Delivering the pioneering NHS scientists of the future

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Dr Anneke Seller  Genomics Education Programme
The NHS belongs to the people.
It is there to improve our health and well-being, supports us to keep mentally and physically well, to get better when we are ill and, when we cannot fully recover, to stay as well as we can to the end of our lives.

It works at the limits of science – bringing the highest levels of human knowledge and skill to save lives and improve health.
The key aims of the session

- Explain what healthcare science is.
- Outline how NHS scientists are being trained.
- Explore how NHS Scientist will lead transformative innovations of the future.

The key message: the future of healthcare being discussed at this Expo: NHS Scientists are Central to its successful delivery.
The NHS – built on science and technology

- **1958**: First diagnostic ultrasound machine
- **1962**: Successful total hip replacement
- **1970**: First CT scan
- **1978**: First IVF baby
- **1980**: First full body MR scan
- **1985**: PCR and automated DNA sequencing
- **1987**: First digital hearing aid
- **1995**: Introduction of medical lasers
- **2002**: First successful gene therapy
- **2010**: First bilateral cochlear implant

An indicative selection from the last 68 years.
New technologies are evolving all the time – we know the landscape will be quite different in 5-10 years time.
The single biggest group of scientists in this country are those working in the NHS. This is some of what they do...
The breadth of healthcare science

Healthcare scientists are trained in STEM disciplines and use their skills for the diagnosis, care and treatment of patients. Currently 50+ specialisms working in a variety of settings (community/hospital/specialist) from trainee to consultant level.

Science Professions EVOLVE all the time – New technologies, skill sets & service locations required: - OLDER approaches may be replaced by NEW TECHNOLOGIES, and DIGITAL PROCESSES
What the next 10-20 years of technology has to offer to health

Quantum Technology
eg fast processing of bio-data

Energy and energy storage
eg more effective medical devices

Regenerative medicine
eg ex vivo printing of cells

Big Data & Energy
Efficient Computing
eg real time epidemic tracking

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Genomics & Synthetic biology
eg novel biomolecular therapeutics

Robotics
Impacting diagnostics and social care

Nanotechnology & advanced materials
eg nanoparticle delivery in cancer

Satellites & space
aiding public health surveillance

Agri-science
eg foodstuffs with special nutrients

Energy and energy storage
eg more effective medical devices

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Impacting diagnostics and social care

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The power is in interconnections

Quantum Technology

Big Data & Energy Efficient Computing

Energy and energy storage

Regenerative medicine

Genomics & Synthetic biology

Nanotechnology & advanced materials

AI-based clinical support assistant for personalised medicine

Paper based, disposable ‘lab on a chip’ for speedy diagnosis

Microsurgical biomaterial directed repair of nerves
As Scientists, we want the NHS to be at the forefront of these innovations so that the millions of patients it treats will enjoy the benefits to health and quality of life.

Scientists will be key to this, so we are thinking ahead and planning for the future of our profession.
Topol Review is laying Ground for some of these by exploring how:

clinical roles will change
new skills will be required
How Training will be impacted
The next era of medicine is here

“as much as 30% of what we do today we will do differently...
– how we evaluate patients,
– how we follow up
– how we manage patients in a hospital
– how we bring the expertise in between clinicians ....”

Dr Robert Pearl, CEO Kaiser Permanente

– Scientists need to step up..
Where is healthcare going?

- A step change in prevention
- Earlier diagnosis of disease
- Enhanced screening and prediction
- Influencing lifestyle choices

FUTURE FOCUS

Population Health  Personalised Care

- Tackling the limits of ‘one size fits all’ medicine & blockbuster drugs
- Medicines optimisation
- Managing adverse drug reactions
- Identification of new targets and treatment approaches
- Improving outcomes
For these transformations in patient care to become a reality, we need well-rounded, world-class healthcare scientists working in our NHS.

How can we do this?

