The Royal College of Pathologists
Pathology: the science behind the cure

The Royal College of Pathologists' response to the NHS 10-Year Workforce Plan: Call for evidence

Response to section 1: The 3 shifts

November 2025

Contents

1 Executive summary

The pathology workforce – comprising medically, veterinary, dentally and scientifically trained professionals and support staff – is essential to realising the NHS 10-Year Plan's 3 strategic shifts: hospital to community, analogue to digital and sickness to prevention.

Pathology is prepared to adapt and innovate; however, working differently and innovatively also requires targeted investment. In this context, there is a clear and evidence-based case for strategic investment and dedicated workforce planning in pathology, recognising the following.

- Pathology is fundamental to healthcare delivery, underpinning the ambitions of the 10-Year Health Plan for England and the National Cancer Plan.
- Demand for pathology services is projected to rise significantly, while current capacity remains constrained.
- **Modernisation efforts** – including automation, digital pathology, AI integration and expanded roles for scientists – can partially mitigate but not resolve workforce gaps.
- **Targeted investment in training** is essential, particularly in disciplines with critical shortages or at risk of service failure.
- **Diagnostic stewardship** must be resourced and prioritised to manage pathology demand while the benefits of investment in workforce and innovation are realised.
- **Infrastructure investment** – in buildings, IT systems and workforce – will enhance productivity across pathology and the wider healthcare system.

Despite more than a 30% growth in overall NHS full-time equivalent staff since 2009,[1] this growth has been inconsistent, with some pathology specialties experiencing a decline in workforce numbers. The College's established position has always been to seek investment for increased training and consultant capacity. While that is still true, there are nuances across pathology and some opportunities that may help stabilise the investment required year-on-year. In the current economic climate, achieving this necessitates a new approach, more than simply increasing staffing numbers, and requires thinking differently about how to safeguard services and, ultimately, patients.

Different specialties – and regions – will require different solutions based on current workforce capacity and infrastructure. Smaller pathology specialties, such as paediatric

and perinatal pathology and immunology, face severe consultant shortages and service collapse. They will require significant investment in both training and consultant posts to restore services. Larger pathology specialties will need to see some increases to training and consultant posts to ensure they do not reach the same crisis points. This can be balanced against investment in infrastructure, digital pathology, AI, and modernised estates and transport models, which over time can reduce the workforce increases required each year. A skills-based, rather than role-based, approach will be fundamental to creating adaptable workforce models that can meet evolving demand.

While it will take time to realise the benefits, making upfront investment in pathology infrastructure can mitigate the risk of continuous and escalating future financial outlays.

1.1 Shift 1: From hospital to the community

Pathology is central to the NHS's ambition of shifting care closer to home, yet workforce shortages, logistical challenges and the absence of cohesive national strategies remain significant barriers. Realising the full potential of safe and efficient community-based diagnostics – such as point-of-care testing (POCT) and direct-to-consumer (DTC) services – requires consistent pathologist oversight across all regions. Pathologists are essential for interpreting results, guiding clinical decisions, reducing health inequalities and ensuring diagnostic stewardship to prevent unnecessary referrals and system strain.

1.2 Shift 2: From analogue to digital

Digital pathology and AI have the potential to transform the field of pathology, enhancing diagnostic accuracy, efficiency and patient care. Telepathology networks can expand access to specialised diagnostic services in rural and underserved areas.

While these technologies will not replace pathologists, they can optimise workflows, shorten turnaround times, enable remote working and automate routine tasks, which can increase efficiency and allow services to expand with smaller workforce increases.

Investment in digital pathology infrastructure – including scanners, image management systems, and AI tools – alongside education and training to equip pathologists with the skills to use these effectively is essential to realise these benefits. Careful planning of roles and skill mix will be required to support this modern service delivery model.

1.3 Shift 3: From sickness to prevention

Nearly all prevention programmes – including those targeting cancer, cardiovascular disease, obesity, inflammatory disorders and infections – depend on pathology testing. Expanding these initiatives must be matched by investment in pathology services and workforce to manage rising demand. Scaling up cancer screening, particularly in underserved populations, requires adequate resourcing to meet increased needs for biopsies and other diagnostic tests.

Precision medicine, driven by advances in genomics, proteomics and technologies like liquid biopsies, has greatly enhanced early detection and disease monitoring. However, its success depends on robust infrastructure, digital integration and a skilled workforce. Pathology's role in population health, infection control and emerging threats requires multidisciplinary support and investment in data-driven systems. To ensure diagnostic accuracy and foster innovation, increased capacity for research and technology integration is essential.

The recommendations below focus specifically on this consultation topic – the 3 shifts. A full set of the College's recommendations across all 4 NHS England consultation papers – the 3 shifts, modelling assumptions, productivity, and culture and values – is provided at the end of each document.

2 College recommendations: The 3 shifts

2.1 Train

- Fund at least 150 additional medical training posts across all pathology specialties, aligned with population needs. Commit funding for equivalent consultant posts to ensure employment opportunities for those completing training.
- Invest in dedicated UK training pathways for pathologists and scientists to secure safe and sustainable service provision now and in the future.
- Expand the multidisciplinary workforce, including clinical scientists, biomedical scientists and bioinformaticians, as well as the medical workforce to meet the identified shift to precision medicine.

- Embed genomics and AI training into Scientist Training Programme (STP) and Higher Specialist Scientist Training (HSST) programmes to future-proof the workforce.
- Introduce effective incentives for recruitment in hard-to-fill specialties and underserved regions.
- Fund training and resources to support implementation of genetic and molecular testing.
- Develop strategies to attract medical students and scientists into pathology, promoting the specialty as offering excellent work–life balance and career flexibility.

2.2 Retain

- Provide protected time in job plans for professional development, research, teaching, innovation and national professional contributions and ensure these are honoured in practice.
- Invest in administrative and support staff to reduce clinical burden and improve efficiency.
- Support flexible, less-than-full-time (LTFT) and remote working across all pathology grades, and address pension-related disincentives for doctors approaching retirement to support retention.
- Develop clear career pathways for locally employed (LE), specialty, associate specialists and specialist (SAS) doctors and overseas-trained professionals entering via Portfolio Pathway.

2.3 Reform

- Deliver a dedicated pathology workforce plan, informed by accurate data, with a focus on filling current pathology vacancies.
- Modernise IT systems and laboratory infrastructure to support digital pathology and interoperability.
- Centrally fund national rollout of digital pathology, recognising the different needs of and the workforce implications for each pathology specialty.

- Improve interoperability of laboratory information management systems (LIMS) with electronic patient records and prescribing platforms.
- Standardise training and governance for AI integration, ensuring pathologists are equipped to validate and use digital tools safely.
- Support flexible research opportunities, including short clinical projects and multidisciplinary programmes in collaboration with universities, improving access to statistical and research governance support to streamline approvals.
- Prioritise equitable access to training and services, especially in remote and deprived areas.
- Support culturally tailored outreach and diagnostic services to address health inequalities.
- Develop cohesive NHS England strategy for coordinating patient-centric sampling (PCS) and integrating DTC testing into clear clinical pathways with clear clinical governance.
- Promote PCS and community-based diagnostics only with appropriate workforce planning.

