

Topol Review: Progress on the recommendations



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Foreword

Published in 2019, the Topol Review presented a compelling vision for preparing the healthcare workforce to deliver the digital future, where technology can help address the big healthcare challenges, through augmenting the workforce, driving productivity, and ultimately releasing more time to care for patients.

The COVID-19 pandemic accelerated changes in the way care was delivered beyond our expectations, transcending digital transformation to become a top priority for NHS policy makers and leaders, demonstrated at the peak of the pandemic where 70% General Practitioner consultations took place either online or by telephone, compared to 30% consultations prior to the pandemic ([Royal College of GPs, 2021](#)). This has presented both opportunities and challenges for delivering the digital future in the context of the Topol Review recommendations.

As Senior Responsible Officer for the Review, I am very proud of the team's achievements over the last four years. It has been a pleasure to both lead and observe the programmes and initiatives described in this update paper. There has been significant progress made by Health Education England and our delivery partners in helping to make this vision a reality, including:

- Establishment of education programmes in Genomics, Digital Readiness and Digital, AI and Robotics Technologies (DART-Ed) to develop workforce capability at all levels
- Development of our Knowledge and Library Services offer, making knowledge more accessible to healthcare professionals ensuring evidence-based decision making, as well as helping to improve digital and health literacy of patients and citizens
- Growth in use of the elearning for healthcare hub, now with over two million users accessing 450+ elearning programmes, and launch of the Learning Hub, enabling the health and care workforce to contribute and share a wide variety of learning resources for colleagues to use.

The legacy of the Topol Review continues with the recent publication of a report on [Developing healthcare workers confidence in AI](#), where Dr Eric Topol praised the work as “*a model for other countries to adopt as we move forward with implementing AI in medical practice*”. I would like to thank those that continue to work on the recommendations of the report and look forward to seeing continued impact both at home in the NHS, and globally.

Patrick Mitchell
Director of Innovation, Digital and Transformation
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Progress towards recommendations

Recommendations from the Review Board

P1. In a similar way to other public health education initiatives, programmes aimed at engaging and educating the public about genomics and digital healthcare technologies should be developed.

Health Education England's Genomics Education Programme (GEP) and the NHSE/I Genomics Unit have engaged with patients and the public to develop information and education materials to support patient journeys and testing routes through the NHS Genomic Medicine Service (GMS). The GEP is:

- Working with a number of charities including Macmillan Cancer Support, the British Heart Foundation and HEART UK to bring patient and public voice into the development of our education resources for the NHS workforce.
- Jointly funding a cancer and genomics subject matter expert to develop promotional and awareness raising activities for genomics in cancer care; assess the impact of this campaign and evaluate the learning offer.
- Establishing a patient and public involvement group as part of its strategy to advise on different aspects of the programme and enable individuals with lived experience of genomics and rare disease to contribute to the resources.

HEE's Technology Enhanced Learning (TEL) team launched the [Learning Hub](#), a digital platform providing easy access to a wide range of education and training resources for the health and care workforce. Organisations and users can contribute and share resources via the Hub.

The Health and Digital Literacy partnership initiated by HEE's national NHS Knowledge and Library Services (KLS) team (see also P2) is building capability within communities to educate and engage the public to find and use high-quality information and digital tools, including Apps and resources within the Learning Hub.

P2. The NHS should work with patient and carer organisations to support appropriate patient education.

HEE's national KLS team initiated a [Health and Digital Literacy Compact](#) with CILIP (the library and information association), Libraries Connected (public libraries) and Arts Council England. Together they aim to establish a sustainable approach to improve the health and digital literacy of citizens. They are developing resources, cascading training and test approaches through local pilot sites.

Developed in partnership with NHS Digital and the former NHSX, Digital Unite has developed a [Digital Health Champions Network](#) with online training and support that turns healthcare staff

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and volunteers into confident Digital Health Champions. The Network provides health organisations with a ready-made framework to achieve sustainable digital inclusion.

HI1. Local arrangements should be established to provide needs-based targeted education and support through existing patient support provision, where possible.

HEE's national KLS team commissioned an enhancement to the [health literacy geodata](#) developed with the University of Southampton, to include interactive maps at borough level. The Health and Digital Literacy partnership is using these data to prioritise pilot initiatives.

See also P2.

Recommendations from the Genomics Panel

G1. The NHS, in partnership with relevant regulatory bodies, should establish a clear, robust framework by which healthcare professionals use genomic data, which safeguards patient confidentiality, and inspires the support and confidence of citizens and the wider community.

Clear protocols and guidance have been embedded practice within the GMS and will be monitored by the NHSE/I Genomics Unit together with Genomics England.

G2. All healthcare professionals should receive core training in genomic literacy to help them understand the basis, benefits and ethical considerations associated with genomics.

