Modernising Scientific Careers: The story so far and future direction
Professor Sue Hill, Chief Scientific Officer for England
Definition of healthcare science workforce

The non medical healthcare science workforce applies science, technology, engineering and mathematics in the fields of biology, microbiology, physiology, medical physics and clinical engineering specifically within the health sector (inclusive of the NHS, Public Health England and National Blood and Transplant) to deliver improved health outcomes and health protection for people and communities.

As a whole, the healthcare science workforce works within and across specialist areas of scientific practice to provide the skills, knowledge, advice and expertise to develop, deliver and support services, through specialist investigations and/or interventions for the diagnosis, treatment, and management of disease and the control and prevention of disease or harmful infectious and environmental agents.

It makes a significant contribution to the innovation pathway, from invention through to translational research, adoption, diffusion and knowledge management.
Modernising Scientific Careers: the context and vision for change

**Context**

- **Big Science** and innovation (*Innovation, Health and Wealth*)
- *Life Sciences Strategy* and science contribution to UK plc
- need for coherence and consistency in education and training arrangements similar to other healthcare professionals
- need for an integrated, fit for purpose and affordable workforce
- changing models of care and provision in response to demographics and disease burden

**Vision**

- a flexible, value driven, responsive workforce focussed on patients, their safety and quality improvements
- leaders of innovation and evidence based use of technology & scientific advances
- roles that support service and quality outcomes for patients
- work outside traditional boundaries e.g. within multi-disciplinary teams (including A & E, primary care, 24/7 arrangements), with patients and other partners
MSC: a training and education solution to meet patient and service needs and improve clinical outcomes

A solution that addresses the whole healthcare science workforce

<table>
<thead>
<tr>
<th>Modernising Scientific Careers</th>
<th>Benefits to:</th>
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<tbody>
<tr>
<td>Life Sciences</td>
<td>• Patients and the Public</td>
</tr>
<tr>
<td>Physiological Sciences</td>
<td>• NHS and Employers</td>
</tr>
<tr>
<td>Physics and Engineering</td>
<td>• Professionals</td>
</tr>
<tr>
<td>Clinical Bioinformatics</td>
<td>• Higher Education Sector</td>
</tr>
<tr>
<td>Assistant/Associate</td>
<td></td>
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<tr>
<td>Practitioner</td>
<td></td>
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<tr>
<td>Scientist</td>
<td></td>
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<tr>
<td>Higher Specialist/Consultant Scientist</td>
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</tbody>
</table>

- Standardised training and education in pathways and programmes underpinned by robust assessment
- Broader training in cognate themes reflecting the potential patient population
- Clear outcomes from training programmes to allow better planning and service matching
- Reduction in costs of training
- Affordable and coordinated approach to the commissioning of education and CPD requirements
- Recognition of previous experience and training
- Opportunities to progress competitively
- Consistent regulation proportionate to clinical risk
- Additional Scientific Practice (ASP) opportunities for all staff in order to develop more structured & workplace related CPD
Key Areas of Policy & Strategic Developments in Healthcare Science

- UK wide development of policy
- Education and Training Programmes development
- Workforce Planning (including tools, new ESR codes, projection planning)
- Employment framework and careers (including working with schools)
- Regulatory Arrangements
- Quality Assuring and managing HCS Training and Education through the National School of Healthcare Science
- Lead Commissioner for academic & training provision (Health Education West Midlands [HEWM])
- Council for HE in HCS and new Strategic Group with DH/BIS
- A “Voice” for Healthcare Science including being a partner for Education and Training (Academy for Healthcare Science [AHCS])
- Development of transparent partnership arrangements with patients, HEIs, MRCs, Professional Bodies
The MSC UK Model for Career and Training Pathways in Healthcare Science

* Anticipation of registration on AHCS register, conferring eligibility to apply for available Consultant Clinical Scientist opportunities
** Could potentially contribute to HSST equivalence
*** Including Certificate of Completion of Scientist Training Programme (CCSTP)
MSC Programme Design