2.4 Contingency

- Promote diagnostic stewardship to reduce unnecessary testing and improve resource use.
- Prepare for cybersecurity threats and infrastructure failures with robust contingency planning and workforce capacity.
- Support One Health initiatives, integrating veterinary and human pathology for joint surveillance and response.
- Promote international workforce collaboration to tackle global health threats and improve pandemic preparedness.
- Strengthen multidisciplinary collaboration across care pathways to support efficient diagnosis and treatment, especially in community settings.
- Continue improving pathology classifications and standards to support consistency and quality to reduce burden on the workforce.

3 The vital role of pathology in delivering the 3 shifts

Pathology services, encompassing 17 specialties,[i] are integral to healthcare delivery across prevention, diagnosis, treatment and monitoring. The pathology workforce is essential to realising the NHS 10-Year Plan's 3 strategic shifts: hospital to community, analogue to digital and sickness to prevention. This response focuses on experiences and evidence of how innovation is already happening in pathology – as well as where further investment is needed.

These shifts will increase demand on pathology services, which are already under strain. Historic underfunding has led to outdated equipment, slow technology adoption, regional disparities and lack of quality data to inform workforce planning. Pathology workforce shortages are critical and projected to increase by 20% over the next decade. These workforce shortages are compounded by ageing populations, increasing complexity and limited investment.

Pathology relies on a well-qualified, well-resourced and diverse range of medical, scientific and other health professional roles working together as an integrated team to minimise the impact of workforce shortages and deliver high-quality care. Local input must be embedded within national workforce planning to assist with identifying service pressures. Bespoke solutions are needed for different specialties and regions to ensure distribution of the workforce where it is most needed, particularly regional services that have collapsed.

To deliver the 3 shifts, investment in innovation and new technologies must be coupled with investment in core pathology capacity and workforce. Priorities include filling existing vacancies, increasing the number of training posts, modernising laboratory infrastructure and expanding research and governance. Without this, the system risks falling behind the pace of clinical advancement.

[i] The 17 pathology specialties are cellular pathology, neuropathology, paediatric and perinatal pathology, forensic pathology, chemical pathology/clinical biochemistry, microbiology, virology, haematology, transfusion medicine, oral and maxillofacial pathology, toxicology, histocompatibility and immunogenetics, immunology, genetics, reproductive science, molecular pathology, veterinary pathology.

Aligned with the RCPath Workforce Strategy, urgent action is needed to **train, retain and reform** the workforce, supported by **contingency** measures that optimise service delivery to make the best use of the pathology workforce.

The College provides examples of how the 3 shifts are being implemented in areas of pathology and highlights barriers that must be addressed to ensure progress.

4 Shift 1: From the hospital to community

Pathology will be central to enabling care closer to home. Expanding diagnostic services into neighbourhood health hubs, GP practices and patients' homes can support faster clinical decision-making and reduce delays improving patient outcomes.

Evidence from international models, such as Denmark and Ireland, highlights that shifting care to the community often leads to increased demand – an outcome that must be anticipated and planned for.[2] Expanding diagnostic services into community settings will drive demand for pathology testing. This will require a clear strategy for funding, workforce, governance and implementation. Pathology is already supporting this shift through innovative models of care in some areas, but barriers remain. Addressing these is essential to fully realise the benefits of community-based diagnostics.

4.1 Community-based sampling and POCT

The pathology workforce is essential to the safe and effective expansion of community-based sampling and POCT. These services – including those delivered through community diagnostic centres – offer significant benefits, including reducing hospital visits by enabling patients to access accurate and fast diagnosis on a range of clinical pathways within their community.

Expanding community-based sampling without coordinated planning places significant pressure on logistics, risks fragmenting patient care and undermining continuity of care. When testing services grow faster than the supporting infrastructure – such as data systems, transport pathways and clinical oversight – results are often not well integrated into patient records or shared effectively between providers. Timely integration of POCT results into main laboratory reporting systems ensures results are readily available during admissions/episodes of care. The NCEPOD report of care of patients with abnormal blood sodium levels highlighted the lack of integration of POCT and electronic systems.[3]

Additionally, many POCT services lack the formal oversight or governance structures that underpin laboratory-based testing, raising concerns about testing quality, result interpretation and overall patient safety.[4]

Pathologists provide critical interpretative expertise, linking test results to clinical decision-making. They should serve as a trusted source of advice to support the design, assessment, implementation and delivery of diagnostic services outside of traditional laboratory settings. Expanding community-based testing without sufficient pathology oversight – such as moving to 'test-first' pathways – risks compromising quality and increasing patient anxiety. This can also generate unnecessary referrals, which has clear health system and workforce burdens.

There are good examples of how POCT is enhancing care from hospital to community. Clozapine blood monitoring for people with schizophrenia demonstrates how community diagnostics can improve access and safety[5] – but access remains uneven due to cost, IT connectivity and quality assurance gaps.

Community-based services, such as outpatient parenteral antimicrobial therapy (OPAT) and home parenteral nutrition, illustrate how diagnostic care can safely move into the community. Further opportunities exist for testing in areas such as obesity, cardiovascular risk and allergies, but these require expansion of workforce capacity, robust logistical support and investment in testing infrastructure to be delivered effectively.

The College's strategic guidance on POCT highlights the need for investment in workforce, infrastructure and quality assurance. Good patient care requires that POCT results can be relied upon to the same standards as laboratory testing, ensuring safe, accurate and consistent diagnostic services within the community.[6]

Case study 1: OPAT.

OPAT enables patients to receive intravenous antimicrobial treatment outside hospital settings, improving patient experience and reducing hospital admissions. However, delivery of high-quality OPAT services is constrained by a shortage of trained community nurses. Expanding and supporting the workforce – with appropriate training and staffing ratios – is essential.

Variation in community OPAT (CO-pAT) criteria and escalation protocols has led to a postcode lottery in service provision. Standardising these frameworks would help reduce health inequalities and improve consistency of care.

Community hubs staffed by advanced nurse practitioners (ANPs) – supported by consultant pathologists – can facilitate safe administration of intravenous therapies. Strengthening specimen transport networks and ensuring access to integrated e-requesting systems and diverse medication delivery options (e.g. elastomeric pumps) are also key to improving service quality and equity.

Transparent and equitable funding between Hospital at Home (H@H) and CO-pAT models is needed to meet local population needs. National, non-punitive monitoring of key performance indicators – such as readmission rates, line complications and patient experience – should be encouraged to support continuous improvement and shared learning.