The HEE [GEP](#) has focused on the development and delivery of core training in genomic literacy for healthcare staff with little or no knowledge of genomics and its application in the NHS. e.g.

- A range of online modules, including Talking Genomics, Inheriting Genomic Information, and From Genes to Genome, completed by 33,700 learners to date.
- A growing series of bitesize, 10-minute introductory sessions to aid understanding of genomics in healthcare. These have reached 66,000 learners, viewed 145,000 times.
- Introductory courses have attracted 10,300 users, with c5,000 UK learners completing the "Whole Genome Sequencing: Decoding the Language of Life and Health" MOOC.

In addition:

- HEE is working with the Royal Colleges to develop genomics content into curricula for NHS professions, so staff have a basic understanding of genomics and its application.
- Genomics and genomic literacy are being included in resources offered through the HEE Digital Academy service including through its digital skills assessment tool.
- HEE NSHCS has reviewed 33 curricula for NHS scientists. New curricula with genomics content, is now in place for all trainees on Master's level Scientist Training Programmes.

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G3. Lifelong training should be available to healthcare professionals with emphasis on continuing support in this rapidly evolving field, including access to dynamic 'just-in-time' digital updates and online genomic information resources.

The GEP launched the second of its two [competency frameworks](#): Communicating Germline Genomic Results. This cross-professional competency framework focuses on the knowledge, skills and behaviours needed to communicate results of a genomic test to patients and their families.

These frameworks are supported by a range of "just in time" resources and factsheets. The newest resource is [GeNotes](#), developed to support clinicians in using genome testing in their clinical practice and consists of two tiers of information. Tier one is specialty specific, 'just in time' information to support the clinician, while tier two allows the user to chart a bespoke learning journey. GeNotes for the oncology specialty, launched in June 2022, has over 4,000 page views and over 1,000 users to date.

HEE NSHCS, in collaboration with the University of Manchester and clinical partners, has commissioned a flexible Clinical Data Science programme to support the development of data science, machine learning and digital transformation capabilities across wider NHS workforce. The programme contains modules that can be taken as standalone CPD, or which can aggregate to a PG Cert. The first module of the programme went live in October 2022 with the full PG Cert commencing in 2023.

HEE NSHCS is also working with partners to deliver an increasing number of end-point assessments in bioinformatics and clinical data science apprenticeships.

HEE TEL team's elearning for healthcare hub now has over 2 million registered users accessing its 450+ elearning programmes. The Learning Hub, launched in May 2020, provides easy access to a wide range of education and training resources for the health and care workforce. Organisations and users can contribute and share resources. (See also P1).

G4. Accredited genomic training for healthcare professionals should be established in key clinical specialities to incorporate genomic testing and genomic counselling into their practice.

Progress by the GEP includes:

- Accredited CPD opportunities including a Master's in Genomic Medicine framework, delivered by seven HEIs. To date, 2,449 NHS staff have completed 11,389 modules. The framework has been commissioned to 2023.
- Continued funding to deliver a genomics framework and resources to support the medical workforce in conjunction with the Academy of Medical Royal Colleges (AoMRC). AoMRC published a [genomics generic syllabus](#) in November 2021 which details the fundamental genomic building blocks across the medical specialties to inform speciality specific curricula, develop educational resources and map to professional exams.

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- Supporting the workforce elements of the seven NHSE/I Genomics Unit transformation projects, looking at the development of patient pathways, identifying critical touchpoints and interventions where education and training may be required. The GEP will work with the GMS to address any gaps in provision, and continue to support through its [Clinical Pathway Initiative](#) (CPI), a step-by-step method to identify workforce development and education needs aligned to patient pathways across the GMS.
- Commissioning a pharmacy-genomics subject matter expert to develop a strategy for embedding genomics into pharmacy practice.

HEE NSHCS delivers the curricula for healthcare scientists in genomics, leading to a master's qualification as a Clinical Scientist and registration with the Health and Care Professions Council (HCPC). The current Scientist Training Programme (STP) includes cancer genomics, genomics, genetic counselling and genomic bioinformatics. Since 2014/15, 59 individuals have undertaken, or are undertaking, the Higher Specialist Trainees (HSST) programmes and 239 individuals have undertaken, or are undertaking, Scientific Training Programmes (STPs).

HEE's Digital Readiness programme previously supported the establishment of the Faculty of Clinical Informatics and the Federation of Informatics Professionals (umbrella body), to help professionalise the digital workforce. This will lead to the establishment of learning and development standards and competencies against career pathways, accreditation, and the development of learning resources.

G5. Capacity should be built within the NHS Genomic Medicine Service through support for specialist healthcare professionals including genomic counsellors, clinical scientists and specialists in genomic medicine.

