

# The future of medicine and medical education

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Medical  
Council

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Professor Terence Stephenson, Chair, General Medical Council

**Working with doctors Working for patients**

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## The future is hard to predict

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- 'There is not the slightest indication that nuclear energy will ever be obtainable'
- 'I think there is a world market for maybe five computers'
- '640k of memory should be enough for anybody'

# The future is hard to predict

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- 'There is not the slightest indication that nuclear energy will ever be obtainable'
  - **Albert Einstein (1932)**
- 'I think there is a world market for maybe five computers'
  - **Thomas Watson, Chairman of IBM (1943)**
- '640k of memory should be enough for anybody'
  - **Bill Gates (1981)**

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## Future trends

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# Some potential influencers

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## Population

- Age
- Geolocation
- Social isolation
- Changing workforce

## Technology

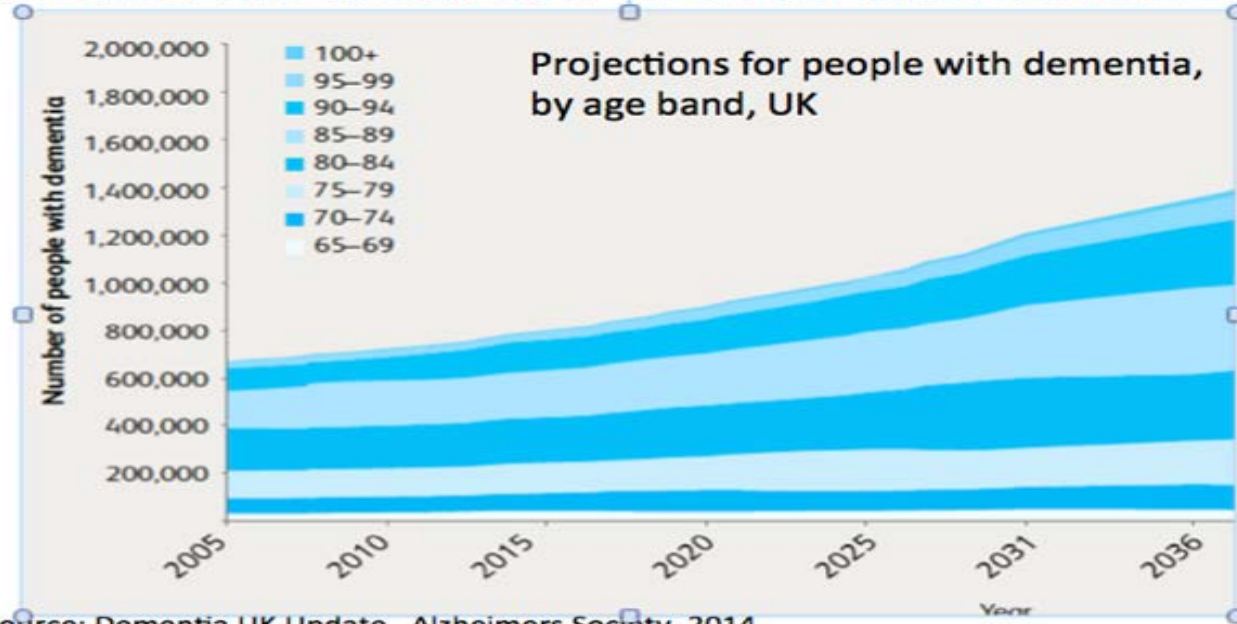
- Genomics
- Nanotechnology
- Artificial intelligence
- Robotics
- Online medicine
- Impact on learning

## Disease patterns

- Long-term conditions
- Complexity
- Multi-morbidity
- Emerging disease

# Ageing population

An ageing population will put increasing pressure on NHS care over the next 20 years



Source: Dementia UK Update , Alzheimers Society, 2014

People with long term conditions *already* account for about 70% of total UK health & social care spend.

