Developments in information and communication technology relating to health and healthcare – Memorandum from *NHS Connecting for Health* in response to the call for evidence from the Royal Society

Introduction

A number of key trends can be identified that will affect the health care of tomorrow. These include:

- an ageing population
- changing and growing patient expectations
- potentially significant medical advances
- a changing labour market and workforce aspirations
- changes in the overall disease profile
- globalisation
- rapid growth in information, communications and medical technology

Communication technologies can liberate health care services from hospitals. The development and adoption of new technology will allow real-time remote communications that mean:

- The patient and specialist can see each other via video links
- Transmission of real-time data from electronic stethoscopes, endoscopes etc
- Sense of touch can be conveyed (which could make telecare much more acceptable for diagnoses, and convenient and time efficient for all parties).

The telephone & internet are already used to provide telecare. Key examples of these include:

- NHS Direct service enables immediate contact between nurse advisors & patients in their own homes
- Digitised images (e.g. of ultrasound scans) can be shared over computer networks to back up telephone consultation between professionals
- Nurse-led units use teleconsultation & are starting to use add-ons such as video opthalmoscopes

While ICT has a fundamental role in facilitating and enabling the delivery of care that is responsive to the needs and wishes of patients and their carers, it is also important to understand that the technology is only a tool and not a solution in its own right. It is essential to understand the business requirements and issues that need to be addressed, and strike the appropriate balance between policy requirements that pull in different directions, including:

- Privacy and Research/Public Health
- Security/Confidentiality issues and Data sharing/Integration of services
- National services and local ownership
- Innovation and standards
- Professionalism and Lifelong learning
- Promoting excellence and equity
- Organisational change and continuity of care
- Making information widely available and ensuring that is access in the appropriate context
- Investment in IT and leaving a digital divide

The main challenges that need to be addressed are:

- Technological change is potentially very fast but implementation could be slow as the risks are dealt with
- Integration of the new digital technologies will enable health and social care to be supported in ways that are convenient, safe and effective for both patients and care professionals

- Communications technologies can liberate health care services and professionals from hospitals and transform the quality of care, e.g. for people with chronic illness
- There will be changes in skill mix, organisational structures and processes as the delivery of services becomes more citizen-centric
- There will be an exponential growth in the information available to professionals and patients (and available 24*7*365) - the challenge will be to make it available as knowledge that is appropriate in a particular context

Identifying relevant future technological developments

1. What relevant technology trends are likely to impact on health and healthcare in the next ten to fifteen years?

Health and healthcare, like all aspects of society will be affected by technological developments across the spectrum, and as health impacts all aspects of peoples' lives, it would be unwise to assume that there is not a potential healthcare application for any given technology. The following are possibly areas where relatively 'early wins' could be gained (in no particular order):

- Growth of mobile high-bandwidth communications
- Increasing availability and use of high quality camera/video on mobile equipment (e.g. videophones and cameras),
- Availability of cheap and robust high capacity storage
- Increasing and widespread integration of intelligence in a very wide variety of equipment
- Wearable technology – 'smart clothing'
- Biotechnology such as DNA analysers
- Micro- and nano-technology will facilitate 'keyhole' type surgery, nanotechnology will facilitate highly targeted delivery of medication
- gene-based technology will facilitate and enable genetic therapies
- smart//tailored drugs designed and manufactured on demand to suit specific individuals
- greater use of predictive and analytical software in decision support
- greater use of intelligent agents ('bots') to retrieve relevant information

Assessing the potential positive and negative impacts of relevant future technological developments

2 What areas in the provision of health and healthcare could be positively or negatively affected by these developments?

Technology is becoming exponentially smaller and smarter. Already industry is looking at ways of developing 'smart homes' by embedding intelligence in domestic appliances. 'Smart clothing' – using embedded technology – is still in the research labs at the moment but has potential for facilitating and enabling telecare and telemonitoring and supporting patients outside traditional healthcare settings in an unobtrusive fashion. Already some patients are using home telemonitoring devices to record and transmit health data; it would be technically quite feasible (for example) to include intelligence in devices such as heart pacemakers to alert users of the need to seek medical advice.

