requesting, variable accessioning processes, lack of end-to-end barcoding and inconsistent specimen tracking make it harder to identify where samples are, where delay is building and which pathways require escalation.

They also increase avoidable rework. Where requests are re-keyed, samples are manually labelled or phlebotomy processes are not supported by consistent training, electronic requesting and bedside or point-of-collection barcoding, the risk of mislabelling, rejection, repeat collection and delay increases. These failures are often experienced by patients and clinicians as access problems, even when laboratory analytical turnaround appears acceptable.

The challenge is not simply whether individual processes exist, but whether they operate as a reliable end-to-end pathway. Access depends on clear handoffs, consistent standards and visibility across the full sample journey.

Reporting capacity is fragile, especially in histopathology

Reporting capacity is a direct access constraint, particularly in histopathology. Unlike high-volume blood sciences, where automation and urgent-flow reliability are central, histopathology depends heavily on specialist reporting capacity, case prioritisation and manual preparation steps. This makes histopathology particularly fragile. Delays can arise from the cumulative effect of specimen preparation, case complexity, consultant availability, reporting backlogs and limited ability to shift work across sites. Where digital pathology is not mature, services have less flexibility to pool reporting capacity or manage backlogs across a wider service model.

The access issue is therefore not simply workforce shortage in isolation. It is the interaction between scarce specialist capacity, manual workflow and limited operational flexibility. **Services need enough reporting resilience to protect fragile, urgent and cancer-relevant pathways when demand rises or local capacity is disrupted.**

Digital and automation maturity is uneven

Digital capability is a core enabler of access because it makes pathway flow visible and manageable. Where digital requesting, barcoding, sample tracking, interoperable LIMS, operational dashboards and digital pathology are underdeveloped, services have less ability to identify delays early, route work effectively or manage exceptions.

Uneven automation also limits consistency. Automation can support faster and more reliable processing, which is seen best in blood sciences, but benefits depend on workflow design, standardised processes and full operational adoption. Technology deployed unevenly or without pathway redesign will not resolve turnaround variation.

In histopathology and cancer pathways, limited interoperability can obscure the full diagnostic journey. Where histopathology, molecular and genomic services are not digitally connected, specimens and results may not be visible end-to-end. This weakens accountability for the cumulative time to diagnosis and treatment decision.

The challenge is therefore not digital adoption in the abstract. It is whether digital and automation are being used to support the access objective: visible flow, fewer manual handoffs, faster exception handling and more resilient reporting across the service model.

How access challenges can be addressed

Improving access requires operational control across the full diagnostic pathway. The aim is to reduce avoidable delay before testing begins, protect reporting capacity where it is most constrained, and make flow visible enough for services to intervene before backlogs become persistent. This is not primarily a further structural reform programme; it is about making existing service models operate as single managed pathways.

Standardise turnaround definitions and expose the full pathway

Services should report both patient-facing and laboratory turnaround. Patient-facing TAT should capture the time from request, procedure or sample collection through to result communication. Laboratory TAT should capture the time from LIMS registration to report release or authorisation.

Dual TAT reporting would make the distinction between pathway delay and laboratory processing delay explicit. It would also allow service models to identify whether underperformance is driven by collection, transport, accessioning, analysis, reporting or release of results.

During transition, services should prioritise a small set of comparable access measures rather than creating an overly complex reporting burden. The minimum requirement is to make pre-analytical delay visible and to ensure that turnaround data can be compared consistently across trusts and service models.

Manage pre-analytical delay as a core access risk

Pre-analytical delay should be managed as part of access, not treated as outside the laboratory's concern. Service models should standardise the practical steps that most affect flow: digital requesting, consistent barcoding, reliable specimen tracking, clear handoffs, standard accessioning processes and defined transport schedules. These changes reduce manual error, make delay easier to locate and support faster escalation when samples are delayed or misrouted.

The purpose is not to centralise every step, but to make the end-to-end pathway reliable, with clear governance. Local processing, hub-and-spoke arrangements and transport routes should be designed around patient-facing turnaround, especially for urgent and cancer-relevant work.

Build reporting resilience in constrained pathways

Histopathology requires a specific access response because its constraints differ from blood sciences. Turnaround is more dependent on reporting capacity, case prioritisation, manual preparation and the ability to deploy scarce expertise across the service model.

Services should strengthen reporting resilience by using governed prioritisation, shared reporting capacity where appropriate, consistent escalation of backlogs and digital workflows that allow work to be routed more flexibly. The focus should be on protecting urgent and cancer-relevant pathways when local capacity is disrupted or demand rises.

For cancer pathways, access improvement should also consider the cumulative diagnostic interval. Where molecular or genomic testing is required before treatment decisions, service models need visibility of specimen movement, referral, processing, integrated reporting and MDT readiness, not only histopathology report release.

Use digital visibility to manage flow and exceptions

Digital infrastructure should be treated as an access enabler. Digital requesting, end-to-end barcoding, interoperable LIMS, sample tracking, operational dashboards and digital pathology can make flow visible across sites and allow services to manage exceptions earlier.

The priority is not digital adoption in isolation. Digital tools should be sequenced against practical access benefits: fewer manual handoffs, better traceability, faster exception handling, more reliable routing and greater flexibility in reporting.

Automation should be used in the same way. In blood sciences, automation can support faster and more reliable urgent flow, but only when aligned to standard workflows, equipment utilisation and staffing models. In histopathology, digital workflow can support reporting resilience, but it will not remove the need for sufficient specialist capacity and clear prioritisation.

Embed operational ownership and escalation

Access improvement depends on clear ownership. Each service model should have named accountability for end-to-end turnaround and operational routines should focus on active control of flow, not retrospective reporting alone.

Services should review backlogs, exceptions, urgent-pathway performance and delayed samples in real time or near real time, with clear escalation routes when performance falls below agreed standards.

Where integration is partial, accountability should be tested explicitly. If different organisations or sites own different parts of the pathway, the service model must still have a single view of patient-facing turnaround and a clear route for resolving delays.

Link improvement to assurance and support

Persistent failure against agreed patient-facing turnaround standards should trigger structured support. **Standardised access measures would allow national and regional teams to distinguish isolated operational issues from sustained service-model fragility, and target support where patients face the greatest risk of delayed diagnosis.**

Taken together, these levers describe the operational capabilities required for access improvement. The question for integrated service models is whether they create the conditions to deploy those capabilities consistently across sites.

What improvements do integrated service models bring?

Integrated pathology service models can support access by allowing services to manage turnaround across sites rather than within individual laboratories alone. The benchmarking suggests a positive association between integration and more consistent turnaround in some areas, but the effect is uneven and depends on operational maturity.

Integration should therefore be treated as an operating platform for access improvement, not as an access intervention in itself.

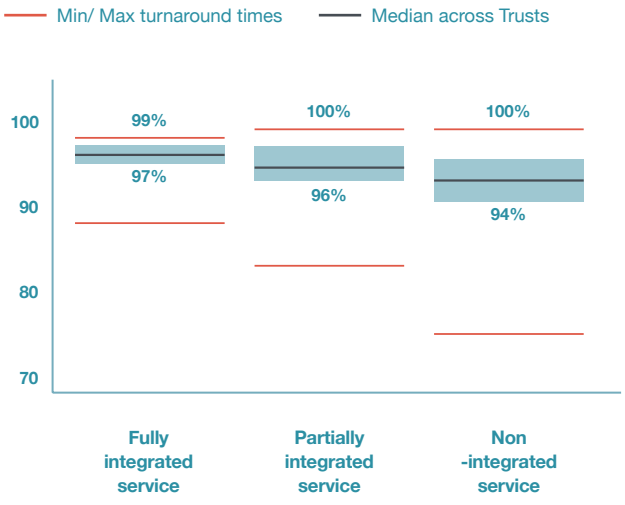
What the benchmarking shows

In haematology, turnaround performance varies only marginally by operating model overall. However, trusts within integrated services show a slightly tighter distribution and fewer underperforming sites, suggesting that common management arrangements can support more consistent delivery.

DRIVERS | INTEGRATED SERVICES

Full Blood Count within 1H

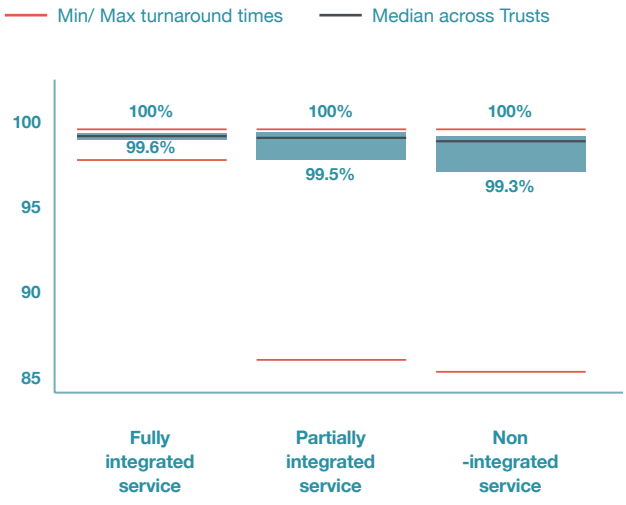
Haematology Trusts TAT by Network consolidation



	Fully integrated service	Partially integrated service	Non -integrated service
# Trusts	13	28	59

Full Blood Count within 6H

Haematology Trusts TAT by Network consolidation



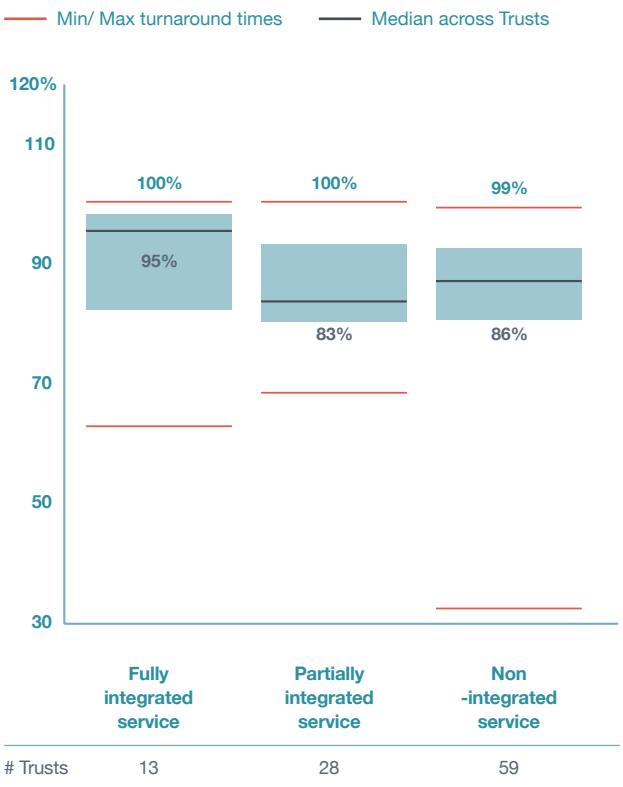
	Fully integrated service	Partially integrated service	Non -integrated service
# Trusts	12	22	58

Note: TAT = Turnaround Times; [1] Annual average of monthly reported % turnaround times: within 1 hour for Acute Haematology - FBC and within 6 hours for Routine Haematology - FBC. Weighted averages not applicable due to the absence of underlying test volumes; [2] 2025 data reported from Jan to July 2025; Trusts without TAT reporting in 2025 are excluded, see “Network Consolidation Status” and “Data Exclusions” for refinements to analysis; Source: NAPDC 2024/2025; PQAD

DRIVERS | INTEGRATED SERVICES

Potassium within 1H

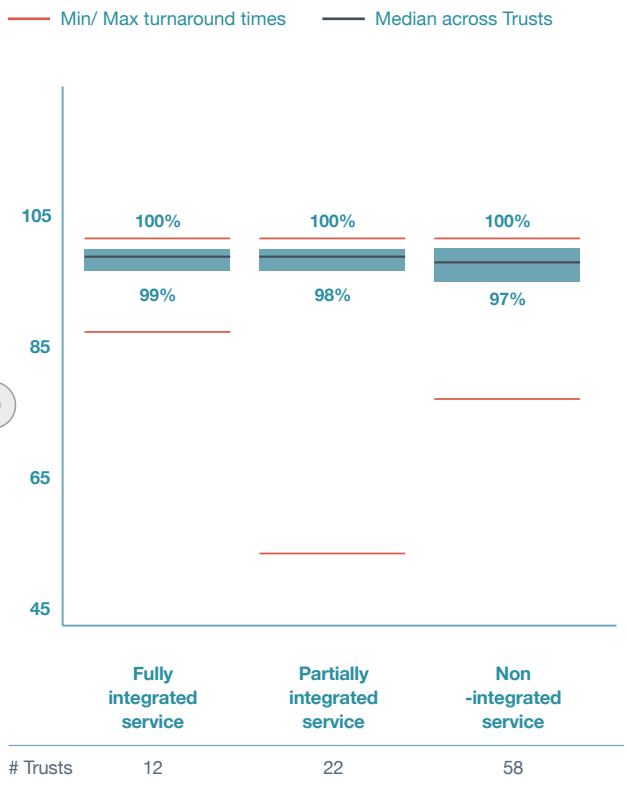
Biochemistry Trusts TAT by Network consolidation



	Fully integrated service	Partially integrated service	Non -integrated service
# Trusts	13	28	59

Potassium within 6H

Biochemistry Trusts TAT by Network consolidation



	Fully integrated service	Partially integrated service	Non -integrated service
# Trusts	12	22	58

Note: TAT = Turnaround Times; [1] Annual average of monthly reported % turnaround times: within 1 hour for Acute Biochemistry- Potassium and within 6 hours for Routine Biochemistry- Potassium . Weighted averages not applicable due to the absence of underlying test volumes; [2] 2025 data reported from Jan to July 2025; Trusts without TAT reporting in 2025 are excluded, see "Network Consolidation Status" and "Data Exclusions" for refinements to analysis; Source: NAPDC 2024/2025; PQAD

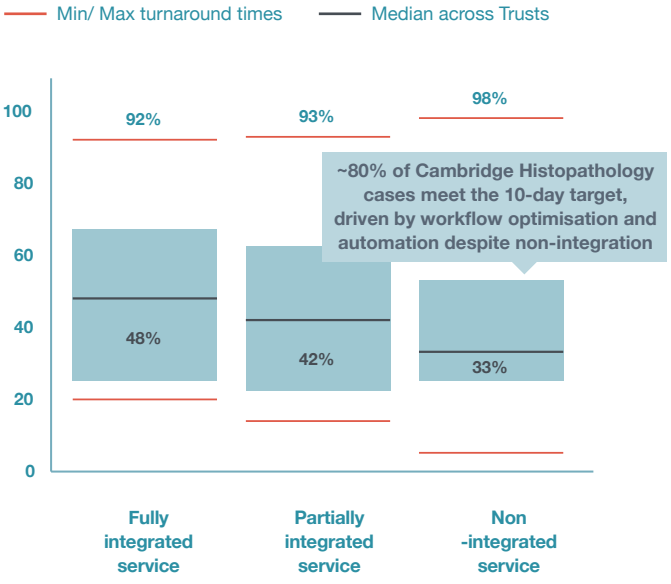
The advantages of integration are more obvious in acute biochemistry. Integrated services achieve a higher median acute turnaround of 94%, compared with 83% in partially integrated services and 86% in non-integrated services, alongside a narrower performance spread. Routine biochemistry performance is more stable across models, with medians of 97%–98%, suggesting that the access benefit of integration is most visible where urgent sample flow and operational coordination matter most.

In histopathology, integrated service models perform somewhat better than partially integrated or non-integrated models, but performance remains substantially below target across all models. Integrated services report 48% performance against the 7-day measure and 66% against the 10-day measure, compared with 33%–42% and 52%–57%, respectively, in partially integrated and non-integrated services. This indicates that integration can support resilience but does not remove the underlying reporting capacity, workflow and case-complexity constraints in histopathology. **The variation also points to the importance of digital pathology, automation and workflow optimisation, which can improve turnaround even where structural integration is incomplete.**

DRIVERS | INTEGRATED SERVICES

Within 7 days

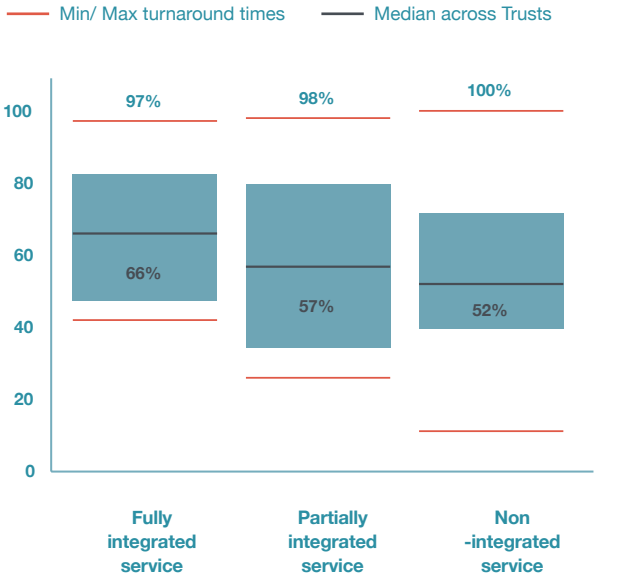
Histopathology Trusts TAT by Network consolidation



	Fully integrated service	Partially integrated service	Non -integrated service
# Trusts	18	28	58

Within 10 days

Histopathology Trusts TAT by Network consolidation



	Fully integrated service	Partially integrated service	Non -integrated service
# Trusts	18	28	58

Note: TAT = Turnaround Times; [1] Weighted average of monthly reported % turnaround times for Jan - July 2025 histopathology within 7 days and within 10 days; [2] 2025 data reported from Jan to July 2025; Trusts without TAT reporting in 2025 are excluded, see "Network Consolidation Status" and "Data Exclusions" for refinements to analysis;
Source: NAPDC 2024/2025; PQAD

What integrated service models enable

Where operationally mature, integrated service models improve access through practical mechanisms: common turnaround definitions, standardised workflows, coordinated specimen transport, shared visibility of flow and backlogs, more flexible use of reporting capacity and clearer escalation when urgent or cancer-relevant pathways are delayed.

