The impact of new technologies in healthcare – how can higher education respond?

Simon Carrington

Tavistock and Portman NHS Foundation Trust
Professionals vs Computers

Michael O’Leary on pilots: ‘Very well paid for doing a very easy job’

The Ryanair chief says the airline will win back people’s faith, and pilots do not want to be unionised

Hugh Linehan

Thu, Sep 21, 2017, 19:40

Video

Images
The future of healthcare

• How will the practice of medicine look in 50-100 years time?

• How will medical education look in 50-100 years time?
Future healthcare technologies

• Computers are embedded in modern working practice
• In the future will the computer be a silent repository, a working partner, an expert or a manager?
• Disruptive technologies stand to change the practice of medicine
Research

• Speeding innovation, technical developments and understanding
• In silico environments – lab on a chip; organ on a chip
• Virtual clinical trials
• Less time, more chance of success in fully clinical trials
The patient

• The internet is now a mature technology – Google, Net Doctor

• Social media a complicating factor
  cheap
  democratising
  doctor no longer on a pedestal?
The patient

- Wearables: watches, clothes, contact lenses, glasses
- Competitive fitness
- Competitive healthiness – role of employers/insurance companies?
- ‘Health and safety’ – train driver, doctor, teacher
- Big Brother?
The location of medicine

• Home diagnostics – the smart phone; a sophisticated and expandable computer plus a versatile communication hub
• Link to sensors – diagnose, communicate health statistics – involvement of doctor/nurse?
• Hospital at home
The location of medicine

• How informed are the public?
• Wider access to drugs through internet (pharmacy)
• Counterfeit and unscrupulous operators
• Aging populations including those living with complicated and multiple conditions
The next step

• Embedded sensors – more opportunities, more Big Brother
• 3D printing – bespoke organs, new dosage forms
• Exoskeletons
• The rise of the cyborg?
Figure 2. Percentage of patients for whom drugs are ineffective. (Source of data: Spear, B.B., Heath-Chiozzi, M., & Huff, J. (2001). Clinical application of pharmacogenetics. TRENDS in Molecular Medicine, 7(9), 261-264.) (Note that lack of efficacy in a given patient may reflect a complex interaction of factors and can also result from inadequate or inappropriate dosing regimens of a drug that would otherwise be effective, as well as lack of adequate patient compliance.)
Personalised medicine

- Drugs are often ineffective in many patients – may be due to inappropriate dosing or other reasons
- Analysis of individual’s genomic make up can be used to develop personalised drug regimens
- Already used for some anti-cancer drugs
Personalised medicine

- Gene therapies coming of age
- More sophisticated and real-time imagining
- 3D printing
Robotic assistance

• Established in pharmacies
• Patient manipulation
• Surgery
Artificial intelligence (AI)

- The amount of relevant information available to doctors is more than can be retained by any individual
- Discoveries and changes to optimal practice are constantly being published
- AI is likely to be a major tool in diagnosis and determining interventions
Artificial intelligence (AI)

- At present people process unstructured info – computers are information repositories
- AI allows computers to become adept at the unstructured
  machine learning
  neural translation
  deep learning
  cloud information
  artistic endeavours
Artificial intelligence (AI)

- The computer as ‘co-pilot’
- In medicine acting to give a second opinion
- Suggest alternative treatment plans
- Help with complex cases
- Act as vigilance and raise alarm
Artificial intelligence (AI)

• AI and the cloud can learn and extrapolate
• At what point will AI take over? banking and trading project management
• New knowledge developed through data and observations rather than programmed research
Artificial intelligence (AI)

• At what point does the AI take over in medicine?
• Once the AI outperforms human staff who is the co-pilot?
• What are the drivers?
• Money: cost of doctors (physician associates) indemnity - cost of negligence and insurance company requirements
Globalisation

• Some say offshoring is a bigger issue than mobile populations
• Offers lower salaries and no spending in the local economy
• Technology opens up new offshoring opportunities
• The market for exceptionally talented individuals will draw from much bigger populations
Education

- Can also draw on new technology: simulation virtual anatomy devices
- Can be a big investment – how do universities make the right choices? (Second Life)
- Will medical professionals retain prestige?
- Will there be employment for all trained healthcare professionals?