4.2 DTC testing and PCS

DTC testing is becoming increasingly common in the shift to community. Pathologists are essential to ensuring the safety and effectiveness of DTC testing is appropriate, particularly in the context of increased commercialisation and rapid growth of unregulated and poor-quality devices/kits. Evidence of problems with many home tests, such as Follicle stimulating hormone menopause tests and vitamin D tests, underscores the need for regulation and professional input.[7]

While at home testing can empower patients and support early detection, risks include misinterpretation of results, increased anxiety, unnecessary referrals, worsened health inequalities and added pressure on NHS services, as worried patients search for explanation of their test results and drive further unnecessary investigations.

Robust regulation, quality assurance and clinical oversight are critical. Pathologists must be involved in the development, validation and verification of tests to ensure clinical relevance and safety.[8] DTC testing must be integrated into care pathways, focusing on identifying high-risk individuals and reducing health inequalities – as demonstrated by the successful colorectal cancer screening programme. Without appropriate oversight, these

services risk fragmenting care and undermining clinical decision-making. Pathologists are crucial in linking diagnostic data to meaningful clinical action, ensuring that DTC supports, rather than disrupts, patient care.

Other forms of PCS – for example, capillary blood sampling – can enhance patient comfort and accessibility by enabling sample collection at home or in non-clinical settings, particularly for individuals with chronic health conditions or those in rural areas. However, uptake has been slow and variable as individual services, often operating with an already stretched workforce, implement their own approaches.

Currently, there is no cohesive NHS England strategy for coordinating PCS or integrating DTC testing into clear clinical pathways with clear clinical governance. Without a framework there is no consideration for workforce capacity, training needs or the operational impact of implementing these sampling methods which further risks fragmentation and limits the potential to improve healthcare closer to home.

Case study 2: Community-based respiratory sampling.

Respiratory infections are a major contributor to winter pressures in healthcare, particularly within secondary where they drive increases in emergency attendance, admissions and hospital bed occupancy. Implementing a community-based 'test and treat' pathway incorporating a POCT offers a practical and scalable approach to reducing patient deterioration and avoiding unnecessary hospitalisation. By providing rapid on-the-spot results, POCT enables medical professionals to distinguish between viral and bacterial infections, support appropriate prescribing decisions and initiate timely treatment. This approach not only transforms care delivery but also strengthens system resilience during periods of high demand.

To shift healthcare into community settings, robust diagnostic capabilities are essential for accurate infection diagnosis. The lack of POCTs, fragmented sample transport systems and procurement challenges hinder timely and effective care. Long transportation times to centralised laboratories and costly private courier options further exacerbate delays.

Workforce shortages across microbiology – and related roles, including antimicrobial stewardship (AMS) pharmacists, infection prevention and control (IPC) teams and CO-

pAT nurses – are significantly affecting specimen processing, testing, reporting, and the provision of expert advice.

Access to advanced diagnostics, such as rapid molecular testing, sequencing and digital microbiology, remains uneven, contributing to service inequalities. Additionally, poor interoperability between LIMS, electronic prescribing records and prescribing platforms impedes efficient data sharing and clinical decision-making.

To enable high-quality community-based microbiology, procurement processes must be streamlined and overseen by NHS pathology networks to ensure diagnostics are reliable, well-maintained and equitably deployed.

4.3 Diagnostic stewardship

Pathologists play a central role in diagnostic stewardship by advising clinicians and patients on appropriate test selection, interpretation and the broader diagnostic process. Their expertise ensures testing is clinically justified and results are contextualised to support effective decision-making. As community-driven diagnostics expand, the risk of over-testing increases. Diagnostic stewardship is essential to mitigate inappropriate testing. However, it remains challenged by the lack of pathology IT systems that have the necessary functionality, standardisation and interoperability, as well as constrained pathologist time.

There are concerns about indiscriminate use of blood tests both for inpatients and in primary care.[9,10] Haematologists and chemical pathologists are well-positioned to guide policy and clinical practice, to ensure tests are ordered appropriately and interpreted correctly. However, workforce shortages limits time for delivery of effective stewardship. Investment in the haematology workforce is critical for safe, effective diagnostic services.[11]

Expanding access to home and hospice care also improves hospital flow and reduces the risk of hospital-acquired infections. From an infection control perspective, inappropriate use of broad-spectrum antibiotics – particularly at the end of life – remains a concern. Enhanced palliative care, engagement with infection specialists and clear communication with patients and families support realistic expectations and more appropriate AMS.

Continuity of care is critical, particularly for chronic disease management, and depends on timely interpretation of pathology results within the appropriate clinical context. This requires improved access to GPs for patient, and integrated support from pathology services. This would support effective collaboration between pathologists and GPs, enabling appropriate testing and reducing unnecessary referrals.

Scotland's commitment to *Realistic Medicine* – a model of personalised, equitable care – demonstrates how shared decision-making between patients and clinicians can improve resource use and outcomes.[12] When patients understand the rationale behind testing and treatment, they engage more rationally with services. Adopting similar principles in England could enhance workforce efficiency and reduce unnecessary testing.

4.4 Addressing health inequalities

Equitable access to high-quality diagnostics must be ensured across all regions, including remote and deprived areas.

Expanding community-based care must prioritise equitable access. The UKHSA's 2025 report highlights poorer infection outcomes and lower vaccine uptake in deprived areas, alongside broader demographic disparities.[13] Health inequalities also persist in bowel cancer screening, with uptake ranging from 55.8% in the most deprived areas to 67.5% in the least.[14]

Targeted investment in underserved areas, supported by digitisation (e.g. telepathology and interoperable systems), can help address disparities. Outreach initiatives – such as diagnostic buses and culturally tailored awareness campaigns – require sufficient trained staffing and must accommodate linguistic and cultural diversity to be effective.

Pathologists are vital to the development, implementation and delivery of diagnostic initiatives to reduce inequity. Recognition needs to be given to the increased workforce needed to deliver this.

Case study 3: Oral and maxillofacial pathology – addressing health inequalities in head and neck cancer.

Oral and maxillofacial pathologists are central to early diagnosis, staging and prognostication of head and neck cancers. Incidence is rising in the UK, notably oropharyngeal cancer linked to HPV infection. Rates are highest in the most deprived areas and among males, though the rate of increase is faster in females. Late-stage diagnosis remains common and is associated with poorer outcomes.

Specialist pathology input ensures accurate diagnosis of rarer salivary and odontogenic lesions, helping to avoid both over- and under-treatment. Targeted community outreach is vital to improve access to care and earlier diagnosis; for example, anecdotal evidence from our members suggests that awareness initiatives focused on mouth cancer in Asian and Afro-Caribbean communities in Leicester have been effective.

5 Shift 2: From analogue to digital

Digital pathology and automation have the potential to enhance workforce efficiency and support equitable access to diagnostics.

Automation has already modernised many pathology processes. Over decades, innovations such as auto analysers, robotic tracks and aliquoting systems have revolutionised pre-analytical and post-analytical processes across blood sciences. Similar advancements are now emerging in histopathology, promising faster turnaround times and improved productivity amid rising demand and increasing case complexity.