These mechanisms matter because pathology access depends on the whole diagnostic pathway, not only the analytical phase. In blood sciences, integration is most relevant where turnaround depends on urgent sample flow, automation readiness and rapid exception handling. In histopathology, it is most relevant where services need to prioritise work, share reporting capacity and maintain visibility of backlogs across sites.

What integrated services do not solve

Integration does not remove variation on its own. High-performing trusts exist across different service models, which indicates that operational maturity, workflow design and local execution remain decisive.

Integration does not overcome structural constraints in histopathology by itself. Where reporting capacity is scarce, workflows remain manual or digital pathology is not sufficiently mature, access gains will be limited. In these circumstances, integration may improve alignment and escalation, but it will not automatically deliver the step-change needed to meet turnaround standards.

There is also a specific risk in partial integration. Where work is moved across sites without equivalent control over collection, transport, accessioning, digital routing, reporting capacity and escalation, integration can add interfaces without improving patient-facing turnaround. Partial integration may therefore create coordination complexity unless accountability for the full pathway is clear.

What this means for service models

Integrated pathology service models should be judged by whether they improve operational control across the diagnostic pathway, not by structural designation alone. The priority is to complete operational integration where services remain partial or fragmented, so that each service model has clear ownership of turnaround from request or collection through to result.

The practical test is whether the service model can:

- measure turnaround on both a patient-facing and laboratory basis
- trace requests, samples and results end-to-end
- manage pre-analytical delay as part of access
- prioritise reporting capacity across sites, especially in histopathology
- assign named accountability for flow, escalation and improvement.

Where these conditions are not in place, integration may move work across sites without improving patient-facing access.

Next steps

Years 1–2: standardise measurement and ownership

- Agree and publish standard definitions for both patient-facing and laboratory turnaround.
- Include a minimum set of urgent, routine and cancer-relevant access metrics in the comparable national pathology dataset.
- Establish service model-level accountability for end-to-end turnaround with named ownership for collection, transport, accessioning, analysis, reporting, escalation and result release.
- Embed daily operational review of turnaround, focused on flow, backlogs, exceptions and escalation rather than retrospective reporting alone.

Years 2–3: reduce avoidable delay and build reporting resilience

- Standardise pre-analytical workflows across sites, including digital requesting, universal barcoding, sample tracking, accessioning processes and specimen transport standards.
- Prioritise improvement in urgent blood sciences pathways, where turnaround depends on reliable sample flow, automation readiness, logistics and rapid exception handling.
- Strengthen histopathology reporting resilience through cross-site reporting models, governed prioritisation, digital workflow and clearer deployment of scarce reporting capacity.
- Define and pilot an end-to-end cancer diagnostic turnaround measure that includes histopathology, molecular and genomic steps where these materially affect treatment decisions.
- Address reporting capacity constraints through service model-level workforce planning, particularly in histopathology and other pathways where turnaround is limited by scarce specialist expertise.

Years 4–5: embed access into assurance and operating maturity

- Use standardised patient-facing turnaround measures to benchmark service models, identify unwarranted variation and target support where delays are persistent.
- Require integrated service models to demonstrate that digital, automation and logistics investments are delivering measurable access benefits.
- Treat persistent failure against agreed patient-facing access standards as an assurance trigger, aligned with quality oversight and defined support or intervention.
- Sequence access improvement with digital, workforce and funding reform.

PART 6: DIGITAL, DATA AND DIAGNOSTIC INFRASTRUCTURE

Executive summary

Digital, data and diagnostic infrastructure underpin whether pathology services can operate at scale within an integrated service model. Digital capability is not a back-office IT issue or optional modernisation programme; it is core service infrastructure for safe, timely and resilient pathology.

The same digital foundations needed to manage today's pathology services - common standards, interoperable systems, traceable workflows, reliable assurance controls and mature operating models - are also the foundations for adopting emerging technologies safely, including AI.

The core finding is that digital maturity is a binding constraint on completed operational integration. Without interoperable requesting and reporting, reliable specimen identity and tracking, service-model-capable LIMS, usable operational analytics and tested resilience arrangements, integrated pathology services cannot function as single managed services at scale. [1][2][3][13][15]

What is the current state of digital pathology infrastructure?

National expectations are clearer than they were, but maturity remains uneven. NHS England reports 27 pathology networks and more than £200 million of investment in digital pathology and LIMS; however, only 23% of networks are described as "maturing or above", with 44% "developing" and 33% "emerging". [1]

DAPB4101 provides the clearest national standard for structured pathology reporting, while UK screening governance provides an important assurance reference point for digital pathology. [2][3][4][5][6]

What are the key challenges?

The main digital constraints are operational.

- **LIMS fragmentation and inconsistent master data** limit shared queues, cross-site reporting, common test catalogues and comparable analytics.
- **Inconsistent digital requesting and reporting** weaken workflow reliability and clinical usability. Structured reporting needs to make orders and results interpretable, comparable and usable across organisations and care settings. [2][3]
- **Incomplete specimen identity, tracking and traceability** reduce visibility of the pre-analytical pathway, make delay harder to locate and weaken chain-of-custody assurance. [11]
- **Limited operational analytics** mean services may rely on retrospective reporting rather than live management of flow, backlogs, exceptions and recovery. [12][15]
- **Variable digital pathology capability** limits cross-site reporting and resilience where scanning capacity, validation, storage, bandwidth, governance and adoption are not in place. [4][5][6]
- **Cyber resilience and downtime readiness** are now core diagnostic resilience issues, as shown by the Synnovis 2024 ransomware incident. [13][14]

How can these challenges be addressed?

Integrated pathology service models need a pragmatic minimum digital standard covering service-model-capable LIMS and master data, standards-based requesting and reporting, end-to-end specimen identity and tracking, operational analytics for live management, digital pathology readiness where deployed, and tested cyber, downtime and recovery arrangements.

Delivery needs to follow dependency. Services cannot rely on dashboards, cross-site reporting, digital pathology or AI to deliver benefits if identifiers, master data, interoperability and workflow standards are not in place. LIMS convergence or interoperability is necessary, but not sufficient; benefits also depend on workflow redesign, adoption discipline, governance (including validation as well as assurance), accountability, workforce readiness and recurrent funding.

Operational analytics should support live management, not retrospective reporting alone. A small comparable dataset should include turnaround stage markers, backlog ageing, specimen tracking completeness, referral routing, downtime events and digital pathology utilisation where deployed, with booking and collection events included where phlebotomy scheduling is in scope. [15][16]

AI should be treated as an emerging capability that depends on, rather than substitutes for, the digital foundations described above; it should not be treated as a near-term fix for workforce shortages, process capacity, turnaround or integration pressures. [7]

What improvements would integration bring?

Completed operational integration would allow digital capability to operate as shared service infrastructure rather than as a set of local systems. It would support common requesting and reporting standards, traceable samples, shared queues, cross-site reporting, comparable stage markers, live backlog management and tested resilience arrangements.

These capabilities would strengthen access, quality, workforce resilience and value by making flow, delay, reporting capacity and resilience more visible and manageable, reducing unwarranted variation in diagnostic access.

However, integration does not remove digital risk by itself. If systems are connected but not standardised, governed, adopted or resilient, integration can increase complexity and fragility. Integration improves digital capability only when it creates completed operational integration: common standards, usable data, redesigned workflows, resilient downtime arrangements and named accountability across the service model.

Core conclusion

Digital maturity is a binding constraint on pathology transformation. Digital investment is necessary, but not sufficient. Benefits depend on sequencing digital capability with workflow redesign, workforce readiness, service-model accountability and funding reform.

Introduction

Digital capability determines whether integrated pathology service models can operate with consistent control across sites. The issue is not whether individual systems are in place, but whether requests, specimens, results, workflows and resilience arrangements can be managed as part of one operational pathway.

This chapter takes an end-to-end view of digital infrastructure in pathology. It considers electronic requesting and reporting, LIMS and master data, specimen identity and tracking, operational analytics, digital pathology, phlebotomy workflow where in scope, and cyber and downtime resilience. These capabilities are treated as service infrastructure rather than discretionary technology investment.

Pathology digital maturity also depends on systems outside the direct control of pathology service models, including EPRs, GP systems, shared care records and wider NHS data platforms. Interoperability is therefore treated in this chapter as a service-model requirement, while recognising that delivery depends on coordinated action with wider system digital architecture.

A key reference point is DAPB4101, the NHS digital pathology interoperability standard. In practical terms, it is intended to make pathology data more consistent and exchangeable across laboratory information management systems, electronic patient records and wider clinical platforms, using common standards such as SNOMED CT and Fast Healthcare Interoperability Resources (FHIR).

The chapter also considers future readiness. As testing models evolve, including greater use of digital pathology, decision support, AI-enabled tools and diagnostics delivered closer to patients, safe adoption will depend on trusted data, interoperable systems, consistent quality controls, clear governance and accountable operating models.

The focus is practical: the minimum digital conditions needed to complete operational integration over the next five years, and how those conditions should be sequenced with workflow redesign, workforce readiness, service-model accountability and funding reform.

Methods and definitions

This chapter is literature- and standards-led rather than dataset-led. There is no single UK-wide, comparable national dataset for pathology digital maturity, interoperability conformance, specimen tracking completeness, downtime performance or digital pathology utilisation. The analysis therefore draws on national standards and programme documentation, including DAPB4101, published national and devolved programme material, governance guidance, including screening references, and selected implementation case studies. [1][2][3][4][5][6][8][9][10][11][12][13][15][16]

In this chapter, “digital capability” refers to the wider pathology digital infrastructure, including LIMS, interoperability, requesting and reporting, specimen tracking, operational analytics and resilience. “Digital pathology” is used more narrowly to refer to image-based diagnostic workflows, principally whole slide imaging, while recognising that digital and AI-enabled tools are also developing in other disciplines.

Where the chapter makes claims about impact, these are limited to areas with credible evidence of mechanism, such as traceability, operational control and resilience. They are not presented as nationally comparable effect sizes unless definitions, denominators and stage markers are consistent. Network and service-model maturity self-assessment is treated as contextual evidence and interpreted cautiously, strengthened where possible by objective indicators such as standards conformance, specimen tracking completeness, digital pathology utilisation and downtime measures. [1][11][12][13][15]

For this chapter, “in scope” refers to the pathway elements that sit within a given service model’s operational responsibility. For example, phlebotomy scheduling is in scope where it is provided or commissioned as part of the pathology service model. “Minimum digital standard” refers to the minimum set of capabilities required for a service model to operate safely and consistently as a single managed service across sites.

Current state: standards are clearer, but digital maturity remains uneven

National expectations for pathology digital capability are now clearer than they were. NHS England's pathology networks programme positions digital as a core enabler of integrated working and productivity. A published national overview describes 27 pathology networks and reports baseline IT and digital maturity, with 23% of networks assessed as "maturing or above", 44% as "developing" and 33% as "emerging". It also notes more than £200 million of investment in digital pathology and LIMS to support integrated operating models. [1]

In England, the clearest national interoperability standard is DAPB4101. The Pathology and Laboratory Medicine Reporting Information Standard sets requirements for structured, coded pathology messaging using Systematized Nomenclature of Medicine – Clinical Terms (SNOMED CT) and FHIR R4 profiles for reportable pathology content. Its purpose is to support interoperable sharing of reports across organisations and systems, with implementation expectations set out in the standard and accompanying guidance. [2][3]

There is also a UK reference point for digital pathology assurance. National screening governance has cleared digital pathology for the reporting of cancer screening samples, supported by a multi-site UK study and accompanying guidance on governance, validation and assurance requirements. This provides a useful minimum reference point for digital pathology controls where whole slide imaging is deployed beyond screening. [4][5][6]

Across the UK, different national and regional approaches are visible. Scotland's Scottish Pathology Network reports substantial variation in digital pathology utilisation across Health Boards. Wales has pursued an all-Wales LIMS approach through the Laboratory Information Network Cymru programme, with electronic test requesting described as critical to standardisation. Northern Ireland has developed the Northern Ireland Pathology Information Management System as a pathology information management programme aligned to pathology modernisation. [8][9][10]

The devolved nations are pursuing related but distinct approaches, which means interoperability challenges can remain at national boundaries as well as between organisations. These examples should be read as evidence different approaches and maturity, not as a comparative ranking of national programmes. Reported maturity should also be interpreted cautiously. It is useful contextual evidence, but it should not be treated as proof that each service model has the digital capabilities needed to manage work safely and consistently across its pathway. Assessment should be triangulated wherever possible with objective indicators, including DAPB4101 conformance, LIMS and master-data readiness, specimen tracking completeness, digital pathology utilisation, operational dashboard use and downtime or resilience measures.

Key challenges

The main digital challenges are not isolated IT issues; they are operating constraints that determine whether a pathology service model can manage work safely and consistently across sites.

LIMS fragmentation and master data inconsistency

Multiple LIMS instances, duplicated test catalogues and inconsistent reference data limit the ability of services to operate as one managed system. They make it harder to create shared queues, route work across sites, compare activity and turnaround, or produce consistent operational analytics.

LIMS convergence or interoperability is therefore necessary, but not sufficient. Services also need common master data, harmonised test catalogues, clear ownership of data quality and adopted workflows. Without these, digital integration may connect systems technically without creating reliable service-model control.

Interoperability limits in requesting and reporting

Where requests and results are exchanged as free text, inconsistent codes or locally variable formats, services cannot reliably automate workflow or compare performance and quality indicators. This also weakens clinical usability: results may be transmitted, but not always in a form that is structured, interpretable and comparable across organisations and care settings.

DAPB4101 provides the national direction for structured pathology reporting, but benefits depend on implementation, supplier readiness, data quality and operational adoption. Interoperability should therefore be treated as a service-model programme, not simply an interface project. [2][3]

Specimen tracking and chain-of-custody gaps

Incomplete end-to-end specimen tracking limits both safety and access. Where scanning is not used consistently at key points, services cannot reliably evidence chain of custody, identify where pre-analytical delay is occurring, or manage exceptions before they affect turnaround. Specimen identity and tracking should therefore be treated as core controls for safety and operational grip. They make the sample journey visible from collection, receipt and processing through to dispatch or referral, and provide the data needed to manage delay, loss, misrouting and handoff risk.

Digital pathology scaling constraints

Digital pathology can support remote reporting, subspecialty pooling, second opinions and cross-site resilience. However, its benefits depend on the operating conditions around it: scanning throughput, validated reporting workflows, image quality, storage, bandwidth, remote reporting governance, fallback arrangements and adoption by reporting teams. [4][5][6]

Where scanning capacity or workflow design is weak, services can drift into parallel working, with some cases reported digitally and others still reliant on glass slides. This can add complexity rather than reduce it. **Digital pathology should therefore be scaled only where the supporting infrastructure, governance and workforce adoption are in place.**

Cyber resilience and downtime readiness

Pathology is now a high-dependency digital service. Integrated service models increase the operational consequences of digital failure if resilience is not designed in and exercised. A local cyber or system incident can affect requesting, sample receipt, analyser connectivity, reporting, result release, cross-site working and clinical escalation.

Cyber resilience and downtime planning should be treated as part of diagnostic resilience, because failures can affect requesting, sample receipt, analyser connectivity, reporting, result release and clinical escalation. The Synnovis 2024 ransomware incident illustrates the scale of disruption to entire health systems that can occur when core pathology systems are compromised. [13][14]

How challenges can be addressed: the minimum digital standard

The response should be a practical minimum digital standard for each integrated pathology service model: a test of whether the service has the digital capabilities needed to manage requests, specimens, results, workflow and resilience.

The order of delivery matters. Foundational data and interoperability need to come before live dashboards, shared queues, cross-site reporting, digital pathology at scale or AI-enabled tools. Resilience also needs to be designed from the start, because greater digital connectivity can increase the operational impact of outages, cyber incidents or poorly tested downtime arrangements.

The minimum digital standard should cover six capabilities.

