One Year On

Progress on the recommendations from the Topol Review

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 (HEE) Genomics Education Programme (GEP) and NHS England/Improvement (NHSE/I) Genomics Unit are working with Macmillan and the Cancer charities and Cancer alliances to provide high quality, accurate and relevant educational materials for patients, carers and healthcare professionals. This has included input into materials for patients to explain the new 'patient choice' for whole genome sequencing. Patient and public friendly leaflets which explain how their genomic data is stored and used for clinical purposes, and for participation in research should they opt for this, have been approved. The new patient choice process is going live in April /May 2020.

HEE's Technology Enhanced Learning (TEL) programme is building a national Learning Hub. The user base is evolving from mainly healthcare professionals (to include carers and volunteers). The next phase could include engaging patients and public.

Organisations such as the Good Things Foundation and Digital Unite, amongst others, design and deliver digital inclusion programmes.

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

HEE's Library and Knowledge Services (LKS) team is working with CILIP, the library and information association, to shape a sustainable approach to skills development, with a common information environment through which health librarians will partner with information providers and librarians in different sectors to support citizens to become digitally and health literate. This will also help people prepare to enter the NHS as a career.

HEE will support and build upon the good work of the NHS Digital Widening Digital Participation programme.

NHSE/I widening participation team is working with [Digital Unite](#) to develop training for citizen digital champions to support use of NHS developed digital products like [the NHS app](#) by citizens, patients and carers.

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

HEE's LKS team initiated and co-funded work with the Universities of Newcastle and Southampton to develop a [geodata tool](#) that provides an estimate of the percentage of a local authority population with low health literacy and numeracy (or simply low health literacy). This will help to guide needs-based targeted education (as per P2).

The NHSE/I widening participation team is working with [Digital Unite](#) (see P1). A new [report on Digital Champions](#) from NHS Digital emphasises the potential.

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.

NHSE/I together with Genomics England and HEE have developed clear protocols and guidance, compliant with General Data Protection Regulation (GDPR) and Genomics England approved research communities' requirements, on the use of genomic data by healthcare professionals. This includes safeguarding patient confidentiality through secure storage of data and use of de-identified data for research where the patient has consented to the use of their data for research purposes.

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

HEE Genomics Education is launching a campaign to [raise awareness of genomics](#) in 2020, aiming to reach 50,000 NHS staff in the first year. The genomic 101 series of 8 modules of 30 minutes each, is almost complete. This introductory series is aimed at those who know nothing, or very little, about genomics and its application in healthcare to develop genomics literacy.

["Whole Genome Sequencing: Decoding the Language of Life and Health"](#), the HEE Genomics MOOC is delivered approximately twice a year:

Relevant content is to be included in the learning programmes and resources offered by NHS Digital Academy.

The National School for Healthcare Science (NSHCS) in HEE has highlighted the central importance of genomics and digital healthcare throughout the entirety of all programmes in its comprehensive reviews of 33 scientific curricula for all NHS scientists.

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.

[HEE GEP](#) is developing multi-professional competency frameworks to guide professionals in their learning of skills to undertake consent for whole genome sequencing, including the research offer for both rare diseases and acquired cancers. We are also working on a framework for the feedback of results for both rare disease and cancer. Profession-specific competences are being developed for the nursing workforce

HEE GEP has developed a range of free formal and informal CPD opportunities. In addition to the MOOC on the future learn platform (see P1), the genomic 101 series (see G2), a range of resources to support patient choice and consent for research (see G1) there is a range of 'just in time' resources and fact sheets.

HEE NSHCS in collaboration with the university of Manchester and clinical partners has commissioned and begun a flexible programme of accredited scientific practice (credentialing) to support the development of data science, machine learning and programming capabilities across the healthcare science and wider NHS workforce including clinical specialties leading to numerous post graduate qualifications in Clinical Data Science

HEE NSHCS is working with industry, university and clinical partners to deliver the End point assessment in numerous apprenticeship standards in bioinformatics and clinical data science.

HEE TEL produce and deliver learning resources to well over a million learners at the moment and are launching a new Learning Hub in 2020. This will provide an even greater capability to disseminate and engage people in learning at scale. Providing relevant learning at the point of need is a key consideration in the long-term roadmap for this platform, aligning with the concept of 'learning in the workflow'.