Through the unique and ground-breaking training programmes delivered through HEE’s:

National School of Healthcare Science
National School of Healthcare Science

Developing people for health and healthcare

www.hee.nhs.uk
The last decade of healthcare science

Pre-2008: >50 disparate scientific specialisms. >50 separate ad-hoc training approaches. None or Poor visibility of Scientists to: medical, nursing, AHPs, managers, pharmacists, Board and to PATIENTS

2008: Vision for HCS
“A world class workforce integral to multi-professional teams delivering high quality innovative patient care, in a range of settings. NHS science workforce will also deliver excellence in knowledge creation, innovation and service improvement. It will lead and embrace research and development,

Modernising Scientific Careers
A single coherent education, training and development structure linking all specialisms and all levels – supporting new roles and opportunities for scientific development in NHS

2018: A more unified profession with a high profile inside and outside the service. Senior scientists lead multiprofessional teams delivering major national structural technology initiatives for patient benefit
1. Provides the operational oversight in areas such as:
   National assessment, monitoring of workplace based training, trainee support for trainees (pastoral and professional), training workplace educators.
   Functions as a National Deanery

2. Additionally: the school is responsible for:
   Curricula development, high stakes assessment, quality assuring standards in the delivery of education and training.
   Mirrors some functions of a Royal college
Career and Training Pathways for the UK Healthcare Science Workforce

PSA: Professional Standards Authority (accredits AHCS and other Registers)
HCPC: Healthcare Professions Council
AHCS: Academy for Healthcare Science

1 as a Healthcare Science Practitioner
2 as a Biomedical Scientist
* currently under development

Consultant Clinical Scientist Appointment

AHCS Accredited Higher Specialist Scientist Registration

Eligibility to apply for

Accredited Additional Scientific Practice (AASP)

Accredited Specialist Scientific Practice (ASSP)

Accredited Expert Scientific Practice (AESP)

Higher Specialist Scientist Training (HSST)

*Clinical Academic Career

Healthcare Science Associate and Assistant

AHCS Accredited Registration

Assistant and Associate Training Programme (including apprenticeships) (AATP)
Level 2 and Level 4 Diploma

Apprenticeship or In-service

Apprenticeship, Full time student or In-service

Equivalence progression route

Practitioner Training Programme (PTP)
Integrated BSc (Hons) Healthcare Science

Equivalence progression route

Clinical Scientist

HCPC Statutory Regulation

Scientist Training Programme (STP)
Integrated MSc Clinical Science and work-based programme

Graduate direct entry or In-service
Our programmes are highly competitive and praised highly by trainees.

97.5% of trainees were pleased to have taken part in the Scientist Training programme.

95% of trainees were employed, or seeking employment in the NHS. 79% as clinical scientists.

Programmes are becoming even more flexible to ensure trainees focus on what they are passionate about and develop the highly-specialised clinical skills needed.

A good opportunity to train, gain an MSc and registration as a clinical scientist.

The opportunities in the STP are second to none. The mix of academic and workplace based learning were essential to develop me as a good scientist in the NHS.
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*Equivalent progression route
Scientific leadership is central to drive future healthcare

Embracing future disruptive technologies

Putting patients at the centre of care

Digitising healthcare information

Shifting focus from treatment to prevention

How care must change in the future

Key Scientific technologies cut across all these areas:

Genomics and functional genomics

Big data and artificial intelligence
It is time for scientists to step up to the plate and lead in many respects, and let colleagues and patients see how vital and positive a contribution they will make to patient care.

Our programmes are producing a new breed of well-rounded scientists, not only experts in their specialist areas, but also talented communicators and potential leaders of the future.
7 years on: Achievements of HEE’s NSHCS

*all* Scientists (HCS), *all* stakeholders

OUTSTANDING

Together, we have *pioneered*:

- National Scientist Training in the UK to-
- Produces scientists who:
  - Change patient & clinical outcomes, *contribute to*
  - Integrated/multi-professional working
  - Lead in innovation and translational research in NHS
  - Lead technological and digital transformations
No-one else in the NHS has the skillset of healthcare scientists
Genomics Education Programme
Preparing for the future of healthcare

Developing people for health and healthcare
www.hee.nhs.uk
Purpose and aims

HEE Genomics Education Programme was established in 2014 to provide staff with the knowledge, skills and experience to ensure the NHS remains a world leader in genomic medicine.