1. Service-model-capable LIMS and master data

Service models should establish LIMS and master data arrangements that support cross-site working, including harmonised test catalogues, consistent reference data, clear data-quality ownership and configuration or interoperability that enables shared queues, referral routing, workload visibility and comparable analytics.

This capability depends on common master data, adopted workflows and accountable data ownership; technical connectivity alone will not create shared service infrastructure.

Procurement and architecture decisions should support future interoperability and avoid creating new integration debt through proprietary interfaces, supplier lock-in or data models that cannot be used consistently across the diagnostic pathway.

2. Standards-based requesting, reporting and interoperability

Structured electronic requesting and results reporting should be implemented in line with DAPB4101, so that pathology information can be exchanged, interpreted and compared safely across organisations and care settings. DAPB4101 provides the clearest national standard for structured, coded pathology messaging using SNOMED CT and FHIR R4 profiles. [2][3]

The benefit is not simply technical exchange. Digital requesting and reporting should improve clinical usability: requests should be clear, correctly coded and routed, and results should be structured, interpretable and usable by clinicians across care settings. **Interoperability should therefore be treated as a service-model capability, not simply as an interface project.**

Public visibility of DAPB4101 readiness remains limited. Supplier conformance, local implementation progress and service-model readiness are not routinely available in a comparable form. This means conformance should form part of future service-model assurance, rather than being assumed from programme participation alone. [2][3]

3. Specimen identity, tracking and traceability

Specimen identity and tracking should cover the stage markers needed for chain of custody, delay visibility and exception management. This includes collection, receipt, processing, dispatch and referral where relevant. Where used consistently, pre-numbered or uniquely identified tubes can reduce manual labelling errors, support positive patient and specimen identification, and reduce the risk of rejection, repeat collection or misrouting. Tracking makes specimen loss, misrouting, handoff risk and pre-analytical delay visible, and should be treated as a core safety and access control rather than an inventory function.

Scan4Safety case material from Leeds Teaching Hospitals describes the use of tissue tracking to improve traceability, reduce missing samples and secure operational benefits from point-of-care scanning. The published evidence is strongest on the safety mechanism and implementation logic; comparable quantitative impacts are not consistently reported across providers. [11]

Where phlebotomy scheduling is within the service model's operational responsibility, booking, attendance or check-in, and order-to-collection events should also be captured. This supports patient choice, demand-capacity management and visibility of the pre-analytical pathway, but should be treated as an in-scope pathway capability rather than as a universal core requirement for every pathology service model. [16]

4. Operational analytics for live management

Integrated services need a small operational dataset that supports live management of flow, backlogs, exceptions and recovery. **The purpose of analytics should be operational control, not retrospective reporting alone.**

A pragmatic minimum dataset should include:

- turnaround stage markers with explicit start and end points
- backlog counts and ageing by discipline and priority
- specimen tracking completeness at required stage markers
- referral routing volumes and turnaround
- downtime events, duration and services affected
- digital pathology utilisation where deployed
- booking, attendance or check-in and collection events where phlebotomy scheduling is in scope. [15][16]

PQAD provides a credible starting point for turnaround and pathway definitions, but the dataset should also include the digital measures needed to manage integrated service operation. [15]

Standard definitions are needed so the dataset can support both daily management and comparable assurance. [12][15]

5. Digital pathology for reporting and resilience

Whole slide imaging can support remote reporting, subspecialty pooling, second opinions and cross-site resilience where the operating conditions are in place. UK screening governance provides a useful assurance reference point, including evidence on diagnostic equivalence and guidance on validation, governance and operational controls. [4][5][6]

Digital pathology should be treated as a reporting and resilience capability, not a substitute for reporting capacity. Benefits depend on scanning throughput, validated workflows, image quality, image management, storage, bandwidth, remote reporting governance, fallback arrangements and adoption by reporting teams. Where these conditions are weak, services can drift into parallel digital and glass-slide workflows, adding complexity rather than reducing it.

AI should be treated separately and cautiously. It may support bounded tasks such as detection, quantification, triage or quality checks, but should not be presented as a near-term solution to capacity, turnaround or integration pressures. Safe use requires defined use cases, reliable data, validated workflows, version control, change management, performance monitoring and clear human accountability. The Richards review identifies AI as a future direction for diagnostics, but also makes clear that safe scaling depends on prior digitisation and connectivity. [7]

6. Cyber resilience, downtime and recovery

Digital maturity includes resilience and governance, not only system deployment. Services should define and test downtime and recovery arrangements for critical workflows, including paper workarounds, recovery objectives, clinical escalation, mutual aid and communication with users. **Cyber response should be treated as part of diagnostic service continuity, not as a separate technical process.**

Recent pathology cyber disruption reinforces the need for tested recovery, escalation and communication arrangements. [13][14]

Delivery conditions

These capabilities will not be delivered through technology deployment alone. Service models need digitally capable teams with the specialist IT, digital and clinical informatics skills required to configure, validate, assure, maintain and continuously improve end-to-end digital pathways. They also need sufficient digital literacy across the wider pathology workforce so that new systems are adopted safely and embedded in routine workflow. Clear accountability is needed for information governance, data protection, validation, training, change control, adoption and benefits realisation. Business cases should recognise recurrent costs as well as capital delivery, including support, storage, cyber resilience, data governance and workflow redesign. Published examples such as Wales' LINC outline business case show the value of programme-level cost transparency, but the main point for this chapter is that digital capability must be funded and governed as continuing service infrastructure, not treated as a one-off implementation cost. [9]

What improvements would integrated service models bring?

Integrated service models do not create digital maturity by themselves. Their value is that, where the minimum digital standard is in place, they allow digital capability to operate as shared service infrastructure rather than as separate local systems.

In practice, this improves digital pathology service operation in four main ways.

1. Shared visibility and control of work

Common LIMS arrangements, master data, specimen tracking, stage markers and dashboards can create a single view of demand, capacity, backlog and exceptions across sites. This allows services to manage work across the service model rather than within individual laboratories alone.

2. Safer and more usable cross-site working

Common requesting and reporting standards allow requests and results to be exchanged, interpreted and compared across organisations and care settings. This reduces manual reconciliation, improves clinical usability and supports safer cross-site working. [2][3]

Specimen identity and tracking also allow services to see where samples are, where delay is occurring and where handoff risk is building. This supports both safety and access by making pre-analytical delay visible and manageable rather than hidden before LIMS registration.

3. More flexible reporting and diagnostic resilience

Digital pathology can support cross-site reporting, remote reporting, subspecialty pooling and second opinions where governance and infrastructure are in place. This can improve resilience when local reporting capacity is disrupted, but it does not remove the need for sufficient reporting capacity, workflow redesign and adoption by reporting teams. [4][5][6]

Integrated services can also define common downtime procedures, mutual aid routes, escalation arrangements and cyber recovery expectations across sites. This is increasingly important because digital failure can affect the whole diagnostic pathway, from requesting and sample receipt through to reporting and result release. [13][14]

4. Better assurance and benefits realisation

Integrated service models are better placed to use comparable operational data for daily management and assurance. A common dataset can show whether digital investment is improving access, quality, workforce flexibility, resilience and value, and reduce reliance on local narrative evidence alone. [12][15]

5. Realising these benefits

These benefits depend on completed operational integration, not structural integration alone. Where these conditions are in place, digital infrastructure can support safer shared working, more visible flow, more flexible reporting and stronger assurance. Where they are absent, integration may add interfaces and coordination complexity without creating the operational control needed for each service model to function effectively.

Next steps

This section sets out immediate actions to establish the minimum digital conditions for completed operational integration.

Years 1–2: establish the minimum standard and ownership

- **Baseline the minimum digital standard across each service model.**
  Complete a rapid assessment covering LIMS and master data, requesting and reporting, specimen identity and tracking, operational analytics, digital pathology readiness where deployed, and cyber and downtime arrangements. The baseline should use the national maturity position as context, but should be tested against objective indicators wherever possible. [1][2][3][11][12][13][15]
- **Assign named operational ownership for closing priority gaps.**
  Each service model should identify accountable owners for interoperability, data quality, specimen traceability, operational dashboards, downtime readiness and digital pathology governance where relevant. This should support completed operational integration rather than further structural redesign. [1][2][3][15]
- **Deliver interoperability as a pathway-wide operating programme, not an interface project.**
  Implement DAPB4101 through staged delivery with named ownership for coding, messaging, master data and data quality, so results can be shared, interpreted and compared safely across sites and settings. [2][3]
- **Standardise the minimum operational dataset.**
  Agree a small set of measures that can be extracted routinely and used for live operational management, including turnaround stage markers, backlog ageing, specimen tracking completeness, referral routing, downtime events and digital pathology utilisation where deployed. Definitions should align to PQAD where applicable. [12][15]

Years 2–3: make the pathway visible, controllable and resilient

- **Extend specimen identity and tracking across the pathway.**
  Services should prioritise end-to-end scan-chain completeness at the points needed for chain of custody, delay visibility and exception management. Where phlebotomy collection is appointment-based, booking, attendance and order-to-collection events should be included in the same operational dataset. [11][15][16]
- **Use analytics for live operational control.**
  Dashboards should support daily management of flow, backlogs, urgent work, exceptions and recovery, rather than retrospective performance reporting alone. Published case-study evidence supports the mechanism, but comparable measures should be standardised before benefits are treated as nationally comparable. [12][15]
- **Prove resilience as part of diagnostic service continuity.**
  Define and exercise downtime and recovery arrangements for critical workflows, including paper workarounds, clinical escalation, mutual aid, recovery objectives and cyber response. Cyber resilience should be treated as part of diagnostic resilience, not a separate technical function. [13][14]
- **Sequence digital pathology against operating readiness.**
  Where digital pathology is in scope, services should set out scanning capacity, validation approach, remote reporting governance, storage, bandwidth, reporting workflow, adoption plan and fallback arrangements before relying on it for routine cross-site reporting or resilience. Screening guidance should be used as a UK reference point for governance and assurance. [4][5][6]

Years 4–5: embed digital maturity into service-model assurance

- **Use comparable digital measures to support assurance and improvement.**
  Service models should report conformance, utilisation, traceability, downtime and benefits measures consistently, so digital maturity can be assessed using objective indicators rather than narrative self-assessment alone. [1][2][3][15]
- **Link digital benefits realisation to access, quality, workforce and value.**
  Digital investment should be tested against measurable improvements in pathway visibility, turnaround management, resilience, reporting flexibility, safety controls and productivity. Where contract-level data is not publishable, consistent outcome measures and cost proxies should be used. [9][12][15]
- **Treat cyber and downtime performance as part of diagnostic resilience.**
  Persistent weaknesses in recovery capability, untested downtime procedures or unresolved digital fragility should be visible in service-model assurance. [13][14]
- **Sequence digital, workforce and funding reform together.**
  Digital infrastructure should make pathways visible and manageable; workforce reform should ensure redesigned workflows are adopted safely; and funding reform should recognise the recurrent costs of interoperability, storage, support, cyber resilience, training and change management. [7][9][15]

Core implementation test

The test of digital maturity is whether a pathology service model can operate safely as one managed service: interoperable requests and results, traceable specimens, visible flow, governed digital pathology, tested downtime arrangements and comparable data for improvement. [1][2][3][5][6][11][12][13][15]

Chapter References

1. NHS England. National overview of pathology networks (PDF). Published 2024. **https://labmed.org.uk/static/fdc62071-5579-42f5-86576cc392e39063/National-Overview-of-Pathology-Networks.pdf**
2. NHS England / NHS Digital. DAPB4101: Pathology and Laboratory Medicine Reporting Information Standard. Release date 15 April 2024; implementation stage date 30 April 2025; last edited 30 September 2025**. https://digital.nhs.uk/data-and-information/information-standards/information-standards-and-data-collections-including-extractions/publications-and-notifications/standards-and-collections/dapb4101-pathology-and-laboratory-medicine-reporting-information-standard**
3. NHS Digital. DAPB4101 implementation guidance (Pathology and laboratory medicine standards implementation). Last edited 6 January 2026. **https://digital.nhs.uk/data-and-information/information-standards/governance/latest-activity/standards-and-collections/dapb4101-pathology-and-laboratory-medicine-reporting-information-standard/implementation**
4. National Institute for Health and Care Research (NIHR). Digital pathology cleared for use in cancer screening programmes. Published 8 February 2024. **https://www.nihr.ac.uk/news/digital-pathology-cleared-use-cancer-screening-programmes**
5. GOV.UK (NHS England guidance). Digital histopathology in the NHS cancer screening programmes. Published 5 February 2025. **https://www.gov.uk/government/publications/digital-histopathology-in-the-nhs-cancer-screening-programmes/digital-histopathology-in-the-nhs-cancer-screening-programmes**
6. Department of Health and Social Care (DHSC), GOV.UK. Digital pathology to improve cancer screening and save lives (press release). Published 5 January 2024. **https://www.gov.uk/government/news/digital-pathology-to-improve-cancer-screening-and-save-lives**
7. NHS England. Diagnostics: Recovery and Renewal - Report of the Independent Review of Diagnostic Services for NHS England (Richards review). Published October 2020. **https://www.england.nhs.uk/wp-content/uploads/2020/11/diagnostics-recovery-and-renewal-independent-review-of-diagnostic-services-for-nhs-england-2.pdf**
8. Scottish Strategic Network for Diagnostics (SSND). Annual Report 2023/24 (PDF). **https://www.nn.nhs.scot/ssnd/wp-content/uploads/sites/37/2025/01/Doc-1-PowerPoint-Presentation.pdf**
9. NHS Wales (Public Health Wales / NHS Wales Health Collaborative). Laboratory Information Network Cymru (LINC) - Outline Business Case (PDF). Version/date as per document (eg, 19 January 2024 in filename). **https://www2.nphs.wales.nhs.uk/PHWPapersDocs.nsf/%28%24All%29/3D-318ED1C07323AD80258385005675C3/%-24File/9.2.240119%20App%202%20LINC%20Outline%20Business%20Case%20V0.17.pdf?OpenElement=**
10. Business Services Organisation (HSC Northern Ireland). Northern Ireland Pathology Information Management System (NIPIMS). Accessed 13 January 2026. **https://bso.hscni.net/directorates/digital/nipims/**
11. NHS Scan4Safety. Lost tissue samples a thing of the past with new innovative tracking system at Leeds Teaching Hospitals. Published 8 October 2024. **https://scan4safety.nhs.uk/lost-tissue-samples-a-thing-of-the-past-with-new-innovative-tracking-system-at-leeds-teaching-hospitals/**
12. NHS England. Case study: improving turnaround times in pathology. Published 9 October 2024; updated 16 October 2024. **https://www.england.nhs.uk/long-read/case-study-improving-turnaround-times-in-pathology/**
13. NHS England - London. Update on cyber incident: clinical impact in south east London (weekly updates, example 29 August 2024). Published 29 August 2024. **https://www.england.nhs.uk/london/2024/08/29/update-on-cyber-incident-clinical-impact-in-south-east-london-thursday-29-august/**
14. Digital Health. Cyber attack cost Synnovis estimated £32.7m in 2024. Published 20 January 2025. **https://www.digitalhealth.net/2025/01/cyber-attack-cost-synnovis-estimated-32-7m-in-2024/**
15. NHS England. Pathology Quality Assurance Dashboard (PQAD) - second edition (PDF). Published August 2020. **https://www.england.nhs.uk/wp-content/uploads/2020/08/Pathology_quality_assurance_dashboard_PQAD.pdf**
16. Salutare Group Ltd. *ONE TESTING: A Digital Phlebotomy Solution* (overview slide deck, PDF). July 2025. Supplied by Salutare.

PART 7: VALUE AND FUNDING

Executive summary

What is the current state of value and funding?

Pathology activity is rising, but the system does not yet have a consistent national framework for defining, counting, costing or pricing tests. Funding remains fragmented across block contracts, local arrangements, ad-hoc programme allocations and wider NHS Payment Scheme flows. These arrangements can support stability, but they often weaken visibility of cost, activity, investment decisions and reinvestment routes.

Available benchmarking shows material variation in cost and productivity between service models. Some of this reflects genuine differences in operating maturity, procurement discipline, automation and workforce deployment. Some reflects inconsistent test definitions, incomplete cost capture, variable managed service contract scope and local accounting practice.

The value challenge is therefore not simply to reduce cost per test. It is to make the true cost of safe, timely and resilient testing visible, and to understand whether operational integration is improving value when quality, access, workforce sustainability and resilience are taken into account.

What are the key challenges?

Current arrangements make it difficult to distinguish the cost of delivering activity from local funding arrangements and wider payment flows; to compare productivity fairly; or to determine whether apparent efficiency reflects better operating practice, different case mix, under-reported overheads or local accounting practice.

This weakens the basis for value improvement and for any future tariff or activity-based pricing framework. Prices cannot be set safely without standardised activity definitions, fully loaded cost data and safeguards for quality, workforce and resilience.

The scale of the opportunity is material. Scenario modelling for this review indicates that aligning most activity to benchmarks associated with fully integrated service models could release an indicative efficiency opportunity of around £450 million per year, with a cumulative opportunity of approximately £1.4 billion by 2029/30.