- Work based programme and underpinning academic award developed with employers, professionals and patient/lay input
- Learning Guides that clearly define:
  - Work Based Learning Outcomes
  - Clinical Experiential Learning
  - Competences
  - Applied Knowledge & Understanding
- Generic Curriculum including:
  - Professional Practice (linked to GSP) and values and behaviours
  - Scientific Basis of Healthcare Science (incl. Genetics, Bioinformatics, Public Health, Epidemiology)
  - Research (CACP), Innovation (ICF), Leadership
- Theme and specialist curriculum
- Overarching Assessment Strategy
- Development of a bespoke on-line assessment tool
- Accreditation of Academic (MSC) and work based environments (NSHCS) – NHS kite-mark (and other kite-marks, e.g. COGENT, Society of Biology)
- New curricula as need arises and review process

- Partnerships with HE sector
- Independent Institute of Education (IOE) review of curricula
Modernising Scientific Careers

How far have we come?
- PTP and STP in place
- CF2-4 framework developed
- HSST framework developed
- ASP framework developed
- AHCS in place
- NSHCS in place
- Academic career pathway
- Leadership training

Where have we still to go?
- Implement CF2-4
- Implement HSST
- Implement ASP framework
- Medical Physics Expert (MPE) Project
- Service mapping
- Service accreditation
Career Framework 2-4

The proposed framework provides a common structure for:

- A defined national ‘Rolemap’ for each of Assistant and Associate roles
- The structure and design of new roles in new contexts
- Curriculum for development in roles, progression and transferability
- Qualifications and Awards
- Equivalence, accreditation of prior learning

The framework and development builds upon and utilises all previous work and existing/under development programmes, awards and qualifications

Working with NHS Estates, IPEM and IHEEM to apply to medical physics and clinical & healthcare engineering
Healthcare Science Apprenticeships

Main entry point for new assistants

Introductory qual Assistants level 2

Higher apprenticeship level 5 (FD equiv)

Higher Apprenticeship level 4 Associates

Personal, cognitive and professional skills
HCS specific

Introductory qual Associates level 4

Adv apprenticeship level 3 Assistants

Main entry point new associates

Exit to PTP completion with 1 yr further study

Main entry point for new assistants

Science in healthcare DRIVING A MODERN NHS
Practitioner Training Programme (PTP)

New HEI participants in the PTP market

- MSC accredited programme at the University of Liverpool
  - Programme starting October 2014
- MSC accredited programme at Cumbria University
  - Programme starting January 2014

MSC approved Graduate Diploma route starting in January 2014 in Radiotherapy Physics and Nuclear Medicine.

- 2 intakes, addressing short term workforce need until undergraduate programmes delivering
- 2 year programme completing same workplace learning as PTP
- HEI provider for Graduate Diploma commissioned subject to contract
- Part commissioned/part employer funded
- Local Education and Training Boards (LETBs) have 32 expressions of interest for January 2014
Scientist Training Programme (STP)

- Third year of recruitment – 3 MSc Providers in England, 1 in Wales
- Now have STP trainees in England, Wales and Northern Ireland
- Three new programmes starting:
  - Reconstructive Science – 10 trainees starting 2013
  - Clinical Pharmaceutical Science – including Radiopharmacy with 10 trainees starting 2013
  - Clinical Bioinformatics with specialisms in:
    - Genomics (starting 2013)
    - Bioinformatics for the Physical Sciences (starting 2014) which includes mathematical modelling of biological systems
## STP recruitment