There is an increasing recognition of the need for a new role within the GMS to both support clinicians in requesting whole genome sequencing studies for their patients, and clinical scientists to ensure the appropriate paperwork and samples are sent to the laboratories. The GEP has convened a multi-professional working group to develop a job description, including role descriptors, entry points and career progression, as well as a competency framework.

There is increased investment in the number of genomics related STP and HSST training places. Trainees will start their programmes in September 2022 across disciplines in genomics, cancer genomics, genomic counselling, genomic bioinformatics and genetics. A further uplift of 68 trainees across the system is anticipated.

There is an increasing need for healthcare workers to understand genomic variant interpretation and the GEP is collaborating with St George's University of London and Cancer Research UK to develop two MOOCs in this field.

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G6. An attractive career pathway should be developed for bioinformaticians, including expansion of Higher Specialist Scientist Training for clinical bioinformaticians

The GEP and NHSE/I Genomics Unit have identified a shortfall in NHS bioinformaticians. HEE is working with Health Data Research UK (HDRUK) to define the 'Future of the data scientist' and better understand the capacity and supply of bioinformaticians with a view to developing more attractive career pathways.

NHSX convened a cross-system Workforce Partnership Board which will provide oversight for ensuring the future digital workforce capacity and capability needs are met. HEE's Digital Readiness programme published a [research paper](#) that set out thinking and forecasts for the digital workforce to 2030. This showed a required increase in workforce, including bioinformatician roles, from circa 46,000 to circa 78,000 by 2030.

G7. A framework for genomic leadership should be developed across clinical specialities and primary care settings to encourage and disseminate best-practice and to simplify patient referral systems.

The GMS infrastructure has grown considerably over the last 2 years with the evolution of seven Genomic Laboratory Hubs (GLHs) and the same number of GMS Alliances (GMSA). The establishment of the GMS Alliances will:

- Help embed genomics into routine care locally by bringing together multi-disciplinary clinical leadership and digital functions that are necessary to enable this.
- Review equity of access for patients to the genomic tests commissioned by the NHS and set out in the National Genomics Test Directory.
- Support the establishment of testing pathways for cancer and rare diseases, enable clinicians to request genomic tests, introduce new models of care that support early access to genomic testing and understand where there are areas of unmet need.

The GEP will support leadership education and training through links with the NHS Leadership Academy and deliver webinars and masterclasses.

HEE is delivering learning content for boards and senior leaders, through a partnership with NHS Providers, which focuses on the importance of future technologies and how this can transform an organisation. This has directly impacted over 80 trust boards through bespoke development and has also included guidance, peer learning events and established digital leadership networks.

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G8. Academic institutions should ensure genomics and data analytics are prominent in undergraduate curricula for healthcare professionals, and that there should be expansion of undergraduate capacity in genomics, bioinformatics and data science.

The GEP works closely with the seven HEIs which deliver Genomic Medicine Master's (see G4) and continues to work with HEIs delivering undergraduate healthcare curricula, ensuring that genomics is represented in teaching, and staff are supported with resources, for example:

- A [nursing educator toolkit](#) to support educators delivering the subject as part of their pre-registration training programmes. This toolkit has to date had over 2,600 visitors, with 8,500 page views.
- A review of genomics content being taught across the pharmacy curriculum is being undertaken.

HEE has commissioned a 60-credit, level 7, PgCert for professional development in Genomics for Nurses and Midwives. This will be an innovative, post-graduate blended learning programme including: the fundamentals of genetics, genomics and inheritance; an introduction to genetic counselling skills, including consent and feedback of results in the rare disease and cancer setting. The programme has an element of work-based learning.

HEE NSHCS is working with Cranfield, St Mary's, Cambridge, Anglia Ruskin and Warwick universities to support and accredit new "Digital Healthcare Science" traditional and apprenticeship undergraduate degrees.

Recommendations from the Digital Medicine Panel

DM1. NHS online content should be a vital trusted source of health information and be resourced appropriately.

HEE's elearning for healthcare platform offers learning created in partnership with professional bodies, ALBs, and other subject matter experts (See also G3). Part of the work of the Health and Digital Literacy Partnership (see P2) is to promote high-quality health information for the public from the NHS and from third sector organisations.

In response to the COVID-19 pandemic, HEE's national KLS team brought together [two types of information on coronavirus](#): for specific patient groups; and in accessible formats, such as British Sign Language and Easy Read. This compilation saved time for busy health and care professionals at a point of stress in the system and was shortlisted for an [HSJ Award 2020](#).

DM2. The NHS should expand research and development programmes, working closely with patients to co-create digital technologies and ensure that emerging technologies meet their needs.

There is a growing awareness of the importance of co-creation across the system, e.g. the [NHS Innovation Accelerator programme](#) works closely with NHS providers and organisations,

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including patient networks “to help create the conditions and cultural change necessary for proven innovations to be adopted faster and more systematically through the NHS.”