Benchmarking also indicates a material workforce productivity opportunity. Scenario modelling suggests that tests per FTE could improve by around 27%, and potentially up to 50%, where services combine fully integrated service models, role redesign, automation and digital tools. Skill-mix analysis points in the same direction, with fully integrated service models delivering higher weighted activity per advanced scientist than partially integrated or non-integrated models.

These figures show why better value and funding infrastructure matters. They are conditional planning estimates, not savings, but a reinvestment opportunity to enable Pathology services to sustainably meet healthcare demands in the decades to come, invest in training and development, whilst controlling costs.

How can these challenges be addressed?

The first requirement is to make value measurable. This means standardising test definitions and activity counting, creating comparable cost and activity data, developing fully loaded service-model costing, and distinguishing the cost of delivering activity from local prices, charges and funding flows.

The preferred implementation route is to develop and publish a shadow price-per-test tariff, initially for community and GP-requested testing, so providers can test performance against proposed prices and validate, recalibrate or reject the rates before live financial implementation. This should be linked to quality, access, workforce and resilience safeguards, with clear routes for retaining and reinvesting realised value in pathology.

What improvements would integrated service models bring?

Completed operational integration can improve value by enabling standardisation, procurement discipline, automation, digital maturity, workforce redesign and better use of scale. It can also make it easier to compare productivity and reinvest benefits across the service model.

These benefits are conditional. Integration will not improve value if activity remains inconsistently counted, costs remain partially captured, local prices remain opaque, or efficiency gains are extracted without protecting quality, access, workforce and resilience.

Core conclusion

Value and funding reform is therefore a case for transparency, accountability and reinvestment. Pathology cannot manage improvement consistently while activity, cost, price and funding remain opaque. The purpose of reform should be to make the value opportunity visible and deliverable through completed operational integration, while protecting quality, access, workforce and resilience. It should support service-model improvement and reinvestment, not become a blunt mechanism for extracting savings from pathology.

Introduction

This chapter focuses on value and funding: how resources flow into pathology, how activity is counted, costed and priced, and how funding arrangements can better support high-quality, sustainable integrated pathology service models. It uses value as a service-model concept: the relationship between resources used, activity delivered, quality achieved and resilience maintained.

The value of pathology is not confined to the laboratory cost base. Appropriate testing can prevent harm, accelerate treatment decisions and improve downstream pathway efficiency. Funding reform therefore needs to support whole-pathway value as well as efficient laboratory delivery.

The central issue is visibility. There is currently no single national framework for how pathology tests are defined, counted, costed or funded. This makes it difficult to compare providers fairly, identify genuine efficiency opportunities or understand whether integrated service models are delivering value.

The test for activity-based pricing or tariff is whether it improves transparency, supports reinvestment and strengthens service resilience, not whether it simply reduces the reported cost per test.

Methods and data sources

This chapter draws on National Annual Pathology Data Collection (NAPDC) cost and activity returns, selected provider-level costing and the tariff options appraisal undertaken for this review. The analysis is intended to test the scale and nature of value opportunity in pathology, not to set definitive tariff rates.

Cost benchmarking

Cost benchmarking draws primarily on NAPDC. Returns include activity and cost data across major pathology disciplines, including blood sciences, microbiology and histopathology. Activity is standardised using Keele-adjusted test counts, which are intended to provide a more comparable measure of analytical workload than raw request or specimen counts.

Providers are grouped using the review's service-model segmentation, based on the degree of operational integration. This allows comparisons of unit cost, workforce deployment and productivity across different operating models.

The national dataset is supplemented by provider-level costing data from a small number of pathology providers. These submissions provide more detailed breakdowns of pay, non-pay, consumables, reagents, equipment, managed service contracts, IT, logistics, estates and overheads.

Tariff options appraisal

The tariff options appraisal informed this chapter's assessment of future pricing reform. It used test-level cost and activity data from a subset of NHS service models and pathology providers to explore how cost baselines and benchmark prices could be constructed, including the effect of activity-counting rules, Keele weighting, indirect-cost allocation and outlier treatment.

Its findings shaped the conclusions on data readiness, sequencing, safeguards and the conditions needed before any tariff or activity-based pricing model is tested.

Definitions

For this chapter:

- **Cost** means the monetary value of resources recorded or estimated as being used to deliver pathology activity.
- **Unit cost** means cost divided by a defined unit of activity, such as a reportable test or weighted test count.
- **Fully loaded cost** means the full cost of delivering pathology activity once direct, indirect, recurrent, support and infrastructure costs are included.
- **Price** means the amount charged, transferred or attributed to a test or service.
- **Tariff** means a proposed or future nationally specified or benchmarked payment rate for defined pathology activity.
- **Funding** means the budgetary flow that supports service delivery.

- **Scenario modelling** means indicative modelling that estimates the potential scale of opportunity under defined assumptions, including activity growth, cost convergence, service-model maturity and productivity improvement. It should be used for planning and prioritisation, not treated as a delivery commitment or guaranteed saving.
- **Efficiency opportunity** means the potential value identified through benchmarking or scenario modelling that may be released through better operating models, standardisation, productivity or procurement. It is not the same as a guaranteed or immediately cash-releasing saving, and may require investment, operational maturity and reinvestment mechanisms before it can be realised.

Limitations and uncertainties

Current data are sufficient to show that variation and opportunity are material, but not yet sufficient to support immediate comprehensive tariffing.

Cost and activity definitions vary between providers. Estates, IT/LIMS, logistics, training, quality systems and overheads are not captured consistently, which can understate the full cost of service delivery. Managed service contract scope, equipment financing, reagent pricing and bundled service arrangements also vary, making non-pay comparisons difficult.

Microbiology is particularly sensitive to differences in test definitions, counting rules and workflow scope. Findings in this area should therefore be treated as indicative until definitions and costing boundaries are more consistent.

The tariff options appraisal is based on a small provider sample and should be read as illustrative rather than definitive. It helps identify design choices, data requirements and implementation risks for any future controlled tariff or activity-based pricing trial. It should not be used to set comprehensive national rates until activity definitions, cost allocation and safeguards are more robust.

Scenario modelling is presented separately from empirical findings. Assumptions should be stated clearly so that constructed projections are not treated as observed results or guaranteed savings.

Assumptions and exclusions

The indicative benefits case rests on material assumptions. It assumes that activity volumes are correctly captured and standardised, with Keele-weighted activity used to adjust for differences in panel structures and multi-analyte testing. The modelling is sensitive to how these factors are applied in practice, particularly where culture-based workflows, panels and referral activity are counted differently.

The modelling also assumes a standardised approach to indirect costs. Where providers do not supply complete allocations, a 35% indirect cost share is used as a working assumption, based on patterns in more complete datasets. This may under- or overstate true overheads in individual service models, particularly where estates, logistics, IT/LIMS and digital infrastructure costs sit outside reported pathology budgets.

The benefits case assumes that more service models can realise procurement and managed service contract benefits through greater standardisation, platform rationalisation and stronger commercial leverage. These benefits should not be treated as universal. Some service models may already be close to efficient procurement positions, while others may face legacy contracts, specialist requirements, local constraints or transition costs.

Important costs and constraints are not modelled in detail. These include: capital investment for operational integration, automation, digital pathology and LIMS convergence; double-running costs during transition; workforce constraints; training and supervision requirements; and the time needed to develop and embed advanced practice roles.

There are also discipline-specific limits. Microbiology and histopathology are more sensitive to differences in workflow, case mix, surge capacity, reporting constraints and fragile sub-specialties. These factors may cap the speed or scale of achievable productivity gains in some service models.

The benefits case is therefore indicative and should be used for planning and prioritisation, not as a guaranteed or immediately cash-releasing saving. Its value is in showing the scale of opportunity and the conditions needed to realise it.

Current state: activity is rising, but value is hard to see

Pathology is a material and growing area of health expenditure. Analysis undertaken for this review indicates that pathology services account for around £4-5 billion a year across the UK, equivalent to approximately 0.25% of GDP and broadly in line with international peers. Within this, NHS England testing accounts for around three quarters of the market, at an estimated £3.4 billion a year, or around 2% of the NHS England budget.

NHS pathology services deliver more than 1.4 billion tests each year. Demand is rising as diagnostic activity increases, the population ages and clinical pathways make greater use of laboratory testing. Despite this, the UK performs around 20%–30% fewer tests per capita than some international comparators. The value challenge is therefore not simply to reduce testing, but to ensure that necessary testing is delivered efficiently, safely and sustainably.

NAPDC returns indicate that NHS pathology test volumes in England grew by around 3.5% a year between 2018-19 and 2024-25. Over the same period, average reported cost per test increased more modestly, from roughly £2.00 to £2.20, an annual increase of around 1.4%. Most growth in total reported spend therefore reflects higher volumes rather than a sharp increase in reported unit cost.

Pathology is not primarily facing a simple unit-cost inflation problem. It is facing a demand, visibility and operating-model problem. Activity is increasing, the cost base is shifting, and current funding arrangements do not make it easy to see where resources are being used well or where avoidable variation remains.

Since the Carter Review, pathology services in England have been expected to move towards larger, integrated operating arrangements. However, operational integration remains incomplete. **Analysis for this review indicates that only around 18% of activity is delivered through fully integrated service models, defined as arrangements where more than 90% of activity flows through a single managed service.** The remaining activity is delivered through partially integrated or non-integrated models, where standards, governance, digital controls and accountability remain more variable.

This means that much of the system is not yet operating with the benefits expected from fully integrated service models: shared standards, unified governance, aligned digital and quality controls, common infrastructure and single service-model accountability.

Scenario modelling estimates that, if around 80% of provision moved towards benchmarks associated with fully integrated service models, the annual efficiency opportunity could rise from approximately £200 million in 2027-28 to around £800 million by 2029-30. Across the period, this equates to approximately £1.4 billion of cumulative efficiency opportunity, or an average of around £450 million per year between 2027 and 2030, relative to current trends.

These figures do not include the investment costs required to complete operational integration, or factor areas of high fragility where sustained under investment will need to be corrected. This issue is addressed in more detail in the Workforce chapter.

The cost base is shifting, and cost visibility is incomplete

The composition of reported unit cost is changing. Staff cost per test has risen from around £0.90 to £1.20 over the period analysed, while non-staff cost per test has been broadly flat or slightly falling. Staff now account for just over half of the average reported cost per test, reflecting national pay awards, workforce mix and reliance on higher-cost staffing in some services.

This makes workforce deployment central to the value question. Within staff costs, consultant posts represent around a fifth of total staff cost, while Bands 5-7 together account for around two fifths.

The non-pay cost base is also important. Reagents and consumables make up the largest share of non-staff cost, making procurement, equipment strategy and managed service contracts central to the value picture. IT and logistics contribute a smaller reported share, while estates account for only about 1% of recorded cost. That figure is unlikely to represent the full estates cost of pathology delivery. It points instead to inconsistent attribution of estates and overheads within current cost collections.

Cost structures differ materially by discipline. Blood sciences, which are highly automated, tend to have lower staff cost per test and a larger proportion of non-pay costs linked to reagents, analysers and managed service contracts. Histopathology and microbiology

retain more manual work and more complex workflows, so staff costs make up a larger share of total cost.

Cost per test cannot be interpreted fairly without understanding case mix, workflow complexity, service scope and activity counting. A lower reported cost may reflect efficient delivery, but it may also reflect incomplete cost capture or a narrower service scope.

Cost visibility is also limited by where costs and delays occur. Workflow analysis for the review indicates that important inefficiencies sit outside the core analytical process, including pre-analytical collection and transport delays in blood sciences and post-analytical reporting constraints in histopathology. This reinforces the need to interpret cost per test alongside end-to-end workflow, turnaround and reporting capacity.

Variation is material, especially in non-pay costs

There is moderate but important variation in cost per test between providers and specialties. Across NHS England pathology services, the standard deviation in total cost per test is around 28%, with much of the variation concentrated in microbiology and histopathology. When statistical outliers are excluded, variation in total cost per test falls to around 20% overall, with particularly notable reductions in histopathology.

Staff cost per test shows a similar but slightly lower pattern of variation, with a standard deviation of around 25%. Variation is greater in microbiology than in blood sciences, reflecting differences in workforce mix, automation maturity, service configuration and reporting practice.

Non-pay cost variation is wider. Across pathology, the standard deviation in non-pay cost per test is around 34%. Blood sciences shows particularly wide variation before outlier removal, reflecting differences in testing platforms, procurement models, reagent pricing and equipment arrangements. Even after outliers are removed, non-pay costs remain more dispersed than staff costs.

Some variation is likely to reflect genuine differences in operating maturity, procurement discipline, automation and workforce deployment. Some reflects inconsistent test definitions, incomplete cost capture, variable managed service contract scope and local accounting practice. Variation is therefore a clear signal for improvement, but it cannot be interpreted safely without stronger definitions, costing rules and activity denominators.

Procurement is a visible value lever, but not a universal savings assumption

Provider-level analysis indicates that part of the non-pay variation is structural and potentially addressable through procurement. **Fully integrated service models, operating with aligned platforms, larger managed service contracts and standardised equipment, tend to be better placed to secure lower per-test consumable and reagent costs than services operating through multiple local contracts.**

These gains should not be treated as universal. Procurement opportunity needs to be tested service model by service model and interpreted alongside quality, resilience, service scope and the ability to innovate services.

Current data are not consistent enough for simple benchmarking

Some trusts do not report overhead costs within cost per test, meaning reported cost per test can understate the true cost to serve. Managed service contract scope and KPI structures also vary significantly, which affects apparent non-pay cost and limits like-for-like comparison.

Microbiology requires particular caution. Test scopes are not always aligned, and culture-based workflows, panels and referral activity can differ substantially between providers. Where providers count or weight these activities differently, both the activity denominator and the derived cost per test can be distorted.

Histopathology also needs careful interpretation. Reported activity and cost can be affected by case complexity, reporting workload, sub-specialty requirements and the balance between routine and specialist work. This limits the usefulness of simple cost-per-test comparisons unless service scope and case mix are understood.

Current data are sufficient to show that variation and opportunity are material, but not sufficient to support crude ranking or immediate comprehensive tariffing.

Current funding arrangements obscure value

The funding picture adds a further layer of opacity. Pathology funding remains largely embedded within block contracts, local recharge mechanisms, internal transfer prices and wider NHS Payment Scheme flows. These arrangements can support service stability, but they provide limited visibility of end-to-end unit cost, cost structure or how resources are deployed within service models.

Without clearer separation between the cost of delivering activity, local prices or charges, and the funding flows that support services, the system cannot reliably identify genuine efficiency, design credible future pricing mechanisms or create clear routes for reinvestment.

Key challenges

Cost, activity and funding data are not yet comparable enough

The current-state analysis shows that variation in cost and productivity is material. **The challenge is that the system cannot yet distinguish consistently between warranted variation, genuine efficiency and differences created by reporting practice.**

This creates a risk that apparent cost differences are treated as performance differences when they may reflect excluded overheads, different activity-counting rules, incomplete non-pay capture or narrower service scope. A low reported cost per test is therefore not, on its own, evidence of better value.

Test definitions and activity counting remain too inconsistent for full tariff adoption

Activity-based pricing or tariff depends on a common unit of work. Pathology does not yet have that consistently across all disciplines.

Weighted activity and Keele-adjusted test counts can improve comparability by recognising differences in analytical workload, multi-analyte testing and test definitions. In the tariff modelling, Keele factors were used to adjust activity, including factors of 1.18 for blood sciences and 2.07 for microbiology. However, some disciplines remain more sensitive to how activity is defined, counted and weighted.

This is particularly important in microbiology, where culture-based workflows, panels, referral activity and test scopes can differ substantially between providers. Where these activities are counted or weighted differently, both the activity denominator and the derived cost per test can be distorted.

Histopathology presents a different but equally important challenge. Activity and cost are shaped by case complexity, reporting requirements, specialist input and the balance between routine and complex work, rather than test volume alone. A pricing model that treats histopathology activity as directly comparable to high-volume automated testing would risk misrepresenting the cost and value of the service.

Without further standardisation, tariff design risks pricing different units of work as if they were comparable activity. That would weaken benchmarking, distort incentives and risk mispricing services with broader scope, greater complexity, fragile sub-specialties or different case mix.

Current funding arrangements obscure the distinction between cost, price and value

The issue is not block funding itself. Block arrangements can support stability in essential services. The problem is block funding without transparent cost, activity and service-model data.

In this environment, commissioners and providers cannot reliably distinguish the cost of delivering activity from local prices, charges, internal transfers or the funding flows that support the service. This weakens accountability and makes it harder to identify genuine efficiency, design credible future pricing mechanisms or create clear routes for reinvestment.

Non-pay variation shows opportunity, but procurement savings cannot be assumed everywhere

Non-pay cost is one of the clearest value opportunities, but it carries a risk of overclaiming. Managed service contract scope, equipment models, reagent pricing, KPI requirements and local cost allocation vary significantly between service models. Procurement opportunity should therefore be tested service model by service model, not assumed uniformly across all services.