The GEP provides co-ordinated national direction and oversight of education and training in genomics to achieve 4 key aims:

- **Ensure the NHS workforce is able to deliver the new Genomic Medicine Service**
- **Support the completion of the landmark 100,000 Genomes Project**
- **Develop innovative approaches to the delivery of genomics education**
- **Establish international collaborations to maintain UK as world leaders in genomics**
Strategy for upskilling the workforce

**DEVELOPMENT:**
Education and training innovation pipeline

- Developing needs assessment to identify E&T gaps
- Engaging with key stakeholders
- Iterative approach with subject experts
- Multi-platform publishing
- Targeted comms
- Working with professional bodies
- Improving knowledge & skills
- Changing practice for patient benefit

**CONTEXT:**
Professional role in relation to genomics

- GEP with HEE & NSHCS develop genetic curricula, commission training programmes
- Developing broader-based training, education and clinical tools
- GEP Creating introductory education and training, and just-in-time resources
- Producing awareness-raising and educational activities

**PITCH:**
Level of education / training

- HEE & NSHCS & GEP help to embed genomics into pre-reg curricula to provide the foundations for the future workforce
- GEP & NSHCS continually improve curricula for higher-level learning specific to the clinical context
- GEP raises awareness and upskilling the current workforce

1.3 million NHS staff with varying needs and motivations

All levels of education, covering future and current workforce
Collaboration with the NSHCS

Level 4 Apprenticeships:
• Worked with NSHCS to develop three genomics modules

Scientist Training Programme:
• STP in Genomics:
  — Established specialist outcome in Genomic Counselling
  — Facilitated development of specialist outcome in Cancer Genomics

Higher Specialist Scientist Training:
• Helped the development of HSST in Clinical Bioinformatics (Genomics)
• Funded places on the HSST in Genetics, Molecular Pathology of Acquired Disease, and Clinical Bioinformatics (Genomics)
Genomic diagnosis tells us what the individual problem is ALSO: guides clinical management

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<td>STAT3 p.T716M</td>
<td>Multi-organ autoimmune disease</td>
<td>? STAT3 inhibitor</td>
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Five babies – five different treatments
Whole genome sequencing MOOC

- Flexible, free online course to raise awareness of WGS amongst non-specialists.
- Platform chosen to reach a large number of healthcare professionals, students and public.
- Additional aim to prepare leaners to take part in the genomics conversation and shape the development and implementation of this technology within NHS.
- Real-time facilitation by experts a key element of FutureLearn courses; team of HSST and STP trainees recruited to act as ‘mentors’.
- 18,500+ course joiners since Sep 2016 with a high % ‘active’ learners.
WGS MOOC: outcomes and benefits

Evaluation of this course shows it benefits:

• genomics workforce, particularly those in training, eg STP, HSST;
• wider NHS workforce;
• patients/members of the public; and
• STP/HSST ‘mentors’ themselves,

Learners benefit through participating in a conversation around the development and implementation of this technology, including the ethics surrounding it.

Mentors benefit through opportunity to interact with clinical colleagues and patients.

“I have been particularly impressed by the input of the course mentors throughout. This isn’t the case on all courses!” LEARNER

“The family of the patients… bring a perspective on all this. They really helped me to reflect on the significance of my own work.” MENTOR

“The course has helped me to understand how my son’s condition has come about, and why it is so difficult to fix.” LEARNER
Supporting the new GMS

The launch of the Genomic Medicine Service marks a new key priority for the GEP. As such, it is putting together a workforce group with representatives from the seven preferred GLH bidders, NHSE and HEE. Insights from that group will inform and direct the GEP in:

1. Co-ordinating and implementing a robust training and education plan.

2. Identifying competences required for key areas of GMS activity and the resources to meet workforce needs in eg consent, data.

3. Workforce planning to address supply and demand, linking to HEE workforce strategy, and identifying new ways of working to address gaps in the workforce.
Thank you

Any Questions?
On NSHCS Website:

The **NHS Employers**:
A beginner's guide to apprenticeships
Getting the most from apprenticeships
Apprenticeship standards
Benefits of apprenticeships
Apprenticeship myths
Apprenticeship questions and answers

**Degree apprenticeships guide**

*What employers need to know'* outlines how higher-level apprenticeships can support career pathways.

**Find an apprenticeship provider**
Visit the 'Find a training organisation' website

**Find an independent EPA organisation**
Register of Apprentice Assessment Organisations.

**Useful links**
Skills for Health
National Skills Academy for Health