The HEE TEL team is working with the simulation based education community to provided strategic guidance and support which will enable them to identify the need to develop simulation approaches both with the need to enable healthcare professionals to utilise this approach to support life-long learning and also to adopt digital approaches such as using virtual and augmented reality to enhance this.

Learning and development resources are available as NHS Digital Academy 'bite size' learning resources with 'specialist academy' offerings for particular workforce groups.

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

HEE GEP has developed a suite of formal CPD opportunities including a Genomic Medicine master's (MSc) framework in which learners can choose to undertake a full MSc, PgDip, PGCert or individual modules. This successful framework has been commissioned for a further three years (2020-2023), with up to £1M pa for course fees

HEE's National School of Healthcare Science (NSHCS) is delivering the curricula for healthcare scientists in genomics, leading to a master's qualification as a Clinical Scientist and registration with the Healthcare Professions Council. The current Scientist Training Programme (STP) opportunities include: Cancer genomics, Genomics, Genetic counselling, Bioinformatics (genomics). For 2020 there are 55 training places available.

The NSHCS also delivers for three of the genomics specialties an accompanying 5-year Doctoral level Higher Specialist Training Programme leading to eligibility to apply for Consultant level positions. The curriculum for Genetic Counselling Higher Specialist Scientist Training (HSST) is currently being developed by the NSHCS for an intake in 2021.

The HEE GEP has funded a Medical Education Lead to work with the Academy of Medical Royal Colleges from April 2020 to undertake a review of the genomic content of the medical speciality curricula and the development of generic and speciality specific learning outcomes to ensure consistency across the specialisms.

The NHSE/I Genomics Unit has funded a Nursing Collaborative to drive forward the workforce transformation required for the nursing and midwifery workforce. HEE GEP is providing the education support through the development of competency frameworks and CPD opportunities for acquiring counselling skills, as well as understanding the genomic report, and taking consent for testing.

Part of HEE's work to professionalise the digital workforce is to establish digital professional bodies and ensure that accredited genomics learning forms a part of their offering.

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.

HEE is supporting the development of future consultant leaders in Genetic Counselling through the introduction of the doctoral level HSST in genomic

counselling (due September 2021). Introduced 4 years ago, 41 counsellors have been recruited onto the STP in genetic counselling programme to date. The first cohort of 15 students qualified in 2019 and a similar number will qualify each year as we move forward.

Macmillan has approved funding for 14 Genomic Nurse Champions based in each of the 7 Genomics Laboratory Hubs (GLH) geographies.

HEE is funding a residential course for participants to upskill their knowledge and understanding of genomics and counselling skills. The champions will adopt a cascade, train the trainer model in their geographical patch.

The HEE GEP has commissioned two universities to deliver 2-day variant interpretation courses for mainstream clinicians. A total of 175 places have been funded in 2019/2020

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

HEE NSHCS implements training of bioinformaticians for the NHS and healthcare through commissioned programmes such as the STP (currently over 70 in training), and the Higher Scientist Training Programme (currently 12 in training) and more recently by accreditation of new "Digital Healthcare Science" degrees at Warwick University and via supporting apprenticeships in bioinformatics and in health and Care intelligence specialists. 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

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.

NHSE/I have procured 7 Genomic Laboratories Hubs incorporating clear leadership roles and responsibilities/accountabilities.

The 13 Genomic Medicine Centres established to support the 100,000 genomes project will be replaced by 7 Genomics Medicine Service Alliances (Spring 2020). There will be clear leadership and lines of accountability within these new alliances.

Meanwhile, learning resources within HEE's digital masterclass for senior leaders incorporate relevant content.

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.

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

The GEP works closely with the 7 Higher Education Institutions (HEIs) which deliver Genomic Medicine Master's. These HEI's also run a number of undergraduate curricula for healthcare professionals and are well placed to ensure that genomics is healthcare is incorporated where necessary.

The HEE Digital Readiness programme, in conjunction with NHSE/I, is exploring plans for a specialist Digital Academy for Data Science. We expect to see more details following publication of the People Plan.

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 e-Learning for Healthcare platform offers learning created in partnership by professional bodies, Arm's Length Bodies, and other sources of subject matter expertise, with approval by the relevant body to ensure trust. HEE TEL team produces and delivers learning resources to well over a million learners and is building a new platform called the Learning Hub. (See G3)

All materials offered by the Genomics Education Programme are developed by subject matter experts and peer reviewed. The GEP is developing a process and guidance for assessing materials prepared by third parties.

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.

