Patients as consumers of healthcare: the role of innovation in self-care and self-management

Prof. Lionel Tarassenko FREng
Institute of Biomedical Engineering
University of Oxford

15 November 2011
The innovation eco-system

Academia

Department of Health

Regulators

Industry

Healthcare Professionals

PATIENT

The informed patient is part of the innovation eco-system in today’s NHS
The informed patient

- The NHS Choices 2010 Annual Report showed that there had been a 10% increase in the number of visits to the NHS website in 2010 compared to 2009, taking the number of times people logged on to the site to well over 100 million.

- Imperial College research found 70% of patients use the internet to search for health information, with a third deciding not to visit their GP afterwards as they were able to find the information they were looking for.

This trend will accelerate with the use of social media and of mobile phones (smart phones)
Social media

- **CureTogether** is a social networking site where patients can list their symptoms, the treatments they have tried, and the results which they have observed.

- Bringing patients into research as active partners is one of the main aims of **CureTogether**.

- **PatientsLikeMe** is a data-driven social networking site that enables its members to share condition, treatment, and symptom information to monitor their health over time.

- **PatientsLikeMe** now has more than 110,000 members, from whom it solicits information about all aspects of their condition. Members can remain anonymous using pseudonyms, but most do not.
Social media
Clinical trials

- After a clinical study based on a small sample of patients showed promise for lithium carbonate in 2008, hundreds of PatientsLikeMe members began taking the drug, which can have serious side effects.
- A sample of patients 10 times the size of the original study group was assembled from the site’s ALS community. The study revealed that the drug had no effect on the progression of their disease.
Andrew Lansley launches a call for ideas for new health apps and maps

Health Secretary Andrew Lansley today launched a call for new ideas for health apps that would help patients make informed decisions about their care.

- In six weeks, 490 suggestions were posted, along with 7625 votes and almost 900 comments.
- A large number of the apps were concerned with the management of chronic diseases (long-term conditions).
The need for new solutions for Chronic Disease Management

Over the last 50 years, healthcare spend has outpaced GDP growth by about 2% a year in most OECD countries.

Chronic disease management accounts for 80% of this growth.
The need for new solutions for Chronic Disease Management

- Chronic diseases are defined by the World Health Organisation as "health problems that require on-going management for years or decades" – e.g. asthma, diabetes, hypertension, Chronic