Despite this, many pathology services still rely on outdated technology that limits efficiency and progress toward truly integrated, cost-effective diagnostic system. Modernisation is urgently needed to support digitisation, interoperability and standardisation – including seamless integration with electronic patient records and NHS-facing apps. Addressing long-standing barriers in test coding and data exchange is necessary to enable more efficient workflows and automation.

Pathologists are fundamental to safe, well-governed, laboratory practice, which is even more pertinent with the emergence of new technologies. While innovation and technology can support their work, they do not replace the expertise of pathologists. Workforce

shortages, coupled with lack of investment, leaves pathologists without the necessary resources, time and capacity to integrate this technology into services and training.

5.1 Digital pathology advancement

To expand digital pathology, investment is needed to build on NHS-funded centres of excellence, which can support wider rollout by sharing standards and expertise. Digital pathology requires a national strategy across all pathology specialties, recognising the different needs – including workforce implications – for each discipline.

A nationally coordinated approach could strengthen standardisation, ensure equitable access, allow centres of excellence to focus on high-quality testing while supporting local adoption, and provide strategic oversight to promote consistency across the country. This approach would also facilitate integration with other national initiatives, such as genomic testing and future AI developments.

Case study 4: Digital pathology advancement in paediatric pathology.

Paediatric pathology is benefitting from digital pathology innovation, as part of the National Pathology Imaging Co-operative (NPIC). Based in Leeds Teaching Hospitals NHS Trust, NPIC is a unique collaboration between NHS, academia and industry, deploying digital pathology across hospitals in England. It also plans to develop AI tools to help diagnose cancer and other disease.

As part of this, a national paediatric tumour network is being rolled out to support this specialist service. It aims to enable easy sharing of digital images between paediatric pathology centres to allow faster diagnosis and treatment decisions. It will also help reduce health inequalities in areas with less access to pathology reporting expertise and lead to future educational opportunities.

In July 2024, Great Ormond Street Hospital for Children NHS Foundation Trust went live with the NPIC digital pathology system, the first paediatric hospital to begin using it outside of West Yorkshire. The network is now expanding to other children's hospitals, strengthening the ability of consultants to seek second opinions and, ultimately, provide a faster diagnosis for children all over the country. This is highly valuable in the context of the paediatric and perinatal pathology workforce crisis, where regions of England (Midlands & South West) have no consultants in post.

However, some Trusts, such as Sheffield Children's NHS Foundation Trust do not have the LIMS enable digital pathology, and it may take 2 years to upgrade.

The NPIC has been funded with a £50m investment, highlighting that there are real benefits in shifting from analogue to digital where this is supported by adequate funding and workforce.

5.2 AI

AI has to potential improve efficiency in cancer diagnosis, automating routine tasks, increasing capacity, enabling remote collaboration and supporting clinical decision-making to improve patient outcomes.[15] In pathology, it holds great potential to tackle bottlenecks at the diagnosis stage and can assist with tissue evaluation, triage and prediction modelling using biomarkers.

Applications currently in trial include prostate tumour grading and patient stratification in blood sciences, as highlighted in a joint College report on in early diagnoses in the NHS.[16] Further examples include AI use in Cambridge to identify chromosomal instability in cancer cells and automate analysis of Cytosponge-collected samples for Barrett's oesophagus, improving diagnostic efficiency and freeing up specialist time.[17]

Progress remains constrained by outdated IT systems, limited physical space and insufficient resources. Data storage costs and environmental impact must also be factored into long-term planning. Investment in informatics and big data within the NHS is limited; closer collaboration with universities and industry is essential to advance these tools safely into practice. The potential and pace of application vary between specialties, as identified in the following case studies. In particular, the ability of AI to analyse increasingly complex cases and relieve workforce pressures on direct patient-facing pathology specialties will be limited.

Successful use of AI within diagnostics requires investment in workforce, infrastructure and governance, including safeguards for confidentiality, regulation and validation. Current trainees will need tailored training to prepare them for interpreting AI-generated outputs; further discussion of this is covered in our response to Section 3: Productivity gains.

AI can support but not replace the pathology workforce or solve existing workforce shortages.

Case study 5: Harnessing AI in cytology.

In cervical cytopathology, commercial AI systems are already enhancing screening efficiency by prioritising cells for professional review. These technologies should be welcomed and adopted within the NHS to improve workflow and diagnostic accuracy.

While full digitisation still faces technical challenges, AI has strong potential to support routine tasks in the short to medium term. This includes automating cell lineage counting, interpreting immunocytochemistry and scoring predictive markers – freeing up specialists to focus on complex diagnostic decisions.

Despite these efficiencies, a skilled cytopathology workforce remains essential. Investment in both technology and workforce is needed to ensure safe, effective integration of AI into diagnostic practice.

Case study 6: Enhancing surveillance with AI in microbiology.

Infection laboratories already use digital technologies to automate routine testing, improve workflow and allow staff to focus on specialised tasks. AI has the potential to further enhance microbiology services by supporting molecular and genomic reporting, outbreak detection, predictive modelling and automated surveillance of healthcare-associated infections and antimicrobial resistance (AMR) trends.

AI-driven decision support tools are also being integrated into AMS, particularly through e-prescribing platforms. However, reliance on automation and AI carries risks, including workforce deskilling and vulnerability to system failures or cyberattacks. AI cannot make complex, non-algorithmic decisions, such as identifying novel or emerging pathogens.

To be safe and effective, AI tools must undergo rigorous validation and be supported by strong governance frameworks. AI should complement, not replace, expert clinical judgement.

Case study 7: Using AI to support diagnostic accuracy in oral and maxillofacial pathology.

AI has strong potential to enhance diagnostic accuracy by pre-screening slides and highlighting areas for focused review. In well-trained and validated settings, AI may reduce the need for manual slide examination and can outperform humans in specific quantitative tasks, such as counting mitotic figures, assessing proliferative indices, identifying necrosis and calculating ratios of positive cells.

These efficiencies can help manage increasing workloads but to realise these benefits, the NHS must engage with AI developers to ensure tools are designed, trained, validated and safely integrated into diagnostic workflows that meet clinical standards.

5.3 Interoperable IT systems

Interoperable systems currently impact pathology efficiency in traditional laboratory settings. The current lack of integration and standardisation – particularly in test codes, nomenclature, units, as well as Trust firewalls – impedes data sharing, delays care and increases resource burden. To avoid compounding these issues, community-based pathology requires interoperable, standardised digital systems that connect laboratories with electronic patient records, clinical databases and patient-facing platforms from the outset.

Digital pathology offers potential for remote collaboration and second opinions, but limitations in system compatibility and governance currently restrict these benefits. A successful example of interoperability is the integration of electronic patient records for blood tests between 2 Cambridge hospitals, which improved safety and efficiency for laboratory staff.[18]

Implementing compatible IT systems throughout England would deliver a world-leading, truly national service that would deliver digital and AI pathology effectively. This would further streamline genomics and cancer care.