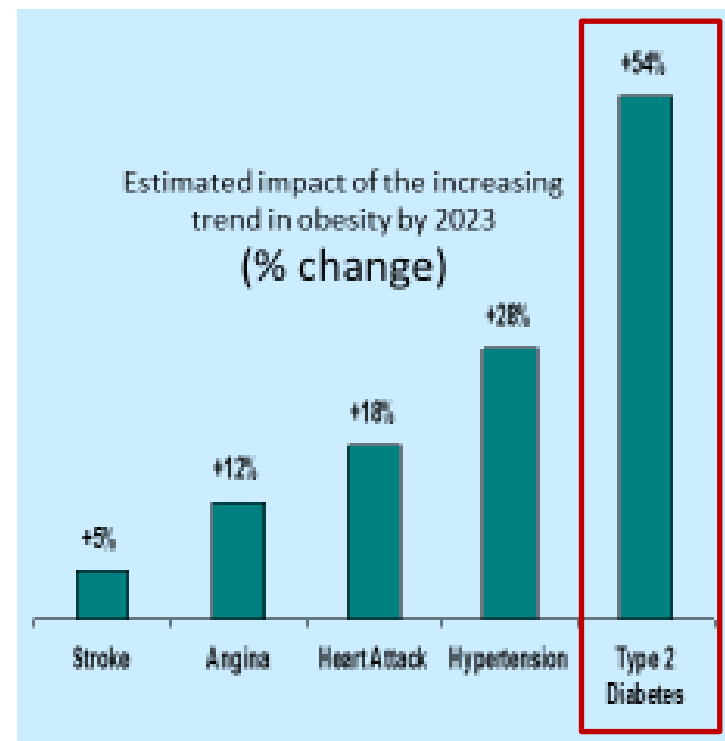
# Our lifestyles are offsetting the gains made in public and personal health care

Obesity is projected to rise- though smoking shows trends can be shifted



- There are already more obese than normal weight adult males, by 2050 60% of men and 50% of women are forecast to be obese
- Similar trends can be seen with drinking; however, smoking is set to decline, albeit with a hardcore of remaining smokers

These lifestyle factors are having a very significant impact on the incidence of disease



Source: Choosing Health: Making Healthy Choices Easier, DH, 2004

# Mental health and wellbeing

## World Health Organisation

- Health: a 'state of complete physical, mental and social wellbeing, not just the absence of disease or infirmity'.

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### More than eight in 10 doctors experience mental health issues during career

By David Millett on the 16 July 2015 3 comments

More than eight out of 10 UK doctors have experienced mental health issues during their career, with the vast majority reporting heavy workload and long working hours as key contributing factors.

[Discuss on Doctors.net.uk](#)

The Kings Fund Ideas that change health care

## Bringing together physical and mental health

### A new frontier for integrated care

Authors  
Chris Naylor  
Preety Das  
Shilpa Ross  
Matthew Honeyman  
James Thompson  
Helen Gilbert

March 2016

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## Mental health: Huge gap between needs and provision

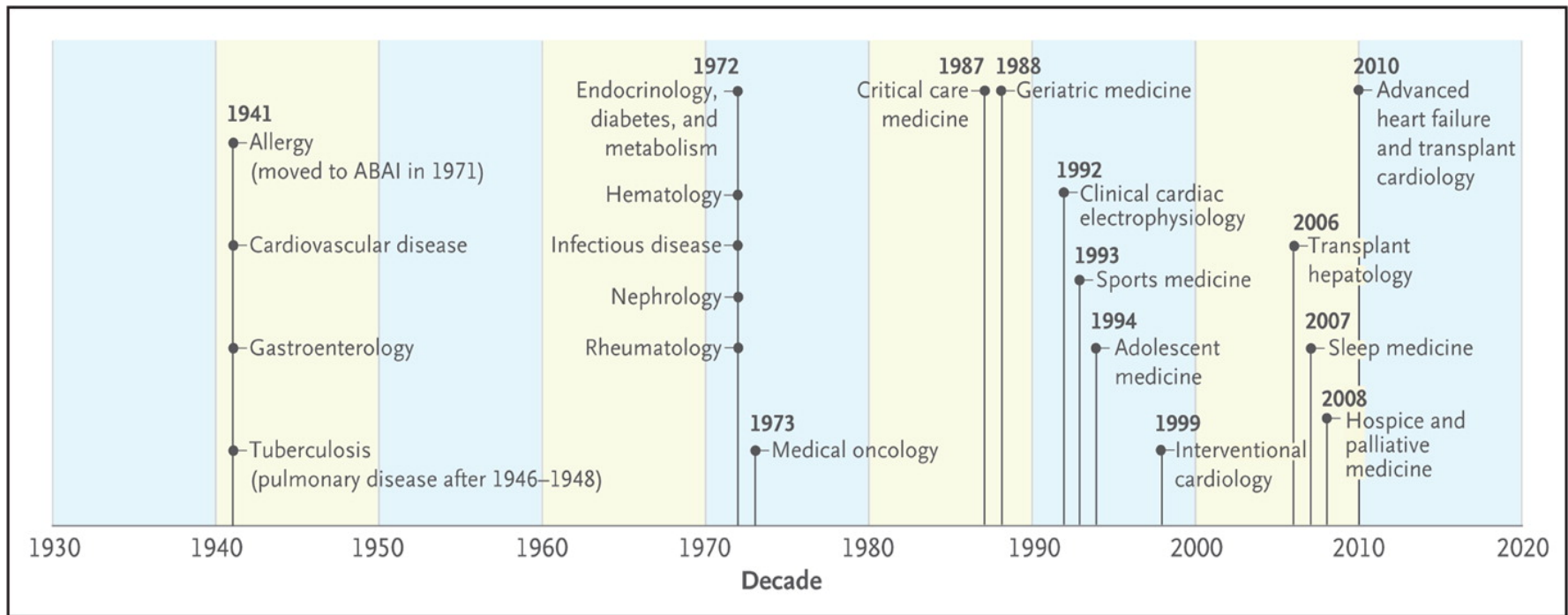
By Catherine Smyth  
Producer, Health BBC News NI