The Digital Readiness Education programme has established learning programmes as part of the NHS Digital Academy service offer, such as the Digital Health Leaders Programme with Imperial College London and the Digital Futures Programme with Yale, as well as the successful [Topol Digital Healthcare Fellowships](#) which have now provided development and delivery support for around 100 Fellows. These programmes include the development of user-centred design skills and space to showcase these skills.

DM3. NHS organisations should invest in their existing workforce to develop specialist digital skills, including the assessment and commissioning of digital technologies, through the Digital Academy, continuous professional development (CPD), sabbaticals and secondments.

HEE’s NSHCS, in collaboration with the University of Manchester and other partners, is developing a Postgraduate Certificate in [Clinical Data Science](#) (G3). The four modules will be adapted to meet the needs of the specialist healthcare knowledge and library workforce. The first pilot module on Clinical Data Engineering ran between October and December 2022.

The NHS Digital Academy offers an innovative postgraduate diploma in [Digital Health Leadership](#), delivered by Imperial College London. Over 400 digital change leaders have graduated with a further 100 to follow by later in 2023. HEE aims to reach a wider section of the workforce through expansion of the Digital Academy model. In addition, a [digital skills assessment tool](#), will be launched for the whole system in 2023.

HEE Digital Academy programme is developing a range of education, learning, knowledge and best practice resources to support the workforce to enhance their digital skills.

DM4/AIR5. The NHS should create or increase the numbers of clinician, scientist, technologist and knowledge specialist posts with dedicated, accredited time, with the opportunity of working in partnership with academia and/or the health tech industry to design, implement and use digital, AI and robotics technologies.

HEE’s work to date through the Digital Readiness programme has previously included:

- Professionalising the digital workforce, through support for the establishment of the Federation of Informatics Professionals and its constituent bodies such as the Faculty of Clinical Informatics. This work spans defining key digital professions, with career pathways, accreditation, training and rewards.
- Publishing a research paper that sets out thinking around the digital workforce to 2030.
- Launching the [Topol Digital Fellowships](#) in 2019, with the fourth cohort now about to get underway meaning around 100 Fellows having the opportunity to develop their digital skills via protected time.

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- Partnering with the Health Innovation Network to establish a Digital Graduate Pathway model with c100 people recruited into digital roles.

For the NHS to optimise the benefits of the expertise of librarians and knowledge managers, HEE is promoting a policy recommendation that all NHS organisations take incremental steps to improve the staff ratio between qualified librarians and knowledge managers per member of the workforce, through role redesign and by expanding this specialist workforce.

AI and machine learning show promise for collating evidence to produce evidence maps, potentially saving time in synthesising evidence. In 2020, HEE supported a trial of an AI-based search tool called Yewno Discover at the University Hospitals Derby and Burton NHS Foundation Trust which demonstrated that Yewno can help address some problems that some searchers experience in finding evidence. There are also significant opportunities to improve the accessibility of evidence through direct integration into clinical workflows. HEE funds BMJ BestPractice (BMJBP) clinical decision support tool for the whole workforce and is working with NHS Trusts to promote the integration of BMJBP into electronic health records, ensuring practitioners have evidence at the point of need.

DM5. The NHS, working with regulators, should develop and commission courses to increase the number of specialists in the evaluation and regulation of digital technologies.

HEE is working with:

- NHS England to develop the [Digital Technologies Assessment Criteria](#) giving staff, patients and citizens confidence that the digital health tools they use meet clinical safety, data protection, technical security, interoperability and usability and accessibility standards.
- NICE to develop the [Evidence Standards Framework](#) aligned and incorporating MHRA's Digital Health Technologies classification system.
- The AI [Multi Agency Advice Service](#) (MAAS) for developers and adopters to provide e-learning educational programmes for learners across health and care and help develop the specialists in evaluation and regulation of digital technologies for the future.

Recommendations from the AI and Robotics Panel

AIR1. The NHS should ensure that patients are involved from the beginning in the design and implementation of AI software for healthcare with their needs and preferences reflected in the co-design process.

See DM2 and OD1.

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AIR2. Educational resources should be developed to educate and train all healthcare professionals in: health data provenance, curation, integration and governance; the ethics of AI and autonomous systems/tools; critical appraisal and interpretation of AI and robotics technologies.

[HEE's Digital, AI and Robotics Technologies in Education](#) (DART-Ed) programme has been established to meet this deliverable. A dashboard of AI technologies nearing or ready for deployment was published in January 2022, alongside a research project with NHS AI Lab examining how to empower clinicians use AI with confidence. The first report [Understanding healthcare worker confidence in AI](#) was published in May 2022, with a follow up report [Developing healthcare worker confidence in AI](#) in October 2022.

A [catalogue](#) of current educational resources in AI is available via the Learning Hub. These include the MOOC, developed with Manchester University, on [AI for Healthcare: Equipping the Workforce for Digital Transformation](#), which shows how AI can be used to support change.