LIMS must be upgraded to support seamless data exchange across NHS services. Investment in skilled IT support staff and infrastructure is essential to implement and maintain these systems.

Case study 8: digital transformation at University College London Hospitals (UCLH).

Our members report that the adoption of the Epic Electronic Health Record (EHR) system at UCLH has transformed their haematology practice. The system has streamlined access to patient records, improved communication across teams and facilitated engagement with patients and primary care. While this represented a significant investment, it highlights the potential of digital innovation to enhance workflow and patient care.

Lessons from UCLH underscore the importance of supporting similar initiatives, including upfront investment, across England to ensure equitable access to digital healthcare solutions for pathology services, particularly as a significant proportion of trusts continue to rely on legacy, non-interoperable systems.

5.4 Remote working

Quality digital infrastructure can improve collaborative working across pathology. Remote access enables pathologists to consult with colleagues and other clinicians in real time, expanding access to care for patients particularly in rural and underserved served areas. This should continue to be encouraged and developed.

Case study 9: Rapid on-site evaluation (ROSE) in community diagnostic hubs.

Cytology plays a critical role in cancer diagnosis, particularly through ROSE, where samples are assessed immediately during aspiration to confirm adequacy for diagnosis and ancillary testing (e.g. molecular analysis).

ROSE can be effectively delivered in community diagnostic hubs using telecytology.[19] In this model, a clinical imaging assistant prepares slides and places them under a microscope equipped with a video camera. A biomedical scientist or consultant pathologist then remotely views the images via platforms like Microsoft Teams, guiding the assistant in real time and providing immediate feedback on sample quality.

This approach is already in use in several UK centres and offers a scalable solution for hubs that face staffing challenges. It enables timely, high-quality diagnostic input without requiring on-site pathology personnel.

However, the potential of ROSE in community settings is constrained by workforce shortages. Cytopathology is a subspecialty within cellular pathology that faces acute staffing pressures. Expanding and supporting a skilled cytopathology workforce – including biomedical scientists – is essential to realise the full benefits of remote diagnostic models and improve early cancer detection in community settings.

5.5 Safeguarding pathology services against IT disruption

Pathology services face increasing risks from cyber-attacks, system failures and supply chain issues. Poor IT interoperability and limited capacity compromise their flexibility and resilience, posing significant risks to service provision.

The June 2024 cyber-attack in southeast London highlighted the urgent need for robust contingency planning. Services must be equipped with ready to deploy, interoperable solutions to maintain sustainability and protect patient safety. This includes adequate workforce capacity to maintain service delivery during IT disruptions.

While the attack itself was external, it highlights the importance of integrated, standardised IT systems – such as fully interoperable LIMS platforms – to improve resilience, facilitate recovery and ensure continuity of pathology services during unexpected events.

6 Shift 3: From sickness to prevention

Advances in technology and diagnostic testing, especially in the areas of genomics and proteomics, have radically increased the potential that screening, early diagnosis and monitoring have for patients. Both clinical and laboratory elements of pathology are necessary for screening and preventative strategies in cancer, obesity, cardiovascular disease, infection and other conditions. Given that nearly all preventative programmes depend on pathology testing, any expansion will require corresponding growth in pathology services to manage the increased workload that these programmes will create.

Clear focus is needed on the level of investment intended for initiatives in the 10-Year Plan.[20] Preserving a focus on prevention is challenging when general practices and hospital emergency departments – as well as pathology services – are overwhelmed with demand. Recognising this in workforce planning is essential.

6.1 Screening

Screening is vitally important for prevention and the early detection of preclinical disease at a stage when it can be more effectively treated or even cured. Pathology services are heavily involved in such screening from before birth until after death. Cellular pathology is critical to cervical and bowel cancer screening programmes; paediatric and perinatal pathology services support parents to understand the reasons for the loss of their child; post-mortems help family members' awareness of genetic disorders by identifying inherited diseases through autopsy processes. These services are all at risk with insufficient pathology workforce or support to deliver them.

6.2 Cancer screening and care

Cancer incidence in the UK is projected to rise by 2% by 2040, with over 500,000 new cases annually by 2038–2040.[21] Pathology underpins cancer screening and early diagnosis, which are central to preventative healthcare. As outlined in the College's response to the call for evidence for the National Cancer Plan, the NHS requires urgent investment in pathology staffing – across histopathology, haematology and other specialties – to address backlogs, reduce waiting times and support prevention.[22]

The pathology workforce must be expanded to meet current and future demand. For example, widening bowel cancer screening to ages 50–74 using faecal immunochemical testing has significantly increased workloads. Workforce levels have not kept pace, resulting in delays – only 88% of polyp pathology meet the targeted turnaround time.[23] Clinical biochemistry and histopathology are both impacted, which requires specific assessment of the additional workforce required for each of these specialties.

Histopathology is central to the screening, diagnosis and grading of prostate cancer. The rise in prostate biopsies, especially with the introduction of pre-biopsy MRI and fusion-targeted biopsies, has increased the complexity and volume of cases that pathologists face.[24] A recent report from Prostate Cancer UK modelled that the introduction of a targeted screening programme would require the greatest workforce increase in pathology.[25] This is in addition to investment in training and modernised, AI-supported workflows. The report also recognised that pathology services are already short-staffed and that active surveillance protocols, including confirmatory and interval re-biopsies, would add further pressure.

All pathology disciplines are integral to cancer pathways, yet inadequate funding risks creating bottlenecks in diagnosis and treatment. Cellular pathology remains particularly constrained by underinvestment and workforce shortages. High rates of retirements and too few training posts exacerbates these shortages. According to the RCPath Workforce Census 2025, 80% of cellular pathologists report that current staffing levels are inadequate to ensure long-term sustainability of their service and to meet growing demand.

To meet rising demand and improve early diagnosis, the NHS must expand the pathology workforce and invest in training, digital infrastructure, genomics and AI-enabled workflows. Emerging technologies – such as multi-cancer detection blood tests and AI tools – offer promise for earlier diagnosis and improved outcomes. However, their success depends on adequately resourced services, integrated pathways and coordinated engagement with primary care to ensure appropriate test utilisation and referrals.

Prevention and early detection of cancers remain the most cost-effective strategies to improve survival and reduce the burden on the NHS. To do this successfully, there must be strategic investment across the pathology workforce, infrastructure and innovation.

Case study 10: Advancing cancer screening and care through innovation.

Researchers have developed multi-cancer early detection (MCED) blood tests capable of identifying a common cancer signal from over 50 cancer types and predicting its tissue of origin. These tests detect circulating tumour DNA (ctDNA) with distinct methylation patterns compared to non-tumour DNA. MCED offers promise for detecting cancers currently unscreenable through conventional methods. However, further refinement is needed.