7 June 2017 | Northern Ireland

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# The workforce is becoming more specialised

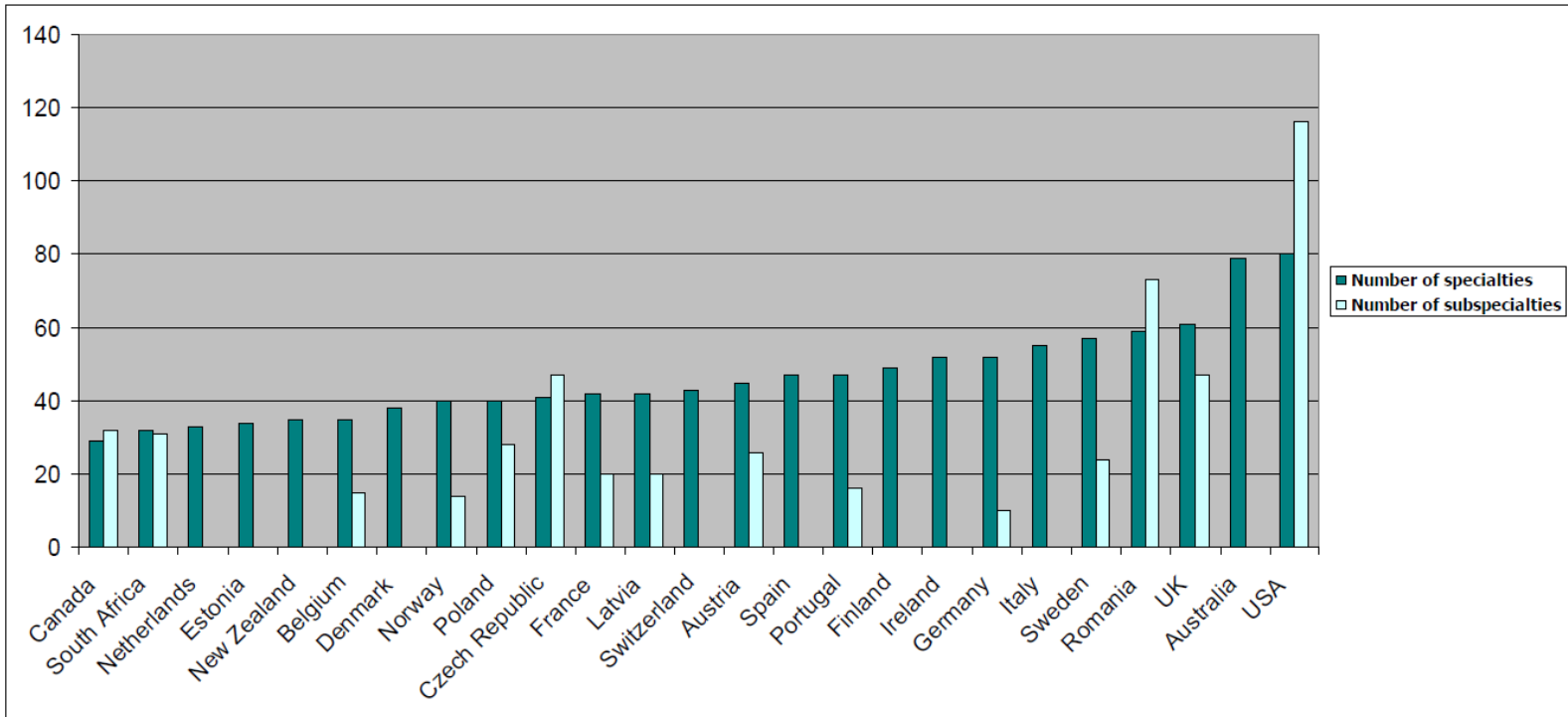


Source: Specialization, subspecialization and subspecialization in Internal Medicine. NEJM, 2011

Past 80 years has seen increasing specialisation of care – illustrated by the American timeline of specialisation for Internal Medicine. A similar trend within the