The Digital Readiness programme has funded the NHS Digital Academy and the programme for the Topol Digital Fellowships. Both programmes include, as core elements, the development of user-centred design skills. This skill-set encourages service leaders to work with users, often patients, to contribute to the design of the technologies they use. This is evident in the projects led by graduates and Fellows.

We observe a growing awareness of the importance of co-creation across the system. For instance, the NHS Innovation Accelerator programme works closely with NHS providers and organisations, 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."

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 NSHCS has developed and will continue to co-create in collaboration with university and clinical partners a suite of pertinent agile and flexible short courses in critical new technology areas such as bioinformatics, clinical and scientific computing, Artificial Intelligence (AI) and machine learning that are aimed at the existing NHS workforce and can be offered as credentialing qualifications.

The NHS Digital Academy is underpinned by an innovative [postgraduate diploma and master's in Digital Health Leadership](#). HEE is exploring the potential to reach more people across a wider range of disciplines, to provide world-class learning for senior digital change leaders. We expect to see more details following publication of the People Plan.

A self-assessment diagnostic digital literacy tool is being taken forward for testing by HEE in early 2020.

HEE TEL is developing a Library of education, learning, knowledge and best practice resources to support the current workforce in expanding their digital skills.

HEE TEL is piloting [Magpie](#) (requires login), a personalised learning tool to drive digital skill confidence across the NHS. It brings together the best curated learning content from across the web to help individuals improve their digital capability.

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 on professionalising the digital workforce spans defining key digital professions, with career pathways, accreditation, training and reward, liaising with professional bodies.

HEE's Digital Readiness programme has established a workforce planning function that is developing a digital workforce planning model to enable provisioning of digital skills for our future needs in health and care. Within the Building the Digital Ready Workforce (BDRW) programme, HEE has conducted an audit (due March 2020) and is working with HDRUK on digital workforce capacity and supply to explore the development of a workforce demand tool and establish a career framework.

To optimise the benefits of the emerging new roles for librarians and knowledge specialists, HEE has approved 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.

The Topol Digital Fellowships, which are hosted by HEE NSHCS, were launched in 2019. See accompanying report.

The Academic Health Science Network (AHSN) has introduced a model for digital graduate/school leaver entry towards building future capacity.

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.

The Digital Academy provides world-class learning for digital change leaders. (See DM3)

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 the update for OD1 and DM2 above.

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 is offering a [MOOC on AI for Healthcare](#): Equipping the Workforce for Digital Transformation introducing how AI can be used to support change. Run in partnership with the University of Manchester, delivered by FutureLearn.   This is one of the series of major short modules in AI, ML and genomics and bioinformatics commissioned for all healthcare professionals by the NSHC.

Also, see the update with regard to DM3, above

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

HEE is conducting an audit to assess and plan for the requirement for future digital roles. See DM4/ AIR5. This will enable a better understanding of capacity and supply, and support planning to attract digital experts from the global community.

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.

The role of AHSNs is to cross traditional sector boundaries and strengthen partnerships with industry partners so that innovative technology makes a difference to more patients more quickly.

We note growing awareness across the system of the value of enabling healthcare professionals to work in partnership with the health tech industry. For instance, the Industry Exchange Network (IXN) for the NHS committee was established in 2019 to allow Industry, Educators, Researchers and Clinicians to work together to advance the UK's healthcare through Interoperability, Efficiency and Innovation open source projects.

Also see the update on 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.

In January 2020 NHSX began a programme of work to understand how best to support frontline staff in buying and building standards-compliant technology (co-creating and co-designing).

The work of the NHS Innovation Accelerator programme, and the development of user-centred design skills as an element of the approach of both the Digital Academy and within the Topol Digital fellowships has already been highlighted. (See DM2)

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 through a series of initiatives:

HEE has piloted 'Digital in a Day' - digital development sessions for Boards and senior leaders. Roll-out is being considered from 20/21.

The work of the Digital Academy is flagged throughout this update (see DM2 and 3).

The NHS Leadership Academy has started work on developing the digital literacy skills of aspirant leaders on their programmes. There are also discussions regarding inclusion of a Digital masterclass within other Leadership Programmes.

Increasingly Chief Information Officer (CIO) or Chief Clinical Information Officer (CCIO) roles are expected to be about skills gap determination.

A library of [Global Digital Exemplar (GDE) blueprints](#) has been developed as a resource for NHS Trusts to deliver digital capabilities more quickly and cost effectively in order to improve services for patients and staff.