Tariff reform could improve transparency, but mis-set tariffs would create new risks

A national tariff or activity-based pricing framework could improve transparency, comparability and reinvestment. It could also create perverse incentives if introduced before definitions, costing rules and safeguards are strong enough.

Tariffs set too low could drive unmanaged cost-cutting, reduce training and supervision capacity, weaken resilience or encourage avoidance of complex work. Tariffs set too high could lock in inefficient configurations and reduce incentives to standardise, automate and integrate. Mis-specified tariffs could also encourage activity shifts between test types, providers or settings for financial rather than clinical reasons. **It is vitally important therefore to involve the expert pathology community in the design and implementation of any tariff.**

Fragile services and training pipelines need protection from the start

Funding reform must recognise that some pathology services are already fragile. Histopathology (particularly sub-specialties such as paediatric and perinatal pathology), specialist infection services and other low-volume or reporting-constrained services face workforce pressure, reliance on scarce expertise and limited training capacity. These services may appear high cost because they carry essential specialist, resilience or training functions.

A strict unit-price model could make these services financially marginal unless explicit safeguards are built in. Tariff design therefore needs to recognise training, supervision, sub-specialist expertise, low-volume resilience and the cost of maintaining capacity that the wider system depends on.

This is not a later implementation issue. Protection for fragile and specialist services must be part of the design from the start, before any tariff trial goes live.

Scenario modelling indicates a material but conditional opportunity

The review identifies a £450m annual saving opportunity. Delivery depends on completing operational integration and developing a shadow tariff that allows the system to test price, volume and budget effects before implementation.

Review modelling estimates that a scenario in which around 80% of provision operates at benchmarks associated with fully integrated service models could generate approximately £1.4 billion of cumulative efficiency opportunity by 2029/30. The opportunity rises from around £200 million in 2027/28 to around £800 million in 2029/30, equivalent to an average of around £450 million per year between 2027 and 2030.

These figures show the scale of the opportunity and the importance of sustained progress, but they are not guaranteed savings. The modelling assumes phased implementation, projected activity growth based on recent trends and convergence towards fully integrated service-model cost benchmarks. It also excludes the investment costs required to complete operational integration.

The figures should therefore be used as a case for investment, operational integration, better data and controlled implementation. They must not be converted into a savings target imposed ahead of the enabling conditions, to ensure sustainable future proofed, cost controlled, pathology services.

Value metrics must sit alongside quality, access, workforce and digital measures

Cost per test is not a complete measure of value. It must be interpreted alongside case mix, complexity, turnaround, accreditation, incident management, workforce sustainability, digital maturity and service resilience.

Some costs that appear inefficient in a narrow unit-cost comparison may be necessary for safe service delivery. Training time, supervision, digital infrastructure, quality systems, logistics and resilience capacity all carry cost, but they are part of the value of pathology.

A value framework that focuses only on cost per test could create the wrong incentives. The challenge is to build a funding and pricing model that makes cost visible while protecting quality, workforce, access and resilience.

How challenges can be addressed

Create a single cost and activity framework

The first requirement is a single national framework for defining, counting and costing pathology activity. Current benchmarking is strong enough to show that variation is material, but not yet consistent enough to support comprehensive tariffing across all disciplines.

A national framework should include a common test catalogue, standard activity-counting rules and consistent cost-allocation guidance. It should distinguish reportable tests from requests, specimens, panels, profiles and weighted activity, so that cost per test, productivity and future pricing design are based on comparable units of work.

Weighted activity should remain part of the framework where it helps reflect differences in analytical workload and complexity. However, it must be applied consistently, particularly in areas such as microbiology where panels, culture-based workflows and referral activity can affect the activity denominator.

These are not technical details. They are the basis for fair comparison, credible benchmarking and any future funding reform.

Move to fully loaded costing

The next step is to move from partial laboratory costing towards fully loaded service-model costing. Current NAPDC cost per test captures staff and non-staff costs reported at discipline level, but some trusts do not report overhead costs such as estates, IT and logistics. This means reported cost per test can understate the true cost to serve.

Fully loaded costing should include direct pay, direct non-pay, indirect costs, estates, IT/LIMS, logistics, equipment, maintenance, quality systems, training, supervision and relevant capital or support costs. This matters because integration, automation, digital pathology and LIMS convergence may support long-term value, but they also require upfront investment and, in some cases, double-running costs during transition.

National costing guidance should distinguish direct pay, direct non-pay and indirect cost consistently. Direct pay should cover staff directly involved in sample processing and reporting. Direct non-pay should cover consumables and other test-related costs. Indirect costs should cover overheads and shared support costs such as estates, utilities, equipment depreciation, IT/LIMS, management overhead and logistics.

Where indirect cost data are incomplete, modelling may need to use assumptions. Those assumptions should not become a permanent substitute for proper cost capture. The aim should be to replace broad assumptions with better service-model-level data over time.

Develop a shadow price-per-test tariff as enabling infrastructure

Tariff or activity-based pricing should be treated as enabling infrastructure, not as a stand-alone cost-control mechanism. Its purpose should be to create a clearer basis for comparing value, supporting operational integration and enabling governed reinvestment.

The preferred implementation route is to develop and publish a shadow price-per-test tariff, initially for community and GP-requested testing, so providers can test performance against proposed prices and validate, recalibrate or reject the rates before live financial implementation. Inpatient testing should remain aligned with Healthcare Resource Group (HRG) payments, with reference tariffs used for cost tracking and benchmarking, to avoid double-counting activity already reimbursed through hospital payment flows.

The shadow tariff should include core-volume assumptions and steep marginal pricing discounts beyond agreed core volumes, so providers and commissioners can test budget exposure, demand effects and the credibility of proposed rates. It should also include a separate route for innovative or new tests, for example through time-limited pass-through arrangements while evidence, activity and cost data are collected.

International schedules are useful mainly as design references; they show how activity-based pricing can support transparency and discipline, but headline prices are not directly comparable because payment scope differs across collection, logistics, IT and pre-analytical activity.

The question is not whether tariff or activity-based pricing can technically be applied to pathology. The next step is to test a governed shadow tariff as part of a wider value framework, with clear safeguards for quality, access, workforce, resilience and reinvestment.

Use discipline baselines to target reform

The benefits case should be grounded in discipline-level baselines rather than broad system averages alone. Blood sciences is likely to be the most suitable early area for tariff testing because it is high volume, more automated and has clearer analytical units.

Microbiology also has a large baseline, but the definitional risks are greater. Culture-based workflows, panels and test scopes vary between providers, and projected costs are highly sensitive to how activity is counted and weighted. This argues for further standardisation before broad tariff exposure.

Histopathology presents a different challenge. Cost and productivity are shaped by case complexity, reporting workload, specialist input and the balance between routine and complex work. This means histopathology should not be brought into broad activity-based pricing until case mix, service scope, reporting capacity and quality safeguards are sufficiently understood.

This discipline-led approach would allow the system to sequence reform sensibly: start where the data are strongest, learn from the trial, and expand only where definitions, costs and safeguards are ready.

Improve procurement and managed service contract transparency

Procurement is one of the clearest addressable value levers. Reagents and consumables make up the largest share of non-staff expense, and cost benchmarking shows significant dispersion in non-staff costs, driven by differences in cost allocation, procurement models and scale.

Managed service contracts are a major part of this picture. Decentralised and bespoke contracts can inflate supplier pricing and limit innovation, especially where contracts contain variable clauses and inconsistent KPI frameworks. Simplifying procurement, standardising KPIs and using volume-based frameworks could help services capture value from scale.

The practical response is to improve managed service contract transparency, contract reporting and procurement capability. Service models should report contract scope, reagent pricing, equipment, maintenance, logistics, KPI requirements and contract duration more consistently. Where operational integration enables demand aggregation, services should use that scale to negotiate better terms, but procurement savings should not be assumed universally.

Case study

Managed service contract savings in fully integrated service models

In South West London, blood sciences activity operating through a single managed service contract was associated with an estimated 46% reduction in non-pay cost per test compared with the pre-integration baseline.

In Black Country, integration of biochemistry and immunology was associated with an estimated 25% reduction in non-pay cost per test through platform standardisation and collective procurement.

These examples are indicative rather than system averages. They show the order of magnitude of procurement gains that fully integrated service models can unlock when demand is aggregated, equipment platforms are standardised and contracts are aligned at service-model level.

Make benchmarking continuous, not one-off

Cost benchmarking should become a regular management tool rather than a one-off exercise. A national approach should include standard metrics for cost per test, cost composition, productivity, non-pay cost, indirect cost attribution and service-model maturity.

A national dashboard should not be used simply to rank providers by cost per test. It should help services understand why variation exists. The cause may be workforce mix, automation maturity, procurement model, case mix, geography, overhead allocation, service scope or data quality. The purpose is targeted improvement support, not crude performance management.

A continuous benchmarking cycle would also support tariff review and recalibration. As cost capture improves, tariffs and benchmark prices should be reviewed for accuracy, unintended behaviours, exclusions, resilience adjustments, quality safeguards and reinvestment rules.

Protect quality, workforce and fragile services

Tariff or activity-based pricing should be conditional on accreditation, external quality assurance, complete activity reporting and reliable cost data. Fragile and specialist services should be protected before any tariff trial goes live, using exclusions, blended payments, resilience adjustments, training allowances or minimum service payments where needed.

Training, supervision and advanced practice should be recognised as core service costs. A model that treats all high unit cost as inefficiency would create the wrong incentives.

Use scenario modelling to guide investment and trial design

Scenario modelling should guide where reform is likely to matter most: where operational integration needs to be completed, where tariff should be trialled, where procurement reform may release value, and where investment is needed before benefits can be realised. The estimate should not be converted into a guaranteed savings target.

Create explicit reinvestment mechanisms

A value-based funding model will fail if realised efficiencies disappear into wider system pressures. Where service models deliver below benchmark cost while maintaining quality, access, workforce and resilience standards, a proportion of the realised benefit should be available for reinvestment in agreed pathology priorities.

Reinvestment should be governed at service-model level and directed towards the capabilities that make value sustainable, including workforce development, digital infrastructure, automation, quality systems and fragile specialist services. This would demonstrate that value released through better organisation is being used to strengthen pathology rather than being extracted from it.

What improvements would integrated service models bring?

Integrated service models can improve value by allowing pathology to operate as a single managed service rather than as a set of separate laboratories. The value lies not in organisational form, but in operational integration: common leadership, shared standards, unified governance, aligned digital and quality controls, comparable activity and cost data, coordinated procurement, workforce redesign and clear accountability for quality, access, resilience and reinvestment.

The review's service-model segmentation shows that fully integrated service models deliver tests at up to 26% lower reported cost than non-integrated service models. Reported mean cost per test is around £1.71 in fully integrated service models compared with £2.41 in non-integrated models. Fully integrated service models also show higher productivity, with around 68,400 tests per FTE compared with around 47,000 in non-integrated models.

These are associations rather than proof that integration alone causes lower cost. The likely mechanisms are common standards, platform rationalisation, procurement discipline, digital maturity, workforce redesign and clearer service-model accountability.

The following sections explain how those benefits are created in practice.

Standardisation

Fully integrated service models make it easier to apply common test definitions, activity-counting rules, operating procedures and reporting standards across sites. This does not mean removing clinically justified variation. It means creating a consistent basis for distinguishing warranted variation from unwarranted variation.

This is particularly important for panels, profiles, referral activity, histopathology complexity and microbiology workflows, where differences in scope and counting can distort cost per test. A service-model view also makes benchmarking more useful by comparing cost, activity, quality, access, workforce and digital maturity together, rather than comparing individual laboratories in isolation.

Scale

Fully integrated service models can aggregate demand across sites. This supports stronger equipment strategies, more consistent analyser platforms, more effective use of managed service contracts and better purchasing discipline for, logistics, reagents, consumables and maintenance.

Scale only generates value when it is operationalised. **A partially integrated service model that remains fragmented across contracts, equipment choices, LIMS, reporting arrangements and governance will not secure the same benefits as a fully integrated service model with aligned procurement, common standards and clear service-model accountability.**

Workforce deployment, automation and digital maturity

Fully integrated service models are better placed to deploy automation, digital tools and workforce redesign across the whole service rather than one site at a time. This is central to value because staff cost is the largest component of reported unit cost.

Productivity benchmarking shows that operational integration is associated with better conversion of workforce capacity into activity. Fully integrated service models deliver more tests per full-time equivalent than partially integrated or non-integrated service models, and scenario modelling suggests scope for a 27-50% uplift in tests per FTE where operational integration is combined with workforce redesign, automation and digital tools.

Skill-mix data points in the same direction, but measures a different aspect of productivity. **Fully integrated service models have a higher proportion of advanced scientists and deliver around 1,018 weighted activity units per advanced scientist, compared with roughly 850-855 in other service models.** This suggests more effective deployment of advanced roles, but it should not be treated as the same measure as tests per FTE.

This should not be interpreted as a staff reduction argument. Workforce value comes from using scarce specialist capacity more effectively, supporting advanced and support roles, reducing avoidable manual work, improving training pathways and releasing staff time for higher-value activity. Productivity gains depend on workforce capacity, training, supervision and adoption, not technology or integration alone.

The implication for funding is important. Productivity gains depend on the infrastructure that enables them: practice educator roles, student placements, protected supervision time, advanced practice pathways and digital upskilling of both the medical and scientific workforce. If efficiency gains generated through operational integration or pricing reform are not reinvested in that workforce infrastructure, the productivity benefit is unlikely to be sustained.

The funding implication is also wider than unit cost. The benefits analysis notes that productivity gains are currently transacted mainly as reductions in cost per test, rather than as additional capacity. A value framework should make explicit whether productivity improvement is being used to reduce reported unit cost, absorb demand growth, improve resilience or release capacity for higher-value work.

Quality, access and resilience

Integrated service models can improve value because they allow services to manage quality, access and resilience across sites. Fully integrated service models show stronger performance on relevant access and quality measures. In the review analysis, fully integrated services had fewer outstanding Datix cases, at around 13 per million tests compared with 34 per million tests in non-integrated models, and stronger histopathology turnaround, with around 66% of activity reported within 10 days compared with 52% in non-integrated models. Partially integrated models may also carry transitional risk where governance and accountability remain mixed.

Value is not achieved if cost falls while turnaround, quality or resilience deteriorate. The performance of fully integrated service models indicates that operational integration can support both lower cost and stronger service performance when governance, workflow and accountability are mature.

The improvement mechanism is practical. Fully integrated service models can pool reporting capacity, route activity more flexibly, manage backlogs across the service, standardise escalation and make better use of automation and digital reporting. These are service-model benefits, not simply financial benefits.

Reinvestment

Integrated service models can create clearer routes for reinvestment because activity, cost and quality data can be managed at service-model level. This makes it easier to identify where value has been released and how it should be reinvested.

This matters because value reform will only be credible if benefits are used to strengthen pathology services, including workforce development, digital infrastructure, automation, quality systems and fragile services.

Integration benefits are conditional

Integrated service models can improve value, but they do not do so automatically. The strongest results are seen where integration is operational: where services have common leadership, shared standards, unified governance, aligned digital and quality controls, transparent cost and activity data, disciplined procurement and clear accountability. Partially integrated service models may carry transitional risks if governance remains mixed, costs are not visible or benefits are not reinvested.

Fully integrated service models also make tariff or activity-based pricing more feasible, because they create the operating conditions needed for comparable data. Without that maturity, tariff reform would create apparent precision without real comparability.

The case is not for another structural reorganisation. It is for completing operational integration within existing service models and giving those models the data, funding and reinvestment mechanisms needed to deliver measurable value. The £450 million annual opportunity and £1.4 billion cumulative opportunity identified in the review modelling will only be realised if operational integration is matched by the national infrastructure described above.

Implementation risks and dependencies

Value and funding reform should be implemented as a staged change programme in collaboration with pathology experts and professional bodies, not as a technical pricing exercise. The main risks are data quality, incomplete cost capture, inconsistent test definitions, mis-set tariffs, interaction with existing NHS payment flows, pressure on fragile services and the loss of efficiency gains into wider system pressures. Tariff testing should therefore be one component of the programme, alongside costing reform, service-model maturity, quality safeguards and reinvestment rules.

These risks are manageable only if reform is sequenced with the wider conditions for operational integration, including reliable data, interoperable digital systems, quality safeguards, workforce capacity and explicit reinvestment routes.

Early implementation should focus on selected high-volume tests and service models where definitions, costing boundaries, digital readiness and safeguards are sufficiently mature. Wider adoption should follow evidence from controlled testing, not timetable pressure.

Next steps

Over the next five years, value and funding reform should focus on making pathology cost, activity and value visible, while developing a shadow price-per-test tariff to test activity-aligned pricing before any live financial implementation. The initial focus should be community and GP-requested testing, where definitions, costing boundaries and demand controls can be most clearly tested. The aim should be to support completed operational integration within existing service models, not to create a separate pricing exercise or another structural reorganisation.