Precision medicine is also transforming cancer management by tailoring therapies to the genetic profile of individual tumours, while emerging approaches like liquid biopsies offer promising alternatives where traditional tissue sampling is not feasible or timely.[26]
For example, the QuicDNA project, initiated in early 2023 in Wales, focuses on integrating non-invasive ctDNA testing into the lung cancer diagnostic pathway.[27]

Success of these innovations will depend on adequate resourcing and workforce to scale up increased demand for biopsy and other tests as a result of increased cancer signals.

6.3 Personalised treatment and precision medicine

Personalised treatment enables more targeted care, reducing unnecessary interventions and improving patient outcomes. Early, thorough clinical assessment – particularly in cancer care – can help avoid over-investigation, such as unnecessary imaging, and ensure appropriate escalation.

The expanding field of cardiometabolic medicine – including lipidology, obesity and diabetes – also aligns closely with the NHS prevention agenda. Precision medicine has significant potential to reduce the burden of these common and complex conditions and strengthen evidence-based medicine.[28] Despite its clinical importance, growth in this area has not been matched by investment in the chemical pathology workforce, training or national leadership. To realise its potential, greater collaboration with universities and sustained investment in translating biomarkers into routine practice are essential.

6.4 Genomics

Genomics is a key driver of healthcare reform in the NHS 10-Year Plan, underpinning pre-emptive and personalised care through predictive analytics. Advances in technology and scientific understanding have rapidly increased demand for genomic services, with AI expected to further enhance the identification and application of disease-causing and preventative genetic variants, supporting precision medicine. This also includes the introduction of new technologies such as liquid biopsy and working with pathology to identify pathways where genomic tissue testing is no longer required.

Genomic testing enables earlier and more accurate diagnosis, personalised treatment plans and preventative care for cancer, rare diseases and common conditions such as cardiovascular and respiratory disorders. It also supports reproductive screening and integration with digital health records to provide a comprehensive view of patient health.

Despite England's commitments to expanding the NHS genomics capabilities,[29] there is concern that England will struggle to meet the scale and ambition of its genomics agenda.

Significant and urgent investment in testing capacity and the pathology workforce – including clinical scientists, bioinformaticians and pathologists – is essential to realise the full potential of genomics and avoid bottlenecks in cancer pathways and precision medicine delivery.

6.4.1 Challenges to genomics expansion

Variation in test request systems, continued reliance on paper and PDF formats, and limited IT integration hinder efficiency. The arrangement of genomics testing has significant impact for cellular pathology departments, with resource from the latter required to identify suitable archival diagnostic tissue samples to send for genetic analysis. Data from our Workforce Census found that only 62% of respondents working in a genomics service reported that their service used digital requests and all reported they continue to receive paper requests, further limiting integration and slowing workflows.

The National Optimal Lung Cancer Pathway (NOLCP) recommends a 14-day turnaround from sample acquisition to molecular report, yet only 3% of respondents reported that their services reported consistently meeting this target (Figure 1). Contributing factors to not meeting recommended turnaround times included high workload, staffing shortages, logistical inefficiencies and limited access to technology (Figure 2). Chasing referrals for clarification of patient information or tests requested was cited as a particular strain on the workforce.

Figure 1. How often cancer genomics services report that they can meet NOLCP turnaround targets.

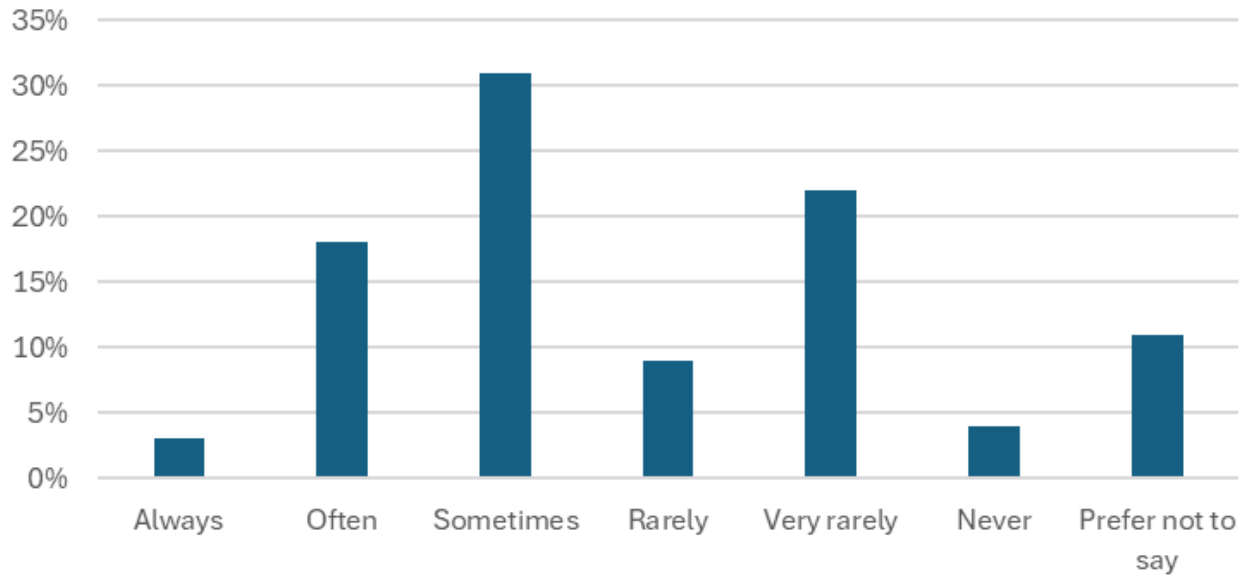
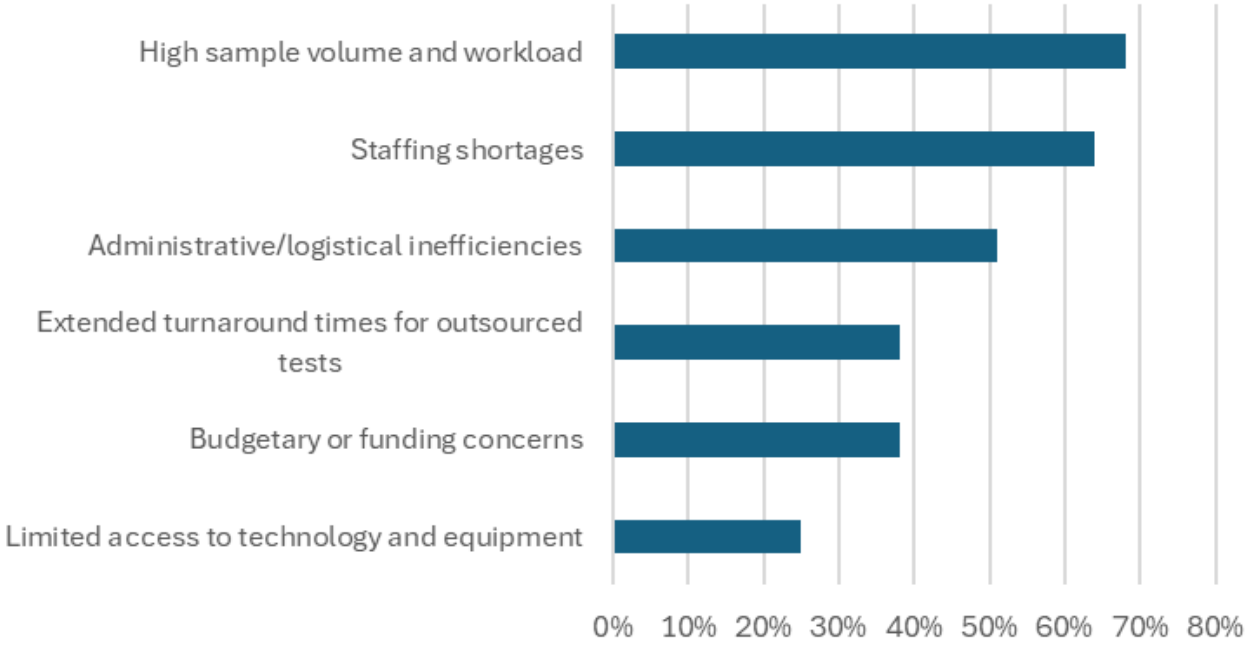