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

HEE TEL and BDRW teams work closely to meet these objectives. See the update for DM3.

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.

NHSX has asked for there to be a CIO or CCIO on every board

In addition to the 'Generic' Board-level digital development offered by the Digital Readiness programme ('Digital in a Day'), good practice is also shared through 'Bespoke' trust board/ Integrated Care System sessions which support peer learning and the sharing of good practice through resources and tailored events for board directors.

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.

The HEE LKS team has developed a [Using Evidence and Knowledge self-assessment tool](#) to help organisations assess opportunities to make better use of knowledge as an asset and develop and implement an action plan with targeted support by NHS librarian and knowledge specialists. This will be made available online by April 2020.

The development of senior leaders is being addressed through the initiatives described above (see OD2. The roll out of digital development sessions for Boards and senior leaders already piloted by HEE ('Digital in a Day') will include knowledge transfer approaches such as peer to peer learning, 'how to' guides and site visits.

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, delivered by NHSX, is building a repository of best practice in implementation of digital change programmes by the Global Digital Exemplar sites. See OD2. These illustrate what good digital development and application looks like.

Extending this approach, the NHSE/I Digital First Primary Care programme is developing a blueprint to support early adoption of the use of video and online consultation.

HEE's Digital Readiness programme will support networks of informaticians to facilitate sharing of best practice and stimulate further collaborative activities. HEE TEL will be supporting the sharing of education, training and learning resources and will host communities of practice within the new Learning Hub platform.

NHS librarians and knowledge specialists are cascading the NHS Knowledge Mobilisation Framework, e-learning and practical resources. Designed by HEE's Library and Knowledge Services team to upskill individuals and teams to share their learning from change initiatives so that pitfalls can be avoided and best practice replicated.

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

The Digital Academy trains participants in using the Non-adoption, Abandonment, Scale-up, Spread, and Sustainability (NASSS) framework and incorporates some specific learning regarding the effective procurement and commercial management of digital solutions.

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

The NHS clinical entrepreneur training programme brings together healthcare staff and industry to develop skills and talent.

Looking ahead - the Digital Readiness programme will explore partnering with industry to make the NHS a more attractive place for informaticians to work, and to help build capabilities and breadth of experience in NHS technical staff.

Also see the update with regard to AIR4 above.

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.

NHSX has established work in this area, particularly around the ethical and safe use of Artificial Intelligence. A list of principles has been produced as well as [a guide](#).

The establishment of the professional bodies also speaks to this objective, including by providing the professional networks to afford such learning. For instance, see 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.

The Genomic Medicine Service is being rolled out within a culture of supported learning. Designated Training and Education Leads in each of the 7 geographies are tasked with developing a proactive training and education plan recognising that the pace of change of genomics also calls for a reactive approach.

An important 'Aha! Moment' in the 'Digital in a Day' sessions delivered by the Digital Readiness programme, has been the recognition that good technology, supported by a culture that encourages and supports lifelong learning, can improve an organisation's ability to recruit and retain staff.

Part of the Digital Readiness development work examines 'how to make the learning stick/be utilised'. Going forward, this will consider contextualised learning in relation to career pathways, linked to digital capability frameworks with appropriate signposting tools.

HEE TEL has a central role in supporting this ambition 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.

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

HEE and NHSE/I are commencing a comprehensive NHS workforce survey in summer 2020 to identify genomics training and education needs across different professional groups. The findings will inform workforce development plans in each of the GLH geographies in England.

The competency frameworks being developed by HEE GEP for key stages in the patient and sample pathways for whole genome sequencing are designed to meet the needs of the multi-professional workforce. See G3.

HEE's TEL learning resources support trusts to take a multi-professional learning approach. See P1 and G3.

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.

The Digital Readiness programme has explored the concept of Digital Champions who help share learning between peers in local organisations to increase skills, knowledge, confidence and motivation in staff. It is expected that graduates of the Digital Academy will be positioned to influence this approach.

HEE NSHCS is formally defining the role of "Digital and technology Champions" and assessing the wide range of communication skills and specialist knowledge they need to undertake these roles. The NSHCS has over 1200 alumni from the STP who play critical roles in various NHS organisations and already act "informally" as digital and technical champions.

HEE GEP is defining the role(s) of 'Genomics Champions' and the necessary skills and knowledge they need to undertake these roles. We have over 1700 alumni from our Genomic Medicine master's programme who are keen to play a role in educating the NHS workforce in genomics. We are exploring how this cadre of educators can be supported or given the opportunities to develop further as educators in genomics.