Years 1-2: establish the value data foundation

- Standardise test definitions and activity counting through a national pathology test catalogue, consistent rules for panels, profiles, referral activity and weighted activity.
- Separate cost, local price, funding and future tariff in national guidance, so these concepts are not used interchangeably.
- Define fully loaded service-model costing, including direct pay, direct non-pay, indirect costs, estates, IT/LIMS, logistics, quality systems, training, supervision and relevant capital or support costs.
- Develop and publish a shadow price-per-test tariff, initially for community and GP-requested testing, so providers can test performance against proposed rates before live financial implementation.
- Build core-volume assumptions and steep marginal pricing discounts beyond agreed core volumes into the shadow tariff design, so price, volume, demand and budget effects can be tested safely.
- Identify fragile and specialist services that need protection before any tariff trial, including low-volume, complex and reporting-constrained services.
- Identify high-performing integrated services that have already achieved expected efficiency benchmarks, so future tariff, benchmarking or efficiency expectations do not require them to deliver further and potentially unrealistic savings.

Use scenario modelling as an indicative planning tool to support investment, reinvestment and implementation, not as an extraction target.

Years 2-3: validate and refine the shadow tariff

- Use provider testing to validate, recalibrate or reject proposed shadow tariff rates before any live financial implementation. Focus early shadow tariff testing on community and GP-requested tests where definitions, activity counts and costing boundaries are robust.
- Keep inpatient activity aligned with HRG payment arrangements to avoid double counting, using reference tariffs for cost tracking and benchmarking where appropriate.
- Link participation to quality, access, workforce and resilience safeguards from the start.
- Improve reporting of MSC scope, reagent pricing, equipment, maintenance, logistics and KPI structures.

Years 3-4: refine and expand only where evidence supports it

- Review shadow tariff evidence on data quality, provider readiness, behavioural effects, administrative burden and impact on fragile services.
- Recalibrate prices, cost baselines, exclusions and activity definitions using provider testing and shadow tariff data.
- Move towards live activity-aligned pricing only where definitions, fully loaded costs, activity feeds and safeguards are mature.

Year 5: embed review, recalibration and reinvestment

- Establish a transparent annual value and tariff review cycle covering benchmark prices, cost baselines, exclusions, resilience adjustments and reinvestment rules.
- Link value measures to quality, access, workforce and digital measures within the service-model assurance framework.
- Maintain explicit protection for fragile services and training capacity.
- Use value released through operational integration to support workforce development, digital infrastructure, automation, quality systems and service resilience.

System-wide priorities for implementation

This review does not call for further structural reorganisation. It calls for disciplined delivery within existing service model configurations. The task now is to turn partial integration into consistent, measurable performance.

Six priorities for action

1. Complete operational integration

Every service model should operate as a single managed service, with shared standards, unified governance and aligned digital and quality controls across sites.

2. Create a single, comparable national dataset and develop a shadow tariff

Agree one national dataset across quality, workforce, access, digital and value, with standard definitions for turnaround, incidents, workforce, activity and cost. Use it to support benchmarking, assurance, funding reform and the development of a shadow price-per-test tariff.

3. Build workforce resilience

Strengthen workforce planning, training capacity, advanced practice and flexible deployment across service models, so that integration is matched by the capacity and skills needed to deliver.

4. Align digital, workforce and funding reform

Treat these as one implementation programme, not separate workstreams. Build interoperable systems, expand advanced practice and trainer capacity, and develop the shadow price-per-test tariff to support delivery, protect quality and resilience, and enable realised value to be retained for reinvestment in pathology.

5. Embed clear accountability

Assign clear service model-level responsibility for performance. Set defined escalation routes where standards are not met, and greater flexibility where they are.

6. Reinvest to sustain resilience

Use value released through integration, automation, procurement discipline and activity-aligned pricing to strengthen workforce, digital infrastructure, specialist capacity and long-term resilience.

Delivery approach

Short term: Agree definitions, assign accountability, baseline digital and workforce capability, publish comparable performance measures, and develop a shadow price-per-test tariff.

Medium term: Complete operational integration, embed interoperability, expand advanced practice and training capacity, and use shadow tariff evidence to validate, recalibrate or reject proposed rates before live financial implementation..

Long term: Move from shadow pricing towards live activity-aligned funding where definitions, cost data, quality safeguards and reinvestment rules are mature, within a transparent national framework that retains realised value for reinvestment in pathology.

The system is not starting from scratch. The next step is to apply what is already known to work, consistently and at scale.

Conclusion

Pathology transformation is essential to wider system resilience and performance. This review shows that current performance is variable, but that the case for action is clear and the route to improvement is practical.

The central lesson is straightforward. Better performance does not depend on further structural reorganisation. It depends on disciplined delivery within existing service model configurations: clearer accountability, consistent measurement, interoperable digital systems, stronger workforce deployment and more transparent funding and assurance.

The workforce remains pathology's greatest strength and one of its most significant risks. The service depends on highly skilled, well trained and committed scientific, medical and support staff, but that workforce is structurally fragile. Vacancies, constrained training capacity, uneven deployment and retirement pressures all limit resilience. Completing operational integration must therefore go hand in hand with a stronger workforce plan, expanded training and advanced practice, and more flexible use of specialist expertise across service models.

The opportunity is material. More efficient service models can release value already present within the system, but only if operational integration is completed and the gains are deliberately reinvested in workforce, digital capability, quality systems and resilience. This is not an argument for extracting savings at the expense of resilience. It is an argument for using better organisation, better data and better operating discipline to improve performance and strengthen the service.

Demand for pathology is rising, and continued investment in workforce and infrastructure will be needed to support growth and deliver the ambitions of the 10 Year Health Plan. By completing the transformation already under way, pathology can expand to meet that demand, release the gains needed to strengthen one of the NHS's most critical services, and realise the savings set out in previous reviews.

The report therefore marks a transition point from analysis to action. It sets out a step-by-step route to maintain momentum: establish common definitions and accountability, complete operational integration, strengthen workforce and digital capability, test funding reform, and embed the changes needed for long-term resilience. The evidence shows what works. The next step is to apply it consistently and at scale.

If that happens, pathology will be more reliable for clinicians, more responsive for patients and more sustainable for the health system as a whole.

Annexes

Annex A – Operating model segmentation methodology

Purpose

This annex explains how providers and service models are grouped for comparative analysis in this review. The segmentation is used to compare quality, workforce, access, digital capability and value on a consistent basis.

The purpose of the segmentation is to distinguish between different degrees of operational integration. It is not intended to imply new structural reorganisation or formal merger beyond existing service configurations.

Source base

The segmentation draws on:

- 2024/25 National Annual Pathology Data Collection (NAPDC) activity-flow data
- Service configuration information used across the review
- Evidence on operating model maturity, including the Pathology Network Maturity Assessment where relevant
- Service and network documentation used to validate provider configuration and laboratory operating model
- Manual review where activity flows or provider configurations required interpretation

The segmentation is based primarily on the degree of operational integration shown by activity flows and operating model evidence, rather than self-assessed maturity alone.

In this review, integration means operating as a single unified service through common standards and controls, including shared governance, interoperable digital systems, harmonised SOPs and quality management arrangements, and the ability to redistribute work and workforce across sites.

Segmentation categories

Fully integrated service model
A service model in which over 90% of activity is delivered through a single provider or single managed service operating with shared standards, unified governance and aligned digital and quality controls.

Partially integrated service model
A configuration where some activity is shared across providers, but governance, digital systems, SOPs, QMS or accountability remain mixed or split, indicating incomplete operational integration.

Non-integrated service model
A configuration where activity is distributed across multiple providers operating independently, without unified management of activity, quality or workflow.

Method

The classification is applied using activity-flow data and service configuration evidence.

1. **Activity-flow assessment**
   The 2024/25 NAPDC activity-flow data were used to assess the volume and share of activity performed by each trust within each pathology service model. The analysis considered whether activity was concentrated within one provider or distributed across multiple providers.

2. **Threshold application**
   A service model is classified as fully integrated where more than 90% of activity is delivered through a single provider or single managed service. This threshold is used as the consistent classification rule across the review.

   Analysis-specific exclusions are applied separately where data completeness or comparability prevents inclusion in a particular analysis.

3. **Partially integrated classification**
   A service model is classified as partially integrated where activity from one or more trusts flows to another trust within the same service model, but activity is not sufficiently concentrated to meet the fully integrated threshold, or where operational evidence indicates mixed governance, SOPs, QMS, digital systems or accountability.

4. **Non-integrated classification**
   A service model is classified as non-integrated where activity remains distributed across multiple providers without unified management of activity, quality or workflow.

5. **Manual review and validation**
   Manual review was applied to move beyond self-assessed maturity categories and create a more objective, data-led grouping based on operational integration.

   This grouping was applied across the service model set using 2024/25 activity flows and then validated against service documentation and available evidence on the laboratory operating model.

6. **Treatment of exclusions**
   Not all analyses use the full service model set. Data exclusions vary by analysis depending on dataset completeness, comparability and reporting quality.

   Analysis-specific exclusions are set out in Annex B and in relevant chapter methods where required.

7. **Treatment of outsourced, referred and specialist activity**
   Outsourced, referred and specialist activity was treated according to how it appeared in the NAPDC activity data. Test volumes are assigned to the laboratory completing the testing activity.

   Where activity was referred between laboratories within a trust or service model, this was collectively grouped to the relevant trust or service model.

   Outsourced, referred and specialist activity was not otherwise separated from the parent specialty grouping and was therefore calculated collectively within the relevant specialty.

8. **Use in time-series analysis**
   The segmentation is based on 2024/25 operational integration status and is then used as the analytical grouping for comparative analysis.

   Where time-series data are presented, the same segmentation is applied across prior years for consistency. This means that some service models may have been in a different transition state during earlier years. Findings should therefore be interpreted as comparisons by current operating model status, rather than as a year-by-year reclassification of each service model.

Limitations

- The segmentation is designed for comparative analysis and cannot capture every nuance of local collaboration, informal mutual aid or specialty-specific arrangements.
- Self-assessed maturity evidence is not treated as a standalone performance measure.
- The classification may not fully reflect differences between disciplines within the same service model.
- Some service models may have been in active transition during earlier years covered by the review.
- Specialist, referred and outsourced activity is only reflected where it is captured in NAPDC activity data.
- Outsourced, referred and specialist activity was not separately reweighted or analysed outside the parent specialty grouping.
- Analysis-specific exclusions mean that not every chart or comparison uses the same service model set.
- The segmentation should be interpreted as an analytical grouping based on best-available activity-flow and configuration evidence, not as a definitive legal or organisational classification.

Annex B – Data sources, coverage and exclusions

Purpose

This annex summarises the main data sources used in the review, the period covered, the level of reporting, and the treatment of incomplete or inconsistent submissions.

Source base

The review draws on national datasets, published literature, regulatory documents, professional-body evidence, international comparator material, stakeholder interviews and provider submissions.

Primary quantitative weight is given to national administrative datasets. Secondary weight is given to peer-reviewed literature and formal regulatory publications. Qualitative evidence, provider submissions and stakeholder input are used to contextualise findings, validate operating-model interpretation and explain implementation constraints.

Core datasets

National Annual Pathology Data Collection (NAPDC)

Used for activity, cost, workload, service model-level activity flows, productivity, cost benchmarking and operating model segmentation.

Pathology Quality Assurance Dashboard (PQAD)

Used for selected quality, incident and turnaround indicators, including serious incidents, Datix incidents open for more than 30 days, turnaround time reporting and tests outside ISO 15189 scope.

NHS Model Hospital / national operational datasets

Used where relevant for benchmarking, cost and productivity context.

Professional-body and workforce datasets

Includes Institute of Biomedical Science training datasets, Royal College of Pathologists workforce evidence, specialty workforce reports and other workforce submissions.

International datasets and published sources

Includes official fee schedules, reimbursement data, regulatory documentation and published comparator evidence from France, Germany, Australia and the United States where available.

Stakeholder and provider submissions

Used to interpret and validate operating-model configuration, cost boundaries, procurement and managed service contract arrangements, workforce constraints and tariff pilot assumptions.

These submissions do not override national datasets for core benchmarking, except in the tariff pilot where selected anonymised provider-level cost-per-test data were used to construct illustrative test-level baselines.

Time period

Unless otherwise stated, the main quantitative analysis covers 2020–21 to 2024–25, with partial 2025 data included where reported.

Workforce analysis extends back to 2018–19 where relevant. International comparisons focus on the last decade of reform and on the post-2016 period in England.

Partial 2025 data are included only where reported and are not treated as full-year equivalents unless explicitly stated.

For access analysis, PQAD turnaround time reporting typically covers January to July 2025, with trusts without relevant reporting excluded.

For quality analysis, 2025 non-ISO accreditation analysis uses data available to July 2025.

NAPDC cost and activity data generally refer to financial year 2024/25.

Geography and weighting

The review is UK-wide in scope but England-weighted where comparable UK-wide datasets are not available. England-weighted findings are used transparently and interpreted with caveats.

London weighting is adjusted only where stated. In the workforce staff-cost analysis, substantive staff costs are adjusted using Inner London 9%, Outer London 6% and Fringe 4%. This adjustment applies to substantive costs only and is used only in the workforce staff-cost analysis.

Reporting levels

Data are reported at trust, provider and service model level depending on dataset availability and analytical purpose. Where service model-level analysis is used, it is aligned to the review's operating model segmentation.

Exclusion principles

The same exclusion principles are used across the review. Where relevant data points are missing, inconsistent or not comparable, trusts or service models are excluded from the affected analysis.

However, exclusions are not necessarily identical across every chapter, chart or comparison, because data availability differs by dataset and indicator. For example, a trust may be excluded from a cost comparison because of incomplete NAPDC returns but still appear in another analysis where relevant quality or workforce data are available.

Exclusions affect time-series analyses more than single-year snapshots.

Service model-level exclusions

Two service models are excluded from either all or part of the analysis where NAPDC returns are incomplete, inconsistent or not comparable.

One exclusion relates to discrepancies in 2024/25 data and missing data for earlier years. The other relates to missing 2024/25 data and activity-flow patterns that made the return unsuitable for like-for-like comparison.

These exclusions are applied only to affected analyses and do not imply a judgement on the quality or performance of the excluded services. Individual service models are not named because the exclusions relate to data completeness and comparability rather than service quality or performance.

Trust-level exclusions

Eighteen trusts are excluded from either all or part of the analysis where NAPDC returns are incomplete, missing, inconsistent or not comparable.

Reasons include missing 2024/25 data, discrepant 2024/25 data, missing 2022–24 data, missing 2023/24 data or missing 2022/23 data.

Exclusions are applied only where necessary for comparability and do not imply a judgement on local service quality or performance.

Treatment by analysis type

For access analysis, trusts without relevant PQAD turnaround time reporting are excluded from affected comparisons.

For quality analysis, trusts without relevant PQAD incident, Datix, ISO scope or accreditation reporting are excluded from affected comparisons.

For cost and value analysis, incomplete non-pay, indirect cost or managed service contract data are treated as limitations rather than filled with unsupported estimates. Where cost submissions are incomplete or not comparable, the trust or service model is excluded from affected benchmarking.

For workforce analysis, exclusions are applied where workforce returns are incomplete or where role categories cannot be mapped consistently. Where London weighting adjustments are applied, this is stated in the relevant analysis.

Limitations

- Data completeness varies by dataset, year, provider and discipline.
- Exclusions vary by analysis depending on data availability and comparability.
- Non-pay and indirect cost reporting is inconsistent.
- TAT definitions are not uniformly patient-facing.
- Some national collections capture laboratory activity more reliably than upstream or downstream workflow.
- Provider submissions are useful for interpretation and validation but do not replace national administrative datasets for core benchmarking.
- Selected provider-level tariff pilot data are anonymised and are used only to construct illustrative test-level baselines.
- Cross-country data are not always directly comparable.

Annex C – Cost benchmarking methodology

Purpose

This annex describes the approach used to compare pathology costs, productivity and activity across service models and disciplines.

The purpose of the cost benchmarking analysis is to identify variation in reported cost and productivity across pathology services using available national data. It is not a tariff-setting exercise and should be distinguished from the separate tariff options appraisal.

Source base

The core cost benchmarking work uses National Annual Pathology Data Collection (NAPDC) returns.

NAPDC provides reported activity and cost data by discipline and sub-discipline. It is used to compare cost per test, staff cost, non-pay cost, productivity and variation across providers and service models.

The cost benchmarking analysis is separate from the tariff options appraisal, where selected anonymised provider-level test-cost data were collected separately to construct illustrative test-level baselines.

Discipline and sub-discipline coverage

Cost benchmarking is reported using NAPDC discipline and sub-discipline categories, including:

- Blood sciences
- Cellular sciences, including histopathology and cytology
- Microbiology
- Genetics
- Other relevant NAPDC categories where reported

These categories are used as the unit of analysis for cost per test and cost-composition benchmarking.

Cost per test

Cost per test is calculated as total direct cost divided by total number of tests at discipline level, using reported NAPDC cost and activity data.

Total direct cost includes reported direct pay and direct non-pay costs. Some trusts do not report overhead costs, including estates, IT, logistics and other indirect costs. Cost per test should therefore be interpreted as a reported direct-cost measure rather than a fully loaded cost measure unless otherwise stated.