A [HEE sponsored CILIP review](#) found that librarians and knowledge specialists are well placed to support the healthcare workforce with knowledge and skills in health data provenance, curation, integration and governance; knowledge and understanding of the ethical considerations; and critical appraisal of digital healthcare technologies. HEE is developing CILIP accredited Critical Appraisal elearning modules which will be available to the health and care workforce and learners providing them with the opportunity to enhance their critical appraisal skills at their own pace and when needed.

See also DM3.

AIR3. The NHS should leverage its global reputation and integrated datasets to attract skilled experts from the global community of data scientists.

See also DM4/ AIR5.

AIR4. Given the national shortage and competition for AI specialists, there should be a national programme of 'Industry Exchange Networks' that would benefit the NHS.

HEE has convened a regular industry roundtable to advise on education and training strategies, development opportunities and the opportunities for solutions that partnering with industry can provide. It will be a forum to share ideas, hear different perspectives, leverage joint funding, consider upcoming innovations and exchange knowledge.

See also DM4/ AIR5.

Recommendations from the Organisational Development Working Group

OD1. NHS organisations must ensure that patients, citizens and staff are involved in the co-design of transformation projects, particularly in identifying how digital healthcare technologies can help to improve both patient experience and staff productivity.

The NHS AI Lab has published a [guide](#) to support frontline staff in buying and co-creating and co-designing building standards-compliant technology.

The work of the [NHS Innovation Accelerator programme](#), and the development of user-centred design skills are elements within: the Digital Academy, the Topol Digital fellowships (DM2) and the Digital Health Leadership programme.

HEE's national KLS team worked with people with learning difficulties and autism in 2021-22 to co-design [Easy Read resources](#) to promote better health consultations, in person and online. People in the wider community will benefit from Easy Read and simple video information.

OD2. Senior roles should be developed with responsibility to advise on the opportunities offered by digital healthcare technologies and identify local skills gaps.

The development of senior leaders is being addressed alongside the establishment of the NHS Digital Academy (DM2 and DM3):

- HEE's has commissioned the Digital Boards Programme, with NHS Providers. After each board a summary of key insights, agreed actions and relevant resources goes to members and a follow up call with the chair reviews the session and agrees future support. Evaluation of these sessions showed that over 90% said it had increased their understanding of successful digital transformation, and over 90% said it increased confidence in the board's ability to assure digital programmes. These are now being expanded for ICBs.

HEE's national KLS team have redesigned the Knowledge for Healthcare Leadership Programme to align with the Mary Seacole programme, enabling participants to benefit from the NHS Leadership Academy's work on developing digital skills, and gain confidence in meeting training needs and developing technological solutions.

A [collection](#) of Global Digital Exemplar (GDE) blueprints has been developed as a resource for NHS Trusts to deliver digital capabilities more quickly and cost effectively.

OD3. Healthcare professionals will need to access training resources and educational programmes in digital healthcare technologies to assess and build their digital readiness.

See DM3.

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OD4. Each organisation should assign Board-level responsibility for the safe and effective adoption of digital healthcare technologies at scale, with a focus on clinical outcomes and on promoting effective and consistent staff engagement.

See OD2.

OD5. NHS Boards should take responsibility for effective knowledge management to enable staff to learn from experience (both successes and failures) and accelerate the adoption of proven innovations.

In 2021, the HEE KLS team launched a digital [Knowledge Mobilisation self-assessment tool](#). This equips organisations to assess opportunities to make better use of knowledge as an asset and to develop an action plan to be implemented with targeted support by NHS librarians and knowledge specialists.

HEE has also developed an outline Business Case for NHS knowledge and library specialists to use with key stakeholders, to help ICBs apply evidence and knowledge and help the ICS and wider NHS develop as a learning health system.

See also OD2.

OD6. The NHS should strengthen systems to disseminate lessons from early adoption and share examples of effective, evidence-based technological change programmes.

The Provider Digitisation programme is building a repository of best practice in implementation of digital change programmes by the GDE sites (OD2). NHS England's [Digital First Primary Care programme](#) also supports the transformation of primary care by promoting the implementation, understanding and improvement of digital tools within general practice.

HEE TEL team facilitates communities of practice to share learning via the new Learning Hub.

NHS librarians and knowledge specialists are cascading the [NHS Knowledge Mobilisation Framework](#), e-learning and practical resources. Designed by HEE's national KLS team to upskill individuals and teams to share their learning from change initiatives work is also underway, in collaboration with National Institute for Health and Care Research (NIHR), to develop a CPD offer on knowledge mobilisation for healthcare professionals at system-level.

OD7. NHS organisations should use validated frameworks to implement technological solutions and ensure staff are trained to use these.