HEE LKS is developing a suite of training resources for NHS librarians and knowledge specialists which will help them support trust staff to develop digital navigation skills.

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 Champions' and the skills and knowledge needed. There are c1700 alumni from the Genomic Medicine master's programme keen to play a role in educating the NHS workforce.

The [potential role of Digital Champions is being explored](#) (see E3) and NHS Digital has just 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.

Building on the experience of the Building the Digital Ready Workforce programme, HEE is establishing a Digital Readiness programme, aligned with other HEE-led work. This programme will pull together what is, in effect, a Digital Education Strategy with the ambition of ensuring that organisations are led by a board that is digitally savvy, supported by data and technology experts at the top of their game, and staffed by a workforce that is both digitally able and digitally willing.

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 Literacy through the self-assessment tool and all the Digital Literacy learning resources (specialist and generic learning) identified through the report (for instance see DM3 and E3).

Delivery on this recommendation is also supported by the establishment of the NHS Digital Academy learning programme and learning resources (see OD2)

The Digital Readiness programme is exploring the formal introduction of digital capabilities into clinical undergraduate and postgraduate programmes to ensure that our future workforce is digitally ready.

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.

The GMC and NMC have jointly hosted a workshop for the regulators to explore the implication of emerging technologies on them and the people they regulate.

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

HEE GEP is developing a toolkit for educators to support Nurse educators in teaching and educating their students. GEP has also appointed a Medical Education Lead to work with the Academy of Medical Royal Colleges to review speciality training curricula with a view to developing generic learning outcomes for genomics together with discipline specific outcomes.

Engaging with Royal Colleges and regulators, HEE is using several sources that have analysed the need for digital skills to set priorities for the Digital Readiness programme, linked to the digital capability framework and career pathways.

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.

Initiatives on which organisations can draw to support this objective are described throughout this update. These include the following:
HEE's Digital Literacy initiatives support organisations to meet this need – developing and linking appropriate learning to the digital capability framework (see E1), which links to career pathways, underpinned by use of our self-assessment tool (see DM3), with signposting to learning resources (see Magpie, DM3), on 'specialist' and 'generic' subjects.

As reported above, HEE GEP is supporting organisations to addressing this recommendation through the development of competency frameworks with signposting to appropriate educational resources (for instance see G3). GEP has introduced Genomics as a topic guide within the GP training scheme together with an education toolkit.   See E7

NHSE/I have funded a training and education lead in each of the 7 GLH geographies to support learning and development in genomics. (See E1)

The formal introduction of digital capabilities into clinical undergraduate and postgraduate programmes is being explored (see E6)

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.

Going forward HEE anticipates that further new learning programmes will be developed, as well as expanding relevant input into existing learning programmes. See G4 and G5 for updates on the development of education programmes in genomics.

The HEE audit will inform planning for future digital roles and career pathways (see DM4)

The potential to extend the reach of the Digital Academy is being explored (see 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.

The HEE audit will inform planning for future specialist roles that may need to be commissioned. The Capacity and Supply workstream of the BDRW programme will look at recruitment and retention models that collaborate with industry. See DM4.

The Digital Readiness programme is starting to explore how to partner with industry to make the NHS a more attractive place to work for informaticians and to help build capabilities and breadth of experience in our technical staff. We expect more detail following the publication of the People Plan.

The NSHCS, as mentioned above, are developing flexible training opportunities in association with industry and universities for clinical bioinformaticians. See G3.

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

HEE is leading work to support bodies such as the Faculty of Clinical Informatics and HDRUK, to professionalise the digital workforce and define key digital professions, with career pathways, accreditation and training.

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.

The Digital Readiness programme has an ambition to create recognised professions for all informaticians to ensure that they are respected expert partners in the delivery of 21st century care. We expect to see more following the publication of the People Plan.

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 Genomics Education Programme, Royal Colleges, Medical Schools Council, the Council of Deans of Health, and the GMC with regard to the undergraduate curriculum.

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 testing a digital literacy self-assessment diagnostic tool with Higher Education providers to ensure that digital literacy in introduced into undergraduate curricula.

HEE is engaging with a range of education providers with regard to the undergraduate curriculum (see E12).

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 is engaging with a range of education providers regarding the undergraduate curriculum see E12).

HEE is 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 – the 'NHS as a digital career'.