<table>
<thead>
<tr>
<th>Specialism</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Clinical Engineering</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unspecified</td>
<td>8</td>
<td>13</td>
<td>4</td>
<td>25</td>
</tr>
<tr>
<td>Clinical Measurement &amp; Development</td>
<td></td>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Rehabilitation Engineering</td>
<td>1</td>
<td>5</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td><strong>Medical Physics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unspecified</td>
<td>9</td>
<td></td>
<td>41</td>
<td>50</td>
</tr>
<tr>
<td>Imaging with Ionising Radiation</td>
<td>7</td>
<td>11</td>
<td>4</td>
<td>22</td>
</tr>
<tr>
<td>Imaging (Non Ionising Radiation)</td>
<td>3</td>
<td>3</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Radiation Safety Physics</td>
<td>9</td>
<td>11</td>
<td>4</td>
<td>24</td>
</tr>
<tr>
<td>Radiotherapy Physics</td>
<td>33</td>
<td>33</td>
<td>16</td>
<td>82</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td>69</td>
<td>72</td>
<td>76</td>
<td>217</td>
</tr>
</tbody>
</table>
HSST – to Consultant Clinical Scientist

- trains an expert senior scientist workforce for roles as Consultant Clinical Scientists enabling them to lead and innovate and co-ordinate care & translational research
- curricula at same standard as that of higher medical specialty training
- developed with the facilitation of the Academy of Medical Royal Colleges [AoMRC] and approved through their systems
Certificate of Completion of Higher Specialist Scientific Training & doctoral level programme

Driving Technological Change: evaluation of medical technologies - adoption and change for improved outcomes. Technology strategy development

Clinical Biomedical Engineering solutions: Benefiting & enabling patients, fostering independence and minimising the impacts of disability

Soft Systems Engineering theory applied to health

Health System Change and Innovation

Health Economics

Clinical Biomedical Engineering/Health System Projects: various investigations, reports, care pathway optimisation, incorporating systems theory approach.

Chartered Engineer status achieved, (CEng)

STP Specialties not specialised in, either: Rehabilitation Engineering, Device Risk Management or Clinical Measurement/Design and Development

Clinical Skills

Good Clinical Practice

Clinical Investigations WHO ICF Framework

Engineering Project Management, Leadership and Innovation*

Doctoral Level Programme

Stage Two

Stage One

Clinical Scientist
**Similar structure under development for Medical Physics**

<table>
<thead>
<tr>
<th>Certificate of Completion of Higher Specialist Scientific Training</th>
<th>Doctoral Level Programme</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stage One</strong></td>
<td><strong>Stage Two</strong></td>
</tr>
<tr>
<td><strong>Continued specialism in one area of Medical Physics: (contributing to service delivery. This specialism will be used to generate clinical project studies to meet the requirements of the HSST Curriculum, including all GSP elements.)</strong></td>
<td><strong>Medical Physics</strong></td>
</tr>
<tr>
<td>Driving Technological Change: evaluation of medical technologies - adoption and change for improved outcomes. Technology strategy development</td>
<td>Project/Health Systems Project: various investigations, reports, care pathway optimisation, incorporating systems theory approach.</td>
</tr>
<tr>
<td>Modelling and Simulation, Statistics, Mathematics: modelling, pharmaco-kinetic analysis, data analysis</td>
<td>Medical Physics</td>
</tr>
<tr>
<td>Change &amp; Innovation Management</td>
<td>Project/Health Systems Project</td>
</tr>
<tr>
<td>ICT - introducing Clinical Bioinformatics, Genomics, Personalised Medicine</td>
<td>Training, Education, Leadership &amp; Management*</td>
</tr>
<tr>
<td>Technology strategy development</td>
<td>Service Leadership Role design and workforce shaping</td>
</tr>
<tr>
<td>Continued specialism in one area of Medical Physics</td>
<td>Doctoral Level Programme</td>
</tr>
<tr>
<td>Medical Device Management, Procurement</td>
<td>Training, Education, Leadership &amp; Management*</td>
</tr>
<tr>
<td>Quality &amp; Safety Management</td>
<td>Service Leadership Role design and workforce shaping</td>
</tr>
<tr>
<td>Advanced Imaging Informatics</td>
<td>Project Management, Leadership and Innovation*</td>
</tr>
</tbody>
</table>
| Health Service Governance and Health Economics | Training, Education, Leadership & Management*