The Digital Health Leadership programme incorporates some specific learning regarding the effective procurement and commercial management of digital solutions.

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OD8. The NHS should support collaborations between the NHS and industry aimed at improving the skills and talent of healthcare staff.

The Digital Readiness programme commissioned the [clinical entrepreneur training](#) programme providing new opportunities for leaders to develop digital development and implementation skills through exposure to start-up organisations in industry ([Health Innovation Placements](#) pilot). The programme is also exploring industry partnerships to make the NHS a more attractive place for informaticians to work.

See also AIR4.

OD9. The NHS should work with stakeholders across sectors to review the regulation and compliance requirements for new digital healthcare technologies, including the provision of guidance and training on cyber security, data privacy and data anonymisation, learning from the experience of other international healthcare systems.

The NHS AI Lab has developed a list of principles and a [guide](#) on the safe use of AI. See also G4.

Educational recommendations to support a digitally enabled health system

E1. NHS organisations will need to: have a strong workplace learning infrastructure; cultivate a reputation for training and support; develop learning activities which are proactive rather than reactive; allow staff dedicated time for development and reflection on their learning outside of clinical duties.

Designated Education and Training Leads in each of the seven GMS geographies are developing and delivering proactive education and training plans. Steps are also being taken to ensure education and training is capturing the interest of those 'hard to reach' groups across the system, for example GeNotes (G3).

The Digital Readiness Education programme has:

- Commissioned senior leadership programmes which have recognised that good technology, supported by a culture that encourages and supports lifelong learning, can improve an organisation's ability to recruit and retain staff.
- Examined 'how to make learning stick and be utilised'. The NHS Digital Academy's learning offer will be contextualised in relation to career pathways and linked to digital capability frameworks with appropriate signposting tools.

The HEE TEL programme has a key role here through the national learning platform, producing strategy and guidance on using simulation and digital approaches to learning and development, as well as through engaging with learning and development professionals in NHS networks.

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HEE approved [a policy](#) in December 2020 on knowledge and library services in NHS organisations as learning spaces, promoting libraries as digital technology hubs. Library services provide a safe and trusted environment to access e-learning and for experiential learning opportunities through use and exploration of new and emerging technologies, such as multimedia tools, augmented reality, virtual anatomy and 3D printing.

HEE joined the [Library Carpentry](#) community in 2020 which focuses on building software and data skills within library and information-related communities. Over 70 NHS knowledge and library specialists have attended Library Carpentry training sessions to date.

The HEE [Directorate of Innovation, Digital and Transformation](#) is undertaking a project using the Learning Health System Framework, mapping Digital First, as a core HEE programme against the model. The aim is to better understand how the Framework can be applied and help HEE to consider how to best fit into the bigger picture of workplace learning infrastructure.

E2. Each NHS organisation should adopt a multi-professional learning collaborative approach supporting staff to learn about genomics and digital technologies.

The GEP has surveyed the medical workforce and the scientific, laboratory and pharmacy workforce to identify genomics training and education needs. Responses have been analysed and will be used to inform workforce development plans in each of the Genomic Laboratory Hub geographies in England. A survey of the nursing and midwifery workforce is in development. All data will be analysed and used to inform the GEP workforce strategy and the development of education and training plans and resources.

HEE GEP's competency frameworks for key stages in pathways for whole genome sequencing are designed to meet the needs of the multi-professional workforce (G3). HEE's TEL resources support trusts to take a multi-professional learning approach (P1 and G3).

HEE's national KLS team have cascaded training on health literacy underpinned by digital literacy to NHS healthcare staff. Local NHS library staff are sharing this training with multidisciplinary teams, and they are encouraged to share this training across ICS footprints.

HEE is working with Manchester University on the development of the Postgraduate Certificate in Clinical Data Science (G3 and DM3). By meeting the needs of NHS knowledge and library specialists the content from these modules will be shared and cascaded through the work of this specialist staff group and the resulting skills used for the benefit of healthcare professionals.

E3. The NHS and local organisations should support the development of a cadre of educators and trainers who can lead the educational programme to ensure timely upskilling of the NHS workforce.

HEE is a member of the [Library Carpentry](#) community, which focuses on building software and data skills amongst information professionals (E1). Several NHS knowledge and library

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specialists have been funded to complete a “train the trainer” programme, enabling them to cascade their skills amongst NHS library and knowledge teams (E1).

The Digital Readiness programme has explored the concept of Digital Champions who help local organisations to increase skills, knowledge, confidence and motivation in staff. It supports models of delivery for this at a regional level. A [champions toolkit](#) has been developed and published to support the development of champions locally. HEE NSHCS also has Digital and Technology Champions within its educational programmes.

HEE GEP is defining the role of multi-professional Genomic Advisors and the skills and knowledge they need. There are over 2200 alumni from the Genomic Medicine master’s programme who can play a role in educating the NHS workforce in genomics.