Figure 2. Top 5 reasons reported for not meeting NOLCP targets.



Emerging real-time diagnostics using next-generation sequencing and histology offer promise, but their success depends on automation, cost-effective methods and a well-resourced genomics workforce. Cellular pathology services are under increasing pressure to deliver the number of designated cancer genomic tests required to support rapid turnaround times or when samples are limited, yet funding and workforce capacity have not kept pace with growing demands. Without coordinated action, genomic medicine risks becoming a bottleneck in cancer care and precision medicine delivery.

Successful delivery of the genomics expansion, as outlined in the NHS 10-Year Plan, will require substantial and urgent investment in the following areas.

6.4.2 Workforce required across genomics, pathology and informatics

Delivering high-quality genomic services requires a sufficient number of highly trained professionals, including consultant-level clinical scientists, bioinformaticians, pathologists and oncologists – many of whom are currently in short supply. The national shortage of band 7 clinical scientists is particularly concerning, given the rapid growth in genomic testing over the past 8 years.

To ensure long-term workforce sustainability, genomic methods and result interpretation must be embedded as core components of STP and HSST training programmes across

blood sciences, immunology and microbiology. This will equip the next generation of clinical scientists with the skills needed to support and advance genomic medicine.

6.4.3 Testing infrastructure, governance and digital systems

Robust and interoperable digital systems across the UK are necessary to support equitable patient access to genomic-informed care. AI is expected to simplify the analysis and interpretation of large DNA sequencing data (datasets) in the future, increasing efficiency and reducing per-sample time pressures. Its integration will be critical to the success of genomic initiatives.

The field has embraced both the introduction of bioinformaticians and data scientists within senior laboratory teams; these professionals, now trained to HSST consultant level, are central to genomic laboratories across the UK. Clear legal and ethical frameworks for data sharing, AI applications and research access is also necessary. Realising these benefits will depend on significant and sustained investment in digital infrastructure, data standards and workforce capacity.

6.4.4 Translational pathways

Effective integration of WGS into clinical decision-making requires faster sequencing pipelines and standardised sample preparation. Fresh frozen tissue remains the gold standard for WGS due to its superior DNA/RNA integrity, but practical constraints limit its routine use across the NHS.

To support rapid diagnostics, NHS England commissioned Cellular Pathology Genomic Centres (CPGCs) under the Genomic Medicine Service to lead tissue preparation, tumour assessment, immunohistochemistry and digital imaging. These centres also deliver designated genomic tests where sample availability is limited.

Despite this progress, genomic testing remains disconnected from cellular pathology in many UK centres. A more integrated model – similar to CPGCs – could also benefit haemato-oncology services, where upstream testing in haematology and flow cytometry informs genomic analysis. Oversight and engagement from both genomics and pathologists are essential to service design and to ensure diagnostic accuracy and timely reporting.

6.5 Pathology in population health

Pathology must take a central role in population health strategies, working closely with public health and preventive care initiatives. Strengthening diagnostic services is vital for early detection and rapid response to emerging health threats.

Infection screening, microbiology, virology and IPC services are essential to monitoring and managing infectious disease outbreaks. However, variability in staffing, equipment and POCT capabilities – particularly in community and acute settings – continues to hinder effectiveness. Addressing workforce shortages through multidisciplinary support, including data analysts, can help to ensure timely interpretation of complex surveillance data, such as that related to water and food safety.

A truly integrated approach requires adoption of the One Health model, which recognises the interconnectedness of human, animal and environmental health. Veterinary pathology is crucial for zoonotic disease monitoring, AMR surveillance and food safety, yet remains underfunded. It has limited career progression opportunities and is poorly integrated into human health systems.

Enhanced collaboration between infection specialists, UKHSA and ICS is needed to improve AMR surveillance and outbreak response. Reforming funding models to reflect the true value of IPC services could help attract and retain specialists. Investment in data-driven performance monitoring and recognition of IPC as a subspecialty through fellowships or dedicated training pathways would further strengthen expertise and service resilience.

6.6 Holistic pathology

Pathologists help patients develop tools and knowledge to engage in their healthcare, but they also need the time to provide holistic support. Embedding them in service design and population health teams would help tackle health inequalities. This is exemplified by an 18-month project undertaken in conjunction with Roche to facilitate a more holistic approach in haematology to managing elderly non-Hodgkin's patients' post-diagnosis, which identified improved outcomes, reduced length of stay and improved patient experience.[30]

6.7 Time and resources for research and implementation of preventative innovations

Pathologists drive innovation. Investment in research is needed for both technological and non-technological advances to be made, in the interests of patients. Time and investment for dedicated time for research needs to be factored into workforce planning.

Case study 11: Self-injectable glucagon-like peptide-1 (GLP-1) agonists for obesity.

The emergence of self-injectable GLP-1 agonists for obesity is transforming obesity treatment.[31] Chemical pathologists were instrumental in research and trial evaluation and are now actively engaged in deploying and monitoring this therapy in routine care. Multiple trials indicate that GLP-1 agonists could provide benefits beyond weight reduction, including improvements in type 2 diabetes, cardiovascular disease and other obesity related conditions.

Case study 12: Investing in H&I pre-emptive transplantation.

H&I services in the UK are delivered through a network of 24 laboratories. These services are essential to supporting solid organ and haematopoietic stem cell transplant programmes, as well as providing diagnostic testing for autoimmune diseases, drug hypersensitivity and transfusion medicine.