This definition should not be confused with the separate cost-per-test analysis used in the tariff options appraisal.

Cost categories

Direct pay cost

Costs associated with substantive, agency and bank staff directly delivering pathology services. This includes staff groups such as biomedical scientists, laboratory staff, clinical scientists and consultants where directly attributable to test delivery.

Trust-level overheads and non-operational staff are excluded.

Direct non-pay cost

Costs of reagents, consumables, equipment maintenance and managed service contract costs where reported. This category may include reagents, quality-control materials, calibration kits, test consumables and analyser service contracts where bundled.

Non-pay cost reporting varies across providers and may reflect differences in supplier contracts, managed service contract structures, test methodology and cost-allocation practice.

Indirect costs

Overheads and shared support costs, including estates, utilities, equipment depreciation, IT/LIMS, management overhead and logistics.

In the NAPDC cost benchmarking analysis, indirect costs are inconsistently reported and often excluded. This means reported cost per test may understate the true cost to serve.

Managed service contracts

Managed service contracts are long-term supplier arrangements that may bundle reagents, equipment, maintenance, service support and calibration into a single model.

The NAPDC cost benchmarking analysis did not systematically normalise managed service contract data across reagent-rental, capital-purchase or capital-equipment models. Differences in contract structure, reagent-rental treatment and equipment-financing arrangements are therefore treated as drivers of observed non-pay cost variation rather than adjusted away through a national normalisation methodology.

Activity counting and weighted activity

Activity is compared using reported test volumes under the NAPDC/Keele weighted test-count methodology.

Under this approach, each analytical process is counted as one test, with multi-analyte or composite assays weighted to reflect analytical workload. This provides a more standardised activity volume across disciplines than unadjusted activity counts.

The methodology excludes phlebotomy.

The review distinguishes between:

- Reportable tests
- Requests
- Specimens
- Panels and profiles
- Weighted activity

This distinction is important because cost per test and productivity measures depend on a consistent denominator.

Productivity measures

Productivity is assessed using measures such as:

- Cost per test
- Direct pay cost per test
- Direct non-pay cost per test
- Tests per FTE
- Weighted activity per FTE
- Discipline-level productivity variation

Where workforce productivity is analysed, it is interpreted alongside role mix, automation maturity, workflow design and reporting practice.

Service model comparison

Costs and productivity are compared by operating model segmentation:

- Fully integrated service models
- Partially integrated service models
- Non-integrated service models

The purpose is to test whether more operationally integrated service models are associated with lower reported cost per test, higher productivity or different cost composition.

Statistical treatment

The analysis uses distributional measures to describe variation, including:

- Standard deviation
- Interquartile range
- Outlier testing
- Discipline-level comparison

Standard deviation is calculated as STDEV.P. Interquartile range is calculated as Q3 minus Q1.

For cost benchmarking, outliers are defined as values at least two times the interquartile range away from the median.

The same underlying outlier definition is used in the cost benchmarking analysis, although its effect differs by discipline because the distributions differ. The impact of outlier removal is greatest in histopathology and microbiology, where reported variation is more pronounced.

London weighting

For the core NAPDC cost benchmarking analyses, no additional London weighting adjustment is applied beyond costs as reported in NAPDC.

London weighting normalisation is applied only in a separate workforce staff-cost analysis, and only to substantive staff costs.

Interpretation

The cost benchmarking analysis is designed to identify variation and potential drivers of cost difference. It should not be interpreted as a complete fully loaded cost model.

Reported cost variation may reflect:

- Workforce mix
- Automation maturity
- Managed service contract structure
- Reagent and consumable pricing
- Test methodology
- Discipline mix
- Reporting completeness
- Treatment of indirect costs
- Local cost-allocation practice

Known limitations

- NAPDC returns vary in how non-pay costs are coded.
- Estates, IT/LIMS, logistics and overheads are often excluded or partially captured.
- Reported cost per test primarily reflects direct pay and non-pay costs rather than fully loaded cost.
- Managed service contract scope, reagent rental and equipment-financing arrangements vary between providers and are not nationally normalised.
- Microbiology is particularly sensitive to differences in test definitions, culture-based workflows, panels and referral activity.
- Histopathology activity counting can be affected by whether activity is counted per slide, block, case or reportable output.
- Cost benchmarking results should be interpreted as national comparative indicators rather than definitive provider-level cost accounts.

Annex D – Tariff options appraisal and economic benefits modelling: assumptions and sensitivity testing

Purpose

This annex describes the methodology used to appraise options for a future pathology tariff or activity-based pricing framework, and to size the indicative economic opportunity associated with greater operational integration.

It is intended to explain the basis of the modelling and prevent the outputs being interpreted as final tariff rates, forecasts or guaranteed savings.

The appraisal is exploratory. It is designed to test how cost baselines and indicative pricing approaches could be constructed, what assumptions materially affect the results, and what further data and safeguards would be required before any future tariff trial or implementation.

Scope

This annex covers two related but distinct pieces of analysis:

1. **Tariff options appraisal**
   An exploratory test-level pricing analysis using selected provider data to examine how indicative activity-based prices could be constructed.
2. **Economic benefits modelling**
   A scenario model estimating the potential gross efficiency opportunity associated with a greater share of activity operating at fully integrated service model benchmarks.

   The two analyses are related but should not be conflated. The tariff appraisal explores potential pricing methodology. The economic benefits model sizes a gross planning opportunity under defined assumptions.

Source base

The tariff options appraisal uses test-level cost and activity data from selected NHS pathology service models and providers. Provider-level test-cost data were shared under non-disclosure arrangements. The review therefore refers to these as selected NHS pathology service models and providers and does not identify individual providers.

The analysis focuses on selected high-volume routine tests and uses test-level cost data across pay, non-pay and indirect cost where available.

International comparator schedules, including NABM, EBM and the Medicare Benefits Schedule, are used as reference points for cost signals, not as directly comparable fully loaded UK costs.

The economic benefits model uses 2024/25 NAPDC activity and cost data to compare a no-change cost trajectory with a phased scenario in which a larger share of included trusts operate at fully integrated service model benchmarks.

Purpose of the tariff appraisal

The tariff appraisal was designed to:

1. **Establish an indicative test-level cost baseline.**
2. **Explore how activity-based tariff rates might be calibrated.**
3. **Assess sensitivity to assumptions on margin, volume, Keele adjustment and test definition.**
4. **Identify data readiness, safeguards and sequencing requirements before any future tariff trial.**

It was not designed to set definitive tariff prices.

Tariff appraisal data inputs

Inputs include:

- Test-level direct pay costs
- Test-level direct non-pay costs
- Indirect cost allocations where available
- Activity counts
- Keele-adjusted volumes where relevant
- International comparator prices or reimbursement schedules for selected tests

Sample composition

The tariff appraisal uses selected NHS pathology service models and providers. The sample varies by test and pilot subset, generally between three and six providers.

For microbiology, the test-level table uses provider data from three to five providers, with indirect cost assumptions applied where providers were unable to provide detailed cost allocation.

For publication, sample size should therefore be described as varying by test and pilot subset, rather than as a uniform sample across every discipline or test.

Cost baseline

For selected high-volume tests, weighted average cost per test is calculated across participating providers. This is used as an indicative cost baseline for tariff appraisal.

Where detailed indirect cost allocations are not available, a working assumption of 35% indirect cost share is used, based on observed patterns in providers with more complete data.

This assumption may understate or overstate true overheads in individual service models and is used only for illustrative appraisal.

Tariff calibration

Indicative tariff levels are produced by applying margin assumptions to the cost baseline.

The tariff options appraisal uses a 0–20% margin range. Tariff tables show 5%, 10% and 20% margin uplifts. Sensitivity analyses include 0%, 1%, 2.5%, 5%, 10%, 12.5%, 15% and 20% margin assumptions.

These outputs are indicative and should not be interpreted as proposed tariff rates.

Sensitivity testing

Sensitivity testing was undertaken for:

- Tariff margin bands
- Activity and volume growth
- Keele adjustment
- Microbiology test-definition uncertainty

The microbiology sensitivity analysis is particularly caveated because projected total cost is highly sensitive to the Keele test-count adjustment factor. Test-level microbiology outputs should therefore be treated as illustrative and not as definitive rates.

Economic benefits modelling

The £450m per year and £1.4bn cumulative opportunity estimates are derived from a separate economic benefits model.

The model compares:

1. **A no-change cost trajectory.**
2. **A phased operational integration scenario in which a larger share of included trusts operates at fully integrated service model benchmarks.**

The model uses 2024/25 NAPDC activity and cost data to calculate cost per test for trusts grouped by current operating model status. It forecasts future test volumes using historic growth rates, then estimates the benefit of moving more trusts toward fully integrated service model benchmarks by applying the 2024/25 fully integrated cost per test.

This captures productivity and unit cost gains and avoids double-counting further price improvements.

Activity growth

NHSE testing activity grew by approximately 5–7% per year between 2018 and 2025, based on NAPDC individual test volumes.

The tariff sensitivity analysis tests volume-growth assumptions from 0% to 10%.

Scenario assumption

The economic benefits scenario assumes that the share of included trusts operating at fully integrated service model benchmarks rises from approximately 10% to 80%.

This is a scenario assumption, not an observed current-state position, forecast or delivery commitment.

The model assumes 56 additional trusts move toward fully integrated operation, with phased realisation as follows:

- 2027/28: 33% of the gap closed
- 2028/29: 66% of the gap closed
- 2029/30: 100% of the gap closed

Annual savings are calculated as projected no-change cost less projected integration-scenario cost.

Estimated opportunity

Under this illustrative scenario, estimated gross savings are approximately:

- £216m in 2027/28
- £467m in 2028/29
- £767m in 2029/30

This gives a cumulative benefit of approximately £1.45bn, rounded in the report to around £1.4bn.

The average annual benefit is approximately £483m per year, presented in the narrative as approximately £450m per year.

Treatment of costs and reinvestment

The economic benefits estimate is a gross illustrative opportunity.

It does not deduct:

- Transition costs
- Double-running costs
- Implementation costs
- Staffing or resource required to implement operational integration
- Digital investment
- Workforce investment
- Reinvestment required to sustain resilience and quality

The outputs should therefore be described as gross efficiency opportunities or planning estimates before implementation costs, transition costs, double-running costs or reinvestment.

They should not be presented as guaranteed net cash-releasing savings.

Interpretation

The tariff appraisal and economic benefits model are intended to support planning, prioritisation and policy design. They should be interpreted as evidence that variation is financially material and that improvement at scale could release significant value if operational integration, cost visibility, digital maturity and workforce capacity are strengthened together.

They do not provide a definitive price schedule, a guaranteed savings forecast or a commitment that benefits will be realised without investment.

Limitations

- The tariff appraisal is based on a small, anonymised provider sample and is illustrative rather than definitive.
- Sample size varies by test and pilot subset.
- Cost and activity definitions vary between providers.
- Estates, IT/LIMS, logistics, training, quality systems and overheads are not captured consistently.
- The 35% indirect cost assumption is a working assumption and may not reflect individual provider overhead structures.
- Microbiology results are particularly sensitive to test definition and Keele adjustment.
- International price schedules are not directly comparable to fully loaded UK costs.
- The economic benefits model is scenario-based and separate from observed savings.
- The 80% fully integrated benchmark is a planning assumption, not a forecast or commitment.
- Investment costs, transition costs, double-running costs and reinvestment are excluded.
- No tariff should be implemented at scale until activity definitions, cost allocation, quality safeguards and reinvestment mechanisms are stronger.

Annex E – Workforce taxonomy and role mapping methodology

Purpose

This annex explains how workforce groups are standardised for analysis across trusts, service models and datasets.

The purpose of the workforce taxonomy is to enable comparison across providers where local role titles, banding conventions and workforce returns are not consistently defined.

Source base

The workforce analysis draws on:

- National workforce returns
- Institute of Biomedical Science training-route data
- Royal College of Pathologists workforce evidence
- Specialty workforce reports
- Provider and service submissions
- Workforce benchmarking material

These sources are used to assess workforce composition, vacancies, temporary staffing, training capacity, skill mix, advanced practice and deployment across service models.

Workforce grouping

The analysis groups roles into broad workforce categories.

Medical staff

Includes consultant pathologists, medical trainees/residents, specialty doctors and other medical grades where reported. Medical staff are separated into consultant and non-consultant workforce groups where data availability allows.

Scientific and technical staff

Includes biomedical scientists, clinical scientists, senior scientists, specialist scientists, consultant scientists and other technical scientific roles where reported.

Clinical support staff

Includes medical laboratory assistants, associate practitioners, anatomical pathology technicians where relevant, and other technical or support roles.

Management and non-clinical staff

Includes operational managers, administrative staff, corporate support roles and non-clinical service management functions.

Role mapping approach

Local role titles and Agenda for Change bands are not standardised across trusts or service models. The review therefore maps local titles into common workforce groups to enable comparison.

Where titles and bands are inconsistent, mapping is based on:

- Role function
- Reported professional group
- Agenda for Change band where available
- Specialty and discipline
- Available local descriptions
- Whether the role contributes directly to sample processing, reporting, quality, training or service management

Agenda for Change banding is used as one input to role mapping where available. It is not treated as consistently available or directly comparable across all datasets.

Treatment of scientific roles

Biomedical scientists and clinical scientists are analysed separately where the data allow. This includes selected scientific and technical workforce views, such as trend analysis showing different growth patterns between clinical scientists and biomedical scientists.

In other analyses, scientific and technical roles are aggregated because the source data do not consistently allow separation by professional group, seniority or scope of practice.

Specialist scientists, consultant scientists and advanced practitioners are grouped within the scientific workforce and advanced scientific practice categories where reported.

Advanced scientific practice

Advanced scientific practice includes biomedical or clinical scientists working at the top of scope within defined governance arrangements.

This may include:

- Specimen dissection
- Defined reporting
- Validation
- Clinical liaison
- Quality leadership
- Training and supervision
- Service leadership

Consultant scientists and advanced practitioners are treated as part of a governed multidisciplinary workforce model. These roles can release consultant pathologist capacity and strengthen resilience, but they are not treated as direct substitutes for medical pathologists.

Treatment of support roles

Support roles are included within the clinical support, scientific and technical workforce categories depending on the analysis and source data.

Medical laboratory assistants and other support roles are included where visible in workforce returns. Associate practitioners are treated within support or practitioner groupings where the source data allow.

Temporary staffing

Temporary staffing includes bank and agency FTE and spend where reported.

Temporary staffing is included in some total workforce measures where the analysis specifies substantive plus bank and agency FTE or spend. Other analyses present substantive-only staff costs. Where this distinction affects interpretation, it is stated in the relevant chapter or figure.

Training-route analysis

IBMS training-route analysis uses IBMS Members Data.

The analysis is used to assess applications, completion and attrition trends for IBMS-recognised training routes. Specialist trainees have three years from certificate issuance to complete training, meaning retrospective completion and attrition data become accessible only after a three-year period.

The training-route analysis is used to evidence training bottlenecks, assessor-capacity constraints and progression risks. It is not treated as a definitive long-term workforce supply forecast.

Workforce measures

The review uses:

- Full-time equivalent (FTE)
- Vacancy rate
- Temporary staffing FTE and spend
- Training applications
- Training completion and attrition trends
- Trainer and assessor capacity
- Tests per FTE
- Weighted activity per FTE
- Advanced scientific practice deployment
- Staff cost measures, where available

Limitations

- Role titles are inconsistent across providers.
- Agenda for Change banding is not consistently available or directly comparable across all datasets.
- Biomedical scientists and clinical scientists cannot be separated in every analysis.
- Specialist, advanced and consultant scientist roles may not be consistently coded in national returns.
- Vacancy data compare funded establishment with staff in post and may understate underlying demand.
- Temporary staffing may obscure underlying vacancy or workload pressure.
- Some analyses include bank and agency staff, while others are limited to substantive staff.
- Local advanced practice deployment may not be fully visible in national workforce returns.
- Training and assessor-capacity data are not consistently reported across service models.
- IBMS training-route analysis is useful for identifying training bottlenecks but should not be read as a complete workforce supply forecast.

Annex F – International comparator methodology

Purpose

This annex explains how international comparator systems were selected and how their relevance to UK pathology was assessed.

The purpose of the international analysis is to identify lessons from other systems on funding, pricing, regulation, operational integration, quality oversight, access and value. It is not intended to recommend direct transplantation of another country's model into the UK.

Comparator selection

The final deep-dive comparator set comprises:

- France
- Germany
- Australia
- United States

These systems were selected alongside the UK baseline because they provide contrast across:

- Statutory insurance systems
- Tax-funded and mixed funding systems
- Public, private and mixed provider models
- Different approaches to regulation, reimbursement and accreditation
- Different levels of market concentration and operational integration
- Different approaches to national quality oversight and pricing

France, Germany and Australia were selected because they provide stronger evidence on pricing, regulation, market structure and operational integration. The United States was included directionally as a contrasting fragmented, high-cost, multi-payer model.