HEE is working with HEIs providing graduate and postgraduate CILIP accredited qualifications in library and information studies to ensure that students are introduced to the healthcare sector and the applications of new technology to knowledge services in the digital age. Interventions range from a full Health Libraries elective module to a shorter 2-hour lecture session covering topics such as Clinical and Embedded librarianship, knowledge mobilisation, and health and digital literacy.

Evidence searching, critical appraisal and evidence summary and synthesis skills, are key skills for knowledge and library professionals in healthcare. They are central in delivering the value proposition and achieving the economic benefits reported by the [Gift of Time report](#). To facilitate development and sharing of these skills, HEE is launching an Expert Searcher Training offer during 2022-23.

E4. These organisations also need to put in place systems to identify and develop talented, inspiring new educators within the workforce.

HEE GEP is defining the roles of Genomics Advisors (E3). The potential role of Digital Champions is being explored (E3) and NHS Digital published a [report](#) on this.

E5. HEE should establish a new NHS Digital Education Programme to oversee the implementation of a national digital education strategy. The programme will complement the Genomics Education Programme.

The Digital Readiness programme is delivering the Digital Education Strategy creating a home for digital learning and development via the NHS Digital Academy, with associated learning programmes and resources. (See also DM2, DM3, and DM4/AIR5).

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E6. Employers must ensure that support for staff to develop and enhance digital literacy is built into training programmes, career pathways and placements.

HEE is providing resources and programmes to enable employers to support their staff to develop digital skills via the digital literacy self-assessment tool (DM3 and E3) and the establishment of the NHS Digital Academy learning programmes and learning resources (OD2).

The Digital Readiness programme is exploring the formal introduction of digital content into clinical undergraduate and postgraduate programmes to ensure that the future workforce is digitally ready. The Blended Learning programme also facilitates the inclusion of digital literacy in undergraduate curricula through commissioned blended learning programme.

Local NHS knowledge and library services are valued as a safe and neutral environment in which all staff can develop digital skills. Support provided by library staff includes access to mandatory training and developing core study skills.

The NHS Knowledge for Healthcare Learning Academy provides opportunities to develop digital literacy, including training provision for expert searchers, software and data skills.

E7. Professional, Statutory and Regulatory Bodies (PSRBs) and practitioners need to identify the knowledge, skills, professional attributes and behaviours needed for healthcare graduates to work in a technologically enabled service, and then work with educators to redesign the curricula for this purpose.

Professional bodies have started highlighting the knowledge and skills required by their members in guidance and standards documents e.g.

- Future Nurse: standards, and genomics has been incorporated into the NMC standards of proficiency.
- HEE GEP has worked with Primary Care and the RCGP to incorporate genomics into the GP training curriculum as a topic guide, supported by an education toolkit.
- The GMC and NMC have hosted a workshop for the regulators to explore the implication of emerging technologies on them and the people they regulate.

HEE GEP has launched a [toolkit](#) to support nurse educators in teaching students while HEE is working the AoMRC on a programme to embed genomics in medical specialties, including the [genomic syllabus](#) launched in November 2021

HEE is engaging with Royal Colleges and regulators, via the establishment of the Faculty of Clinical Informatics.

HEE's national KLS team worked with the CILIP to revise the Professional Knowledge and Skills Base, the PKSB, which is the sector skills standard for the information, knowledge, library and data profession. This was informed by CILIP's [Research Report: The Impact of AI, Machine Learning, Automation, and Robotics on the Information Professions](#), itself a response to the Topol Review.

Topol Review: Progress on the recommendations

E8. Organisations responsible for employing and training must ensure that current and new staff are supported to reach an appropriate level of digital literacy for their career stage.

HEE initiatives to support this recommendation include:

- The digital literacy self-assessment tool and online digital certificate (DM3 and E3). The Digital Readiness programme is developing an online digital certificate aimed to provide base digital knowledge for all.
- HEE GEP is developing competency frameworks with signposting to appropriate educational resources (G3). GEP has introduced Genomics as a topic guide within the GP training scheme together with an education toolkit (E7). NHSE/I have funded a training and education lead in each of the seven Genomic Laboratory Hub geographies to support learning and development in genomics (E1). The formal introduction of digital content into clinical undergraduate and postgraduate programmes is being explored (E6).
- Employer organisations draw upon NHS knowledge and library services for personalised digital support, acting both as technology hubs (E1) and a neutral space for learning (E6). This provides the environment, tools and expert human support to equip staff with the digital skills appropriate for their career stage.

E9. For both existing and new roles addressing skills gaps in clinical bioinformatics, digital technologies, AI and robotics, the NHS should develop or expand both educational programmes (for example, the Higher Specialist Scientist Training) and attractive career pathways.