The *Organ Donation and Transplantation 2030: Meeting the Need* strategy outlines a 10-year vision to improve transplant outcomes and optimise resource use.[32] One of the most impactful opportunities identified is the expansion of pre-emptive transplantation – where patients receive a transplant before requiring dialysis.

Investment in H&I services is critical to enabling this shift. Pre-emptive transplants not only improve patient outcomes but also reduce healthcare costs; for example, a report from Kidney Research UK highlights that avoiding dialysis through early transplantation is projected to save £51.8 million.[33] Currently, around 30,000 patients are on dialysis, each losing at least 12 hours per week to treatment. Without intervention, this number could rise to 143,000, with transplant demand reaching 12,000 per year by 2033.

Expanding H&I capacity through workforce investment – particularly in training, recruitment and retention – will be essential to meeting future demand and delivering cost-effective, patient-centred care.

6.8 Drug problem services

The UK has a significant drug abuse/misuse problem and relies on toxicologists to support drug screening, identification and treatment programmes. Clinical toxicology services are under resourced, with basic non-specific drug screens rarely backed up by the necessary confirmatory services that are often only available after death.

Investment is needed in analytical equipment, such as high-resolution mass spectrometry, to enable systemic toxicological analysis, including the detection of novel psychoactive substances (NPS) not captured by standard non-specific drug screens. Resources should also support the purchase of reference materials that aid the accurate identification of NPS, allowing laboratories to respond rapidly to the evolving drug market and provide precise data on drug use trends.

Equally important is investment in staffing: skilled personnel are required to interpret complex results, maintain and update drug libraries and ensure timely reporting to both clinical care and public health interventions. Strengthening support for toxicology services would enable harm reduction programmes to function more effectively and reduce both morbidity and mortality.

7 College recommendations

Immediate action is needed to develop a pathology workforce fit for future. Investment in infrastructure, technology, IT, automation, digital pathology and advanced roles will enable pathology to increase productivity, reduce demand and improve patient pathway. But investment is needed first to realise these goals.

To ensure that these investments translate into sustainable improvements, centralised workforce planning for pathology is essential. This should include modelling based on current establishments, vacancies, projected retirements, workforce attrition, LTFT

working, service redesign, and centrally collected and analysed pathology diagnostic data to inform workforce planning.

Responding to NHS England's 4 consultation requests – the 3 shifts, modelling assumptions, productivity and culture and values – the College makes the following recommendations.

7.1 Train

- Fund at least 150 additional medical training posts across all pathology specialties, aligned with population needs. Commit funding for equivalent consultant posts to ensure employment opportunities for those completing training.
- Invest in dedicated UK training pathways for pathologists and scientists to secure safe and sustainable service provision now and in the future.
- Reinstate locum appointment for training posts to support flexible and LTFT training pathways.
- Expand the multidisciplinary workforce, including clinical scientists, biomedical scientists and bioinformaticians, as well as the medical workforce to meet the identified shift to precision medicine.
- Embed genomics and AI training into STP and HSST programmes to future-proof the workforce.
- Introduce effective incentives for recruitment in hard-to-fill specialties and underserved regions.
- Fund training and resources to support implementation of genetic and molecular testing.
- Develop strategies to attract medical students and scientists into pathology, promoting the specialty as offering excellent work–life balance and career flexibility.
- Expand protected academic training posts and increase the number of academically trained senior doctors to supervise and mentor trainees to ensure that the pathology workforce is adequately resourced to research and develop new innovative ways of working.

7.2 Retain

- Provide protected time in job plans for professional development, research, teaching, innovation and national professional contributions and ensure these are honoured in practice.
- Invest in administrative and support staff to reduce clinical burden and improve efficiency.
- Support flexible, LTFT and remote working across all pathology grades, and address pension-related disincentives for doctors approaching retirement to support retention.
- Develop clear career pathways for LE and SAS doctors and overseas-trained professionals entering via Portfolio Pathway.
- Correct the current exclusion of CPD funding for healthcare scientists in the 2024–2025 year to ensure equitable support in line with other regulated clinical professions.
- Formal job planning for consultant scientists should be endorsed to ensure consistent recognition of their clinical and scientific contributions and equitable access to professional development opportunities.

7.4 Reform

- Deliver a dedicated pathology workforce plan, informed by accurate data, with a focus on filling current pathology vacancies.
- Modernise IT systems and laboratory infrastructure to support digital pathology and interoperability.
- Centrally fund national rollout of digital pathology, recognising the different needs and the workforce implications for each pathology specialty.
- Improve interoperability of LIMS with electronic patient records and prescribing platforms.
- Standardise training and governance for AI integration, ensuring pathologists are equipped to validate and use digital tools safely.
- Establish more digital pathology fellowships to support and develop the workforce in the digital era, enabling greater impact.

- Support flexible research opportunities, including short clinical projects and multidisciplinary programmes in collaboration with universities, improving access to statistical and research governance support to streamline approvals.
- Prioritise equitable access to training and services, especially in remote and deprived areas.
- Support culturally tailored outreach and diagnostic services to address health inequalities.
- Develop cohesive NHS England strategy for coordinating PCS and integrating DTC testing into clear clinical pathways with clear clinical governance.
- Promote PCS and community-based diagnostics only with appropriate workforce planning.
- Invest in laboratory services to support service development and innovation. Future roles must be equipped to provide clinical leadership from within laboratories, working collaboratively in multidisciplinary teams.

7.5 Contingency

- Promote diagnostic stewardship to reduce unnecessary testing and improve resource use.
- Prepare for cybersecurity threats and infrastructure failures with robust contingency planning and workforce capacity.
- Support One Health initiatives, integrating veterinary and human pathology for joint surveillance and response.
- Promote international workforce collaboration to tackle global health threats and improve pandemic preparedness.
- Strengthen multidisciplinary collaboration across care pathways to support efficient diagnosis and treatment, especially in community settings.
- Continue improving pathology classifications and standards to support consistency and quality to reduce burden on the workforce.

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9 Contact details

This response was collated by the Workforce and Engagement team within the Professional Practice Directorate of the College, informed by feedback from Specialty Advisory Committees.

Please contact the College if you have any questions: workforce@rcpath.org.

10 About the Royal College of Pathologists

The Royal College of Pathologists is a professional membership organisation with more than 11,000 fellows, affiliates and trainees, of which 23% are based outside of the UK. We are committed to setting and maintaining professional standards and promoting excellence in the teaching and practice of pathology, for the benefit of patients.

Our members include medically, dentally and veterinary qualified pathologists and clinical scientists in 17 different specialties, including cellular pathology, haematology, clinical biochemistry, medical microbiology and veterinary pathology.

The College works with pathologists at every stage of their career. We set curricula, organise training and run exams, publish clinical guidelines and best practice recommendations, and provide continuing professional development. We engage a wide range of stakeholders to improve awareness and understanding of pathology and the vital role it plays in everybody's healthcare. Working with members, we run programmes to inspire the next generation to study science and join the profession.