The other major theme is the growth of 'patient power'. Technology will enable and empower the patient as never before. Clinicians will increasingly be expected to justify everything they do against the best available evidence. The widespread availability of high bandwidth telecommunications will promote the take-up of telemedicine and telecare

3 What actions should be undertaken now to maximise positive impacts, or to prevent or minimise adverse effects?

On the positive side, the key actions are to recognise the potential of technology to transform the delivery of healthcare, and recognise that primary goals are to keep citizens healthy, and to support independence and increase options for care outside acute hospital settings. To reduce the adverse effects, the key actions are to be aware of the issues and dangers that technology can bring and ensure that the change process is taken forward in a frank and open process that engages all stakeholders.

Evaluating the wider implications of relevant future technological developments

4 Do you have any concerns associated with the generation, release and subsequent use of personal data?

Confidentiality and security of personal data are paramount concerns. The fundamental principle is that personal sensitive information given in confidence should not be shared without the subject's informed consent. There may be cases where it is necessary to deviate from this principle – where there is a medical emergency, legal requirement to disclose or an overriding public interest in doing so – but these will be exceptional and normally managed in a frank and explicit manner.

5 What medico-legal and ethical issues merit consideration when introducing new technologies, such as the responsibilities, processes and liabilities for decision making?

Technology is no more than a tool for clinicians. The same medico-legal and ethical issues need to be considered regardless of the technology deployed. Pre-eminent among these are:

- Ensuring patient safety
- Ensuring the privacy and confidentiality of sensitive information
- Respecting the needs, wishes and aspirations of patients and their carers
- Ensuring the informed consent of patients and their carers to any intervention
- Ensuring that there is clear and well-understood line of clinical accountability
- Ensuring that the intervention and the use of technology is in accordance with professional best practice and that there is clear and robust evidence to support that

6 What regulations or other mechanisms (including standards) would facilitate the responsible development of relevant technologies?

One of the major features of strategic approaches to healthcare delivery, exemplified by the National Programme for IT for the NHS in England, is the shift to more corporate, national approaches. For the purposes of health records, this means:

- An overarching information system
- Common standards for functionality, interoperability and connectivity
- Clearly defined business and technical architecture
- A national approach to procurement and implementation;
- services that conform to national standards;
- services that interoperate with national infrastructure services such as the NHS Care Record Service and Choose and Book services currently being rolled out to the NHS in England.

Standards are critical to enabling the exchange of information, both locally and nationally. There is a wide range of standards to be considered, including:

- Information governance - including confidentiality, security and data quality
- Terminology and Classification - SNOMED CT, ICD-10, OPCS-4, etc.
- Clinical Communications - HL7 version 3, DICOM and ENV 13606
- XML Schemas
- Datasets
- Training and Service Management
- Technical (e.g. the e-Government Interoperability Framework (e-GIF) standards)
- Infrastructure standards within and between organisations.

7 What infrastructure would be required to allow any new technologies to be used effectively?

The overriding prerequisite for the successful long-term application of ICT in healthcare is the availability of a robust and secure broadband and local telecommunications network to provide a platform for all ICT dependent services in health and social care. Citizen access to personal health information will require the establishment of robust mechanisms to authenticate and control access that are comparable with those in place for healthcare professionals. Increasingly, wireless communications will facilitate remote working, telecare and telemedicine.

8 What are the most likely promoters and barriers to the take up of new ICT devices and systems?

The promoters and barriers are not directly technology related. Key examples include
- Service accessibility
- Equity of access
- Cost
- Reliability and support
- Resource demand/profile
- Confidentiality
- Patient Safety
- Training
- Healthcare outcomes
- Clinical acceptance

9 What education and training would need to accompany the introduction of any technologies, and who would need to be involved?

All health and social care staff need basic IT skills such as that provided by the European Community Driving Licence (ECDL) or similar, if they are to perform successfully in future working environments that are largely technology enabled. In addition, there will need to be job specific training that takes account of specific technologies, functionality and working processes. Education and awareness is important not only for staff but for patients and the public to ensure understanding and acceptance and to highlight important security, confidentiality or ethical issues.