HEE anticipates that new learning programmes will be developed, as well as expanding relevant input into existing learning programmes (G4 and G5). The reach of learning and development offerings is being extended via expansion of the NHS Digital Academy programmes (DM3).

E10. The NHS should commission flexible and responsive training for specialist roles. This may include engaging with industrial learning organisations and developing placements, exchanges and secondments.

See also G3 and G6.

E11. The NHS should work with PSRBs and other bodies to introduce and strengthen accreditation of newer specialist groups.

HEE's Digital Readiness programme has established the Faculty of Clinical Informatics, to help professionalise the digital workforce. This will lead to learning and development standards, competencies and requirements against career pathways, including accreditation of learning.

Topol Review: Progress on the recommendations

The incorporation of Genetic Counselling training into the STP has meant that genetic counsellors can now become registered as Clinical Scientists with the Health and Care Professions Council. The first cohort of counsellors completed the programme in 2019.

HEE advocates professional registration of knowledge and library specialists with the professional body CILIP which offers registration at Certification, Chartered, and Fellowship levels. HEE also supports the Federation for Informatics Professionals (FEDIP). In 2021, the Knowledge for Healthcare Learning Academy achieved short course accreditation for its offers.

E12. Education providers should ensure genomics, data analytics and AI are prominent in undergraduate curricula for healthcare professionals. Future healthcare professionals also need to understand the possibilities of digital healthcare technologies and the ethical and patient safety considerations.

HEE is engaging with a range of education providers including GEP, Royal Colleges, Medical Schools Council, the Council of Deans of Health, the GMC and the NMC to ensure the inclusion of genomics both in professional standards and undergraduate curricula.

HEE supported CILIP to revise the PKSB (E7). Alongside being a tool for personal professional development, the PKSB is used within CILIP's process for accreditation of Undergraduate and Postgraduate courses at schools of Library and Information Science and equivalent.

E13. Education providers must ensure that students gain an appropriate level of digital literacy at the outset of their study for their prospective career pathway.

HEE is providing resources to education providers and employers to support their students and staff to develop digital skills, e.g., the digital literacy self-assessment tool (DM3 and E3). The Digital Readiness programme is developing an online digital certificate (DM3). These products will be available for all NHS (E6).

Local NHS knowledge and library services are central to health care staff developing digital literacy skills. HEE's [learning space policy](#) promotes the importance of NHS libraries as digital hubs in which to develop digital skills, complemented by the digital navigation skills to find and use digital resources effectively.

E14. Education providers should both offer opportunities for healthcare students to intercalate in areas such as engineering or computer science, and equally attract graduates in these areas to begin a career in health, to create and implement technological solutions that improve care and productivity in the NHS.

HEE's Digital Readiness programme is exploring the formal introduction of digital content into clinical undergraduate and postgraduate programmes (E6). HEE is also committed to professionalising the digital workforce, establishing the digital professional landscape and associated career pathways and also to building future capacity through an engagement programme.

Topol Review: Progress on the recommendations

HEE's Digital Readiness programme is working in partnership with [University Technical Colleges](#) to attract young people between 14-19 into health and digital careers in the NHS by introducing a digital literacy skills training to their health and care students and awareness of careers in the NHS to their digital and engineering students.

Summary

This report demonstrates the considerable progress Health Education England has made in delivering the Topol Review's recommendations. Topol said, "To engage and support the healthcare workforce in a rapidly changing and highly technological workplace. NHS organisations will need to develop a learning environment in which every member of the workforce is encouraged to learn continuously". HEE has been working on a wide range of initiatives to deliver that learning environment. Much has been achieved; there is much more to do.

The transition of HEE into the new Workforce, Training and Education Directorate of NHS England creates exciting opportunities to bring the breadth of work together, helping to further accelerate progress towards a digitally enabled, digital ready workforce, realising the digital future of healthcare for the benefit of patients, families, carers and citizens.

Abbreviations

AoMRC – Academy of Medical Royal Colleges
CILIP – The Chartered Institute of Library and Information Professionals
CPD – Continuing Professional Development
CQC – Care Quality Commission
GDE – Global Digital Exemplars
GEP – HEE Genomics Education Programme
GMC – General Medical Council
GMS – NHS Genomics Medicine Service
HEE – Health Education England
HEI – Higher Education Institutions
HRA – Health Research Authority
ICB – Integrated Care Board
ICS – Integrated Care System
KLS – Knowledge and Library Services
MHRA – Medicines and Healthcare products Regulatory Agency
MOOC – Massive Open Online Course
NHSE – NHS England
NICE – National Institute for Health and Care Excellence
NMC – Nursing and Midwifery Council
NSHCS – National School of Healthcare Science
PKSB – Professional Knowledge and Skills Base
PSRB – Professional, Statutory and Regulatory Bodies
SME – subject matter expert
TEL – Technology Enhanced Learning