Wider systems, including the Nordics and Eastern Europe, were considered at scan level but not taken forward as deep-dive comparators because the final comparator set provided stronger contrast and more usable evidence for the review's analytical questions.

Evidence sources

The international analysis draws on:

- Published fee schedules and reimbursement data
- National regulatory and accreditation frameworks
- Published literature
- Public system and company information
- Comparator country case studies
- Market participant interviews

Sources referenced in the underlying analysis include HBI, national fee schedules such as NABM, EBM and MBS, Laboratory Economics, literature search and market participant interviews.

No additional comparator interviews outside those reflected in the underlying analysis were used.

Analytical focus

The review uses international evidence to test how different systems address:

- Funding and pricing
- Scale and operational integration
- Quality regulation and enforcement
- Access and turnaround
- Workforce and skill mix
- Digital maturity
- Cost visibility and productivity

Use of unit prices

International unit prices and fee schedules are used as indicators of relative cost signals. They are not treated as directly comparable to fully loaded UK cost per test unless scope and inclusions are clear.

Differences may include:

- Whether clinical interpretation is included
- Whether overheads are included
- Whether tests are billed individually or bundled
- Whether capital, digital, logistics or quality costs are embedded elsewhere
- Whether reimbursement applies to public, private or mixed activity
- Whether provider margin is embedded in the published price

Where international comparator rates are used in the tariff appraisal, rates are converted to GBP. For some benchmarks, assumed provider margins are adjusted to improve comparability, for example excluding assumed profit margins of 40% for France and 30% for Australia.

These adjustments are illustrative and should not be treated as definitive purchasing-power or fully loaded cost normalisation.

Use of United States evidence

The United States is used directionally to illustrate a fragmented, high-cost, multi-payer model and to provide contrast with more centrally governed reimbursement systems.

US evidence is not treated as a direct benchmark for NHS tariff design because reimbursement depends heavily on payer mix, negotiated discounts, Medicare and Medicaid coverage, private insurance dynamics and provider contracting.

Discipline-specific comparability

International evidence is strongest for high-volume automated testing in blood sciences and broader medical biology. It is weaker for anatomical pathology, histopathology, cytology and complex specialist services.

For cellular pathology and infection sciences, the review interprets international evidence cautiously, recognising that resilience, clinical liaison, specialist expertise and surge capacity may be as important as cost efficiency.

Interpretation

International comparisons are used to inform the review's analysis of policy options. They are used to identify recurring features of more mature systems, including clearer pricing signals, more consistent quality baselines, stronger digital infrastructure and greater operational integration.

They are not used to argue that scale alone is sufficient or that any comparator model can be adopted wholesale in the UK.

Limitations

- Cross-country funding systems differ materially.
- Unit prices do not necessarily reflect full cost.
- Published tariffs and fee schedules may include or exclude provider margins.
- Provider ownership models vary.
- Published data may not separate laboratory analysis, clinical interpretation and downstream pathway costs.
- Quality and access measures are not consistently comparable.
- Exchange-rate conversion does not fully account for purchasing-power differences or local cost structures.
- Evidence is strongest for high-volume routine testing and weaker for complex specialist services.
- International findings are used to inform policy options, not to prescribe direct transplantation of another system.

Annex G – Glossary of key terms

This glossary defines key terms as used in this review. Where definitions differ from common usage, the review's specific meaning is intended.

Access
The timeliness and reliability with which patients receive diagnostic results across the end-to-end pathway. In this review, access is assessed using turnaround time (TAT) performance and the factors that drive variation across requesting, collection/transport, accessioning, analysis, reporting and result release.

Accessioning
The point at which a sample is formally registered in the laboratory (typically in LIMS) and assigned identifiers/ workflow status so testing can proceed.

Activity (test volume) and counting rules
The way pathology activity is defined and counted for benchmarking. The review notes that counting rules can materially affect comparisons (for example, histopathology activity may be counted per slide rather than per case in national returns).

Advanced scientific practice / advanced roles
Extended scope roles undertaken by biomedical or clinical scientists within defined governance arrangements, used to strengthen capacity and flexibility (particularly in constrained specialties such as histopathology) and to support cross-site pooling of work.

Assurance framework (pathology)
The system of oversight intended to assure safe, accurate and reliable pathology services. The review describes current assurance as fragmented across accreditation, regulation and commissioning, and argues for a more coherent, outcomes-focused approach with clearer triggers, escalation and accountability at service model level.

Backlog
Work waiting to be completed (for example, unreported cases or delayed tests), typically tracked by counts and ageing, and used as a core operational control and resilience indicator.

Benefits realisation
A structured approach to defining, measuring and reporting the outcomes expected from changes (such as digital pathology, automation, LIMS integration). The review recommends baseline measures (pre-analytical time, laboratory TAT, backlog) and routine reporting against delivery milestones.

Chain of custody
End-to-end traceability of a request and sample through defined stage markers so specimen identity and handling are reliably evidenced. Used to reduce loss/ misidentification risk and to make pathway delay visible.

Commissioning
The way services are contracted and funded, including the expectations and levers commissioners use to require standards (for example accreditation coverage) and to trigger remediation when quality or access problems persist.

Cyber resilience and downtime readiness
The ability of pathology digital infrastructure and workflows to withstand disruption (including cyber incidents) and continue operating safely through tested downtime and recovery arrangements integrated with clinical escalation.

Datix over 30 days
Incidents that remain open on local incident reporting systems for more than 30 days. Used in the review as a comparative governance/quality indicator (expressed per million tests when aligned with activity).

Digital maturity
The level of capability and readiness of digital infrastructure and data to support integrated working, operational control and resilience at scale (including interoperable requesting/reporting, specimen tracking, LIMS configuration/master data, and analytics).

Digital pathology (as infrastructure)
The deployment of digital scanning and digital workflows to support reporting, prioritisation and cross-site working. The review frames digital pathology as core diagnostic infrastructure (not merely an IT project), with benefits dependent on throughput, validated workflows, storage/ bandwidth and governance.

Direct-to-patient testing
Testing models where services are delivered directly to patients outside traditional laboratory requesting pathways. The review notes these can sit at the edge of existing accreditation and incident-reporting arrangements if not explicitly brought into governance.

EQA (external quality assessment)
Proficiency testing used to monitor analytical performance. The review proposes clearer escalation triggers when repeated EQA failures occur and stronger integration of EQA signals into service model-level assurance.

Equity (of access)
Consistent access to timely diagnostics regardless of where a patient enters the system. The review treats widening variation in turnaround as an access and equity problem and recommends segmentation of performance to identify where delays concentrate.

Fully integrated service model
A service model in which over 90% of activity is delivered within a single, unified operating model functioning as one managed service across sites, with shared SOPs, common QA arrangements, unified leadership and coordinated hub-and-spoke workflows.

Fully loaded costing
A costing approach intended to include indirect and overhead costs (such as estates, IT/LIMS, logistics and management) in addition to direct staff and consumables, so comparisons of unit cost are consistent and transparent.

Governance (service model-level governance)
Named ownership and accountability for performance (quality, access, value), with authority to coordinate across sites and ensure standardised definitions, routines and escalation are applied consistently.

Hub-and-spoke workflow
A model where activity is distributed between hub and spoke sites under a single managed service, enabling standardisation, load balancing and shared reporting pools when supported by interoperable digital workflows and logistics.

Indirect costs
Non-direct costs required to deliver services (for example estates, IT, corporate overheads). The review notes these are often under-reported or inconsistently allocated, which can distort benchmarking unless “fully loaded” approaches are applied.

Integration (in this review)
Operating as a single unified service through common standards and controls, including shared governance, interoperable digital systems, harmonised SOPs/QMS arrangements and the ability to redistribute workload and workforce across sites. It does not necessarily imply structural merger beyond existing configurations.

Interoperability (requesting and reporting)
The ability of systems to exchange and use information consistently across organisations and sites. In this review it is a prerequisite for integrated working, comparable analytics and safe cross-site operations.

ISO 15189 scope (accreditation scope)
The set of tests and processes covered by a laboratory’s accredited schedule under ISO 15189. Tests outside scope are those reported by trusts as not currently covered by their accredited schedule.

Keele weighted activity
A methodology used to standardise activity so volumes are more comparable across disciplines and test types by adjusting for analytical complexity and multi-analyte procedures.

Laboratory TAT
Turnaround measured from registration/accessioning in LIMS to result release/authorisation. This is what many trusts currently report.

LIMS fragmentation
Multiple LIMS instances, duplicated test catalogues and inconsistent master/reference data that prevent shared queues, cross-site reporting and comparable analytics, undermining integrated working.

Managed service contract (MSC)
A contractual model used widely for pathology equipment/platforms where supply, service and consumables may be bundled. The review highlights that integrated services can secure non-pay savings through MSC leverage when procurement is centralised at scale.

Minimum digital standard
The minimum set of digital capabilities required for integrated pathology services to operate safely and effectively at scale. The review emphasises interoperable requesting/reporting, reliable specimen identity/tracking, service-wide LIMS and analytics, operational dashboards, and cyber resilience/downtime readiness.

Minimum national dataset (quality/access/value)
A comparable set of measures proposed to support transparency and peer benchmarking, including accreditation status/scope, non-ISO test volumes, serious incidents, Datix over 30 days, key TAT measures, and high-level EQA signals.

Molecular and genomic testing in cancer pathways
Additional testing steps requested after histopathology confirms diagnosis. The review notes end-to-end cancer diagnostic turnaround includes specimen preparation, referral, batching, transport, processing, interpretation and reporting, and can be materially extended where tracking and interoperability are weak.

Non-integrated service model
A configuration where activity is distributed across multiple providers operating independently. Informal collaboration may exist, but there is no unified management of activity, quality or workflow.

Non-ISO testing / tests outside accredited scope
Testing reported as outside ISO 15189 accreditation scope. The review flags growing volumes outside scope, particularly in complex and innovative pathways, and argues these can create assurance blind spots.

Operational control
Active, visible day-to-day management of flow, backlogs and exceptions (ideally near real time) supported by dashboards and consistent routines, enabling earlier intervention and recovery actions.

Operational maturity
How embedded and reliable a service model's governance, workflows, digital infrastructure and performance management are. The review cautions that self-assessed maturity can diverge from objective performance unless triangulated against measurable indicators.

Partially integrated service model (transition model)
A configuration where some activity is shared across providers, but governance, digital systems, SOPs or quality controls remain mixed or split, indicating incomplete operational integration. The review treats poorly governed transition as a higher-risk state.

Patient-facing TAT
Turnaround measured from a patient-facing start point (typically sample collection) to result communication/release, to reflect the whole pathway rather than only the analytical phase.

POCT (point-of-care testing)
Testing performed near the patient rather than in the central laboratory. The review notes POCT can fall partially outside traditional accreditation/incident reporting unless brought explicitly within service model governance, supervision and connectivity arrangements.

Pre-analytical delay
Delay occurring before testing begins (especially collection, transport and receipt/accessioning). The review highlights that many clocks start at LIMS registration, which can hide the largest share of patient-facing delay and weaken accountability.

Quality (in this review)
The consistency, accuracy and clinical reliability of diagnostic testing, supported by accreditation and quality systems and monitored using objective indicators (for example accreditation coverage, non-ISO activity, serious incidents and Datix backlogs), alongside access and resilience signals.

Quality Director (service model-level quality lead)
A designated service model-level role accountable for quality across partner trusts, responsible for harmonised QMS, common SOPs/QC, incident logging and escalation, and consistent EQA participation/response, enabled by converged digital platforms.

Resilience
The ability of a service model to maintain safe and timely performance under demand fluctuation, workforce pressure or digital disruption, including the ability to redistribute work across sites and to operate safely under downtime conditions.

Serious incident
Serious incidents recorded in trust PQAD returns under the NHS incident reporting framework, used in the review as a quality indicator analysed by service model segmentation.

Service model segmentation
The review's standard approach to grouping providers by degree of operational integration (fully integrated, partially integrated/transition, non-integrated) to support fairer, like-for-like comparison of performance.

Specimen tracking completeness
The proportion of samples with complete scan/trace events at required stage markers (or the proportion missing key timestamps). Used to evidence chain of custody and to make delay visible for operational control and benchmarking.

Standard operating procedures (SOPs)
Documented, standardised procedures used to harmonise how work is done across sites. The review treats shared SOPs as a core requirement for integrated service operation and consistent quality.

Tariff (activity-based pricing framework)

A proposed move from predominantly block-based funding toward activity-based pricing for pathology. Intended to align incentives with quality and cost transparency, not as a blunt cost-control mechanism. The review emphasises the need for consistent test definitions, a unified test catalogue and fully loaded costing rules before implementation at scale.

Turnaround time (TAT)

A performance measure for timeliness. The review distinguishes laboratory TAT from patient-facing TAT and recommends standardised definitions and dual reporting to avoid misleading comparisons driven by "clock start" rules.

T0–T3 timepoints (turnaround stage markers)

A standardised measurement framework used to locate delay along the pathway (collection/receipt/registration/authorisation), enabling dual reporting and clearer accountability for pre-analytical delay.

Unit cost (cost per test)

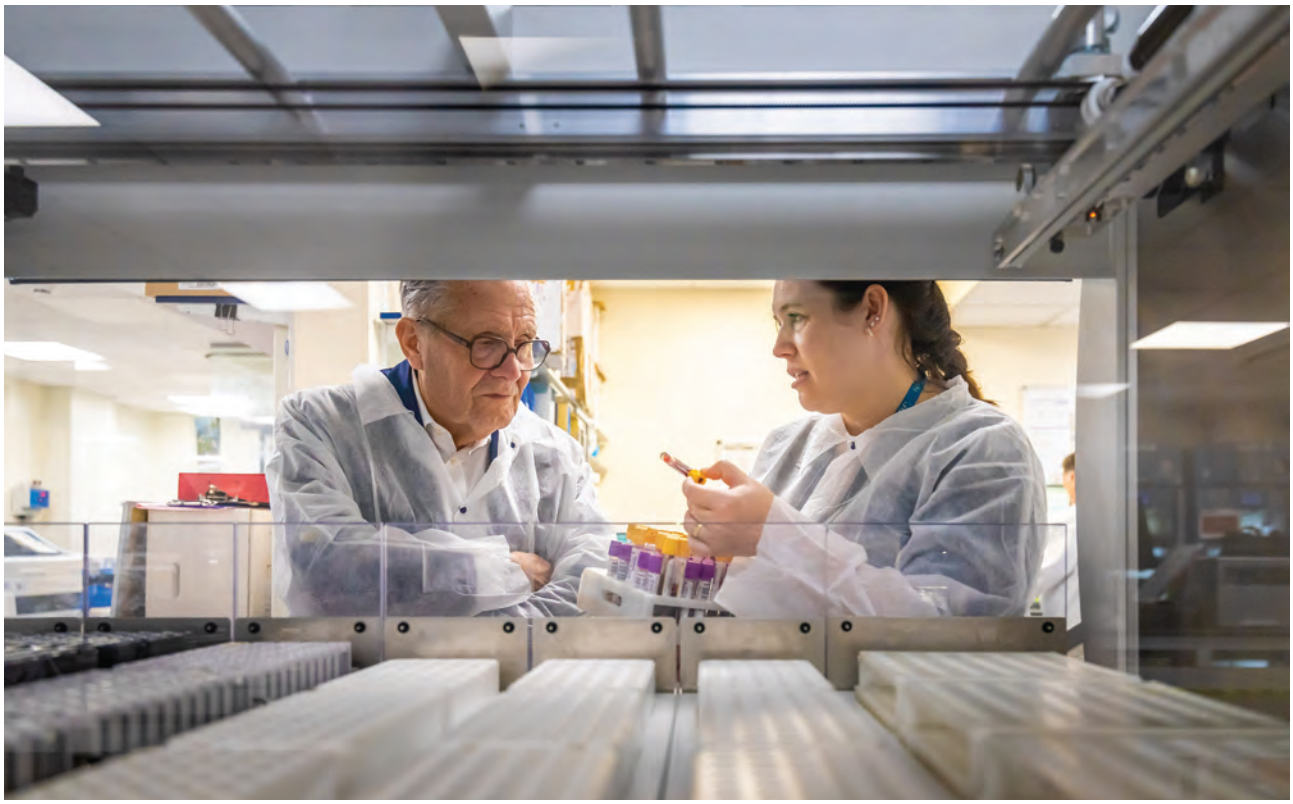
The calculated cost per test derived from activity and expenditure data. The review distinguishes staff cost per test, and total cost per test and highlights definitional issues where non-pay items and indirect costs are inconsistently allocated.

Value (in this review)

The relationship between cost transparency, activity and performance outcomes (quality, access, resilience and workforce sustainability). The review argues funding reform should support reinvestment in training, digital infrastructure and resilience, not only reduce costs.

Workforce flexibility and pooling

The ability to distribute workload and deploy staff across sites, supported by shared rotas, standardised roles/scopes of practice, and interoperable digital workflows, to reduce single-site fragility and improve resilience.



Pathology Transformation Review 2026

Chaired by Lord Carter of Coles

Commissioning body: IBMS

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