UK, with trainees also encouraged to specialise at an earlier point in their training.

Will this continue?

# But increasing calls for generalists

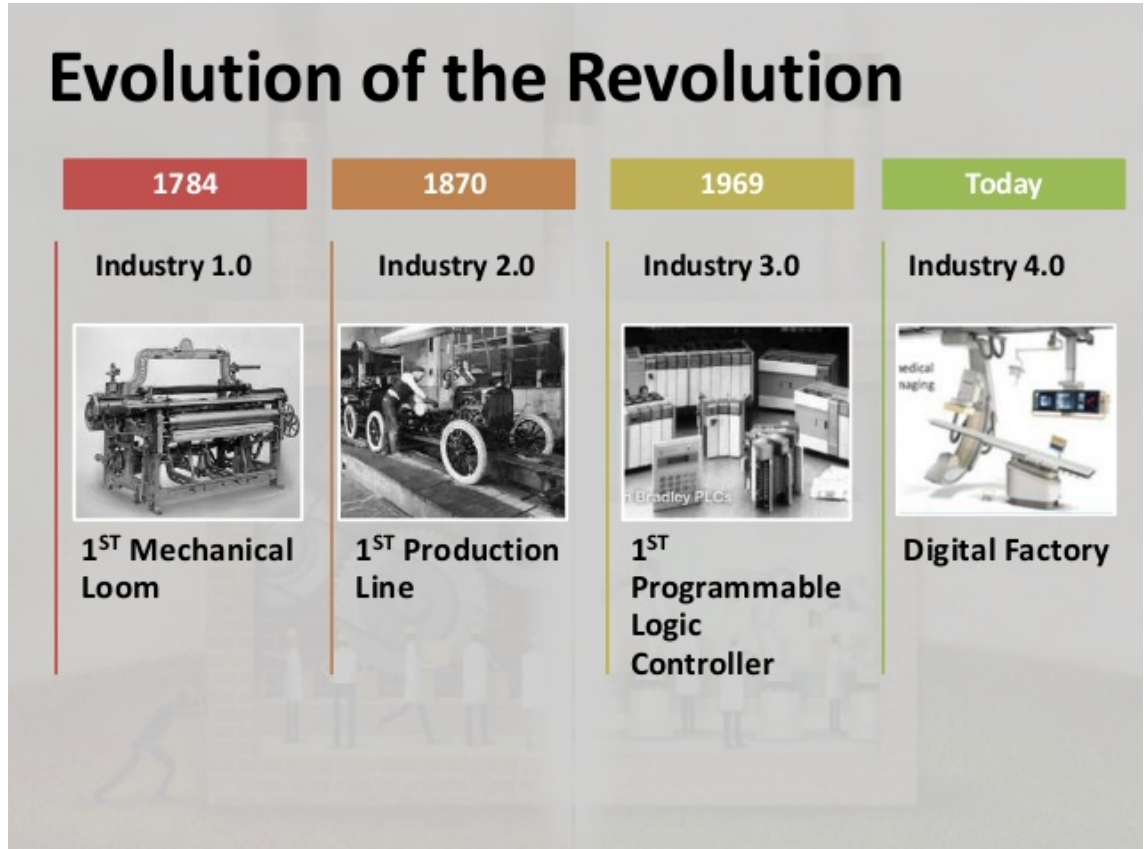


The UK has one of the highest specialised workforces.

However, recent reviews have called for a reduction in the number of specialties and a move towards broad areas of work structured around the needs of patients with multiple co-morbidities.