**RCR Equivalent**

- **FRCR Equivalent**

**Clinical Scientist**
Framework for Accredited Scientific Practice (ASP)

HCS Group

Academic Element

Minimum Entry

Practice Element

ASP Status

Professional and skills development

HCS Group

Healthcare Science Associate
Qualification base at FD level

Healthcare Science Practitioner/Biomedical Scientist
Qualification base at FD level

Clinical Scientist
Qualification base at Masters level

Doctoral-level credit

STP or equivalence to Scientist

Masters-level credit

PTP or equivalence to Practitioner

Bachelors-level credit

FD or equivalence to Associate

Completion of workbased assessment

Completion of workbased assessment

Completion of workbased assessment

Accredited Additional Scientific Practice

Accredited Specialist Scientific Practice

Accredited Expert Scientific Practice
Career and Training Options for Clinical Scientists

Completion of MSC STP Programme or Equivalence

Accredited Expert Scientific Practice¹

Work Based Training plus Doctoral Level Academic Programme

Accredited Expert Scientific Practice (AESP)

Higher Specialist Scientific Training (HSST)

Research PhD

Clinical Academic Career (CAC)

Option 1

Option 2

Option 3

¹ On completion of STP some registered clinical scientists may be required to consolidate and gain further clinical experience before applying for further education and training.
Workforce numbers and future planning

• 2% increase overall between 2010 and 2012
  – 7% increase in Radiotherapy Physics
    o (11% increase in attendances, 10% increase in LINACs, significant increase IMRT &IGRT – shows more productive workforce)
  – 10% increase in the Clinical Scientist workforce
  – 9% reduction in Rehabilitation Engineering
  – No change in the technical workforce or in the age profile
  – Need to recruit 85 to PTP every year to replace current technical workforce

• Anecdotal evidence of the loss of Consultant Clinical Scientists as departments fragment and Heads of Service are not replaced
• 10% loss in Consultant Clinical Scientist posts between 2010-12
  – 21% drop in the over 55 age-group
• Workforce planning report due
• Tools for workforce planning being reviewed
• Changes to Electronic Staff Record being implemented
Recognise the changing role of healthcare science in care delivery resulting in new roles and functions for the healthcare science workforce:

- as more processes become automated, different skills are needed to monitor and operate the process which could free up the time of specialist staff to focus on other activities

- the ability to monitor certain conditions remotely and for patients to play a role in monitoring their own conditions could change where and how care is delivered

- advances in science are resulting in more complex tests and procedures, which require greater expertise to carry out these tests and interpret the results.
Quality, Innovation, Productivity and Prevention (QIPP) is a large-scale transformational programme for the NHS that aims to improve the quality of care the NHS delivers, while making up to £20 billion efficiency savings by 2014-15 that will be invested in frontline care.

MSC checklist
09/04/2013
NHS Employers has produced a checklist to help employers implement aspects of Modernising Scientific Careers (MSC).

MSC is an opportunity to refocus and re-energise the healthcare science workforce to meet the increasing demands of future healthcare delivery. NHS Employers has produced the following checklist which provides practical steps that employers should take to engage with, and support, the implementation of MSC.

Use apprenticeship schemes
Particularly with the CF2-4 Programme

Innovation and practice
28/06/2013
In an increasingly demanding environment, the challenge for the NHS is to pursue innovations that add value and help minimise costs, helping to improve quality, increase cost effectiveness and transform the patient experience.

The healthcare science workforce is constantly evolving and over the next 20 years will be at the forefront of changing delivery models and advances in technology.

Clinical and scientific advances are making significant changes to patient care delivery and pathways. As new services are being designed around patients, we are starting to realise new benefits both to the healthcare science workforce itself and those in receipt of high quality care. Now is a key time for commissioners, providers and employers to work together and embed innovation and advances into workforce planning.

Workforce planning tools
11/06/2013
This page contains three healthcare science workforce planning tools and background information designed to help you effectively plan your science workforce.

These healthcare science workforce planning tools were commissioned by the Department of Health and are designed to help employers effectively plan their healthcare science workforce.
Education & Training within the new health & care system

System informed by:
- Scientific leadership at all levels
- Scientific advice and expertise
- Scientific networks

HEE held to account via the Mandate across 5 domains of Education Outcomes Framework:
- Excellent education
- Competent and capable staff
- Adaptable and flexible workforce
- NHS values and behaviours
- Widening participation
Embedding the sustainability of HCS training

National School of HCS (NSHCS)

- coordinate the implementation of MSC training programmes
- engage with health departments for Northern Ireland, Scotland & Wales
- provide specialist scientific advice on healthcare science work based E & T
- Quality management and accreditation of training environments
  - Initially using the well respected IPEM accreditation
  - All but 1 STP trainee in currently IPEM accredited departments – working in a consortium with 2 experienced departments
  - 5 year programme of accreditation visits plus annual self assessment
- manage national recruitment for STP/HSST
- monitor progress of trainees through the themed boards and the on-line assessment & learning tool (OLAT) & the Objective Final Structured Assessment (OFSA) in order to issue the Certificate of Completion of Training
- develop training capacity by the provision of annual Train the Trainer programmes

Lead LETB for HCS

Health Education West Midlands (HEWM)

- NHS West Midlands continues in its role as lead education and workforce commissioner for MSC through the Lead LETB for HCS
- working with the other LETBs, HEWM as the Lead for HCS will receive and advise HEE on LETB plans for commissioning workforce, giving oversight and recommendations for these small specialties
- commissions, procures STP Master’s in Clinical Science programmes and other further required e.g. bioinformatics, clinical pharmaceutical science, critical care science, reconstructive science and
- will commission doctoral programmes for HSST

Science in healthcare DRIVING A MODERN NHS
Embedding the sustainability of HCS training

**Academy for Healthcare Science (AHCS)**

- develop consistent regulation for the healthcare science workforce e.g. by establishing accredited voluntary registers
- implement a system to assess and confer ‘equivalence’ of the existing qualifications and experience offered by individuals, mapped to the outcomes of formalised quality assured training programmes
- quality assure education and training in partnership with other stakeholders
- developing common standards for healthcare science practice
- project on the accreditation of Medical Physics & Clinical Engineering services being initiated with IPEM
- “recognised educational provider” for the Scientist Training Programme

**Council of HCS in Higher Education**

- actively champion and promoting the unified concept and profile of academic healthcare science within the HE sector
- enable strategic discussion on academic healthcare science issues, including career pathways, capacity and capability building and programme development
- ensure the HE sector is informed about development in healthcare science education, research and innovation
Development & Implementation of HCS training

Curricula, learning guides and accredited programmes

Assessment programme and e-portfolio (OLAT)

Raising Outcomes & Standards of Education (ROSE Guide)

Workforce data & planning tools

Career framework & roles

through

Strategic partnerships-patients/NHSE/HEIs/MRCs, Prof Bodies

Quality assurance framework

Workplace Accreditation process of clinical placements

Pilot programme in Genetics and its evaluation

through

National School of Healthcare Science (NSHCS)

Equivalence strategy

Accredited Voluntary Registers

“One Voice”

through

Academy for Healthcare Science (AHCS)

Excellence in Education
Future considerations for Medical Physics & Clinical Engineering

- Services need to demonstrate they are critical to the delivery of recommendations in the National Advisory Group report on *Improving the Safety of Patients in England*
- Demonstrate **impact on patient outcome** measures
- Review of commissioning and provider models to embrace new models of care and technology advances
- **New ways of working** and working across boundaries
- Take full advantage of initiatives to **promote and develop leaders**
- Introduction **service accreditation** and transparent audit and quality assurance mechanisms
- Establish **standardisation and benchmarking**
- Further develop **leadership at all levels** within the workforce
- **Improve workforce data** – IPEM Workforce Intelligence Unit
- Make full use of **workforce profiling** tools