10 How are professional roles and responsibilities likely to be affected by the increasing use of ICT?

There are two main aspects of this. One is the increasing use of telemedicine and telecare to provide healthcare services remotely has great potential to deliver care to patients responsively. It also requires clinicians to interact with their patients in new ways. The other aspect is that the use of decision support systems and access to patient records provides opportunities to review

traditional healthcare roles. An example is the traditional medical role; diagnosis has been, and remains, the primary role of the physician; but the availability of decision support systems and well defined treatment protocols makes it possible to consider whether routine cases can be dealt with in other ways, providing more resource for physicians to make more effective use of their specialist skills.

11 How can the development of technologies that meet patients' and informal carers' needs and are practically usable be best facilitated?

This was one of the themes of a recent enquiry by the House of Commons Health Select Committee on "**The Use of New Medical Technologies within the NHS"** ***(HC 398-I 12 April 2005).***

The main recommendations of the committee were:

(This is a simplified summary – reference should be made to the full report for the full recommendations)

1. That Trusts be encouraged to identify 'clinical champions' to promote the benefits of telemedicine within the Trust and to ensure that the organisational and staff development requirements to make the system workable are in place. (Paragraph 17)

2. Clinicians, technicians, health and social care workers, formal and informal carers and, most importantly, the patient are involved in determining the level of telecare that is suitable and acceptable to each individual recipient. It is essential that a balance between the use of technology and the continuation of human contact is an important element in any such judgement. (Paragraph 21)

3. Evaluation needs to take account of the qualitative benefits for users and carers over time. (Paragraph 22)

4. There should be a national system for reviewing and tracking the implementation of new devices over a number of years to ensure patient safety and efficacy issues are closely monitored. (Paragraph 23)

5. New technologies should be commissioned according to nationally approved standards. (Paragraph 25)

6. Protection of confidentiality and the privacy of the individual are key factors in the decision making process. Privacy and confidentiality policies and protocols should be developed, implemented and audited when new technologies are introduced.
(Paragraph 27)

8. To encourage greater familiarity with the possibilities and opportunities as well as limitations and risks of telemedicine, training should be modified in those specialist areas that are most likely to be primary users of telehealthcare such as pathology and radiology. Medical schools as well as the professional bodies should develop programmes to ensure effective training is put in place. Training in telecare for health care assistants working for social services and in the community also requires improvement to gain full benefits of new technologies. (Paragraph 54)

12 What are the potential impacts of the costs of any of these new technologies?

The total cost of implementing new technologies across the whole spectrum of health and social care is likely to be very substantial. The National Programme for IT for the NHS in England (funding for which was the Government's direct response to the Wanless report) has let contracts to the value of £6bn for the implementation of national and local information infrastructure services for the NHS in England up to 2013. This is additional to the 'baseline' funding of ICT in the NHS which has been around £850m a year. However, this takes no account of non-NHS, non-English expenditure on healthcare, or deployment of technologies under other programmes, including, for example, wider aspects of clinical training and continuing professional development (outwith NPfIT funded training in the use of deployed systems) of the type identified in recommendation 8 of the Health Select Committee (see above); or research into and evaluation of new technologies and their deployment (which are funded out of NHS and academic R&D resources).

13 What are the implications of the international use of future technological developments, such as global use of health data, variability of ICT-enabled support, and interoperability?

The use of ICT opens exciting possibilities for the more cost-effective delivery of healthcare services. For this type of vision to be realised, it is essential that there are clear international standards and protocols in place for the secure and reliable exchange of healthcare information. This needs to take place within an equally robust framework of information governance, in particular that protects the privacy and confidentiality of sensitive patient information.

Perhaps most crucially, there needs to be a common understanding and agreement of clinical protocols and standards, together with a robust system for clinical credentialing.

Are there any other important issues that have not been addressed by the questions above and that you think the working group should address?

No

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