# Future science – the 4<sup>th</sup> revolution

- **INDUSTRIAL: 1784** – Cartwright's mechanical loom
- **ELECTRICAL: 1870** 1<sup>st</sup> assembly line
- **IT: 1979** Imperial College Mainframe
- **STEAM! 2017** Science, Technology, Engineering, Arts, Maths



# Future science – the 4<sup>th</sup> revolution

- Artificial intelligence
- Machine learning
- Block chain technology
- Big data
- Bio-informatics
- Genomics
- Nano-tech

## Gene editing could revolutionalise cancer treatment and organ transplantation



The world's first gene-editing trials took place in California. Around 80 patients with HIV have immune cells in their blood removed. Scientists then deleted a gene called CCR5 which HIV uses to gain entry to cells. The treatment is based on a rare, gene mutation which gives some people a natural immunity to the disease. One of the volunteers has been off all antiretroviral medication for two years since having his immune cells gene edited. Source: The BBC, 2016

Research is ongoing on human-pig chimeric embryos for growing human organs



But the work is controversial. Last year, the main US medical research agency, the National Institutes of Health, imposed a moratorium on funding such experiments



# Future healthcare: the 4 P's

- predictive, preventive, personalised, participatory medicine

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Pharmacogenomics offers a new era in personalised care – but, like most technology, raises thorny ethical issues



Genomics is transforming the pharmaceutical industry. Companies are moving from drug R&D based on medicinal chemistry to the design of drugs based on information from genomics



Examples include design of **drugs** like Trastuzumab (Herceptin), for treatment of breast cancer in women with high HER2 levels, and genetic **tests** to identify those patients that are likely to have an adverse reaction to a drug treatment e.g. patients for whom the drug Abacavir, a drug used to treat HIV, is highly toxic.

Pharmacogenomics raises a number of ethical issues including privacy of people's genetic data, and potential discrimination against population sub-groups

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# The role of the doctor

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# BUT Doctors still mostly do what they have always done

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## **Problem solving Doctors do 5 things:**



- i. listen to the patient's story**
- ii. examine the patient**
- iii. form a set of differential diagnoses**
- iv. select appropriate tests & reach a single working diagnosis**
- v. start treatment**

**Subsequent treatment often follows a protocol or guideline and needn't always be delivered by doctors.**

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# What hasn't changed over the last 40 years?

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*The Dr sent home a 47-year-old complaining of calf pain, who had a family history of DVT, who then died of a blood clot 11 days later.*

**“Doctors are like magicians – they both deal with the unknown”**

**There is still a need for someone who can accept ambiguity, be comfortable with complexity and distil a diagnosis with grey data.**

**These doctors need a comprehensive and general training.**

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# Priorities for medical education

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## The future?

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**So maybe 2 training tracks - shorter training for proceduralists or ‘technicians’ where the diagnosis is already limited and longer training for problem solving generalists who see unselected patients.**

**But predicting the future is difficult (eg peptic ulcer disease) – and retraining a technical proceduralist for something else will not be easy.**

**We need lifelong learners**

# Doctors as professionals

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- A professional is a highly trained person who you go to for independent, expert advice
- Professionalism has both:
  - technical skills and
  - generic capabilities – communication skills, honesty, empathy

# Reasons why Drs are complained about to the GMC

**FIGURE 37: What are the most common types of allegation investigated by employers and the GMC?**

TYPES OF ALLEGATION	Number of cases investigated			% investigated by the GMC
	Total	Referred to employers to investigate	Investigated by the GMC	
Criminality	1,196	8	1,188	99%
Health	899	34	865	96%
Acting honestly and fairly	3,972	988	2,984	75%
Working with colleagues	1,106	271	835	76%
Professional performance	2,766	736	2,030	73%
Safety and quality systems	526	178	348	66%
Clinical competence	8,176	3,840	4,336	53%
Communication and respect for patients	5,216	3,057	2,159	41%
Unspecified*	1,986	49	1,937	



## Further ahead

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- Need to be innovative as we revise medical curricula and training pathways – ‘one in, one out’
- UG teaching and PG training need to be complementary not duplication – the spiral curriculum
- Review the role of the doctor to meet the **future** population and workforce needs, not today’s or tomorrow’s needs – consulting ‘Outcomes for Graduates’ (‘Tomorrow’s Doctors’)
- Better understand and embrace approaches to lifestyle and training – National Training Survey and data driven learning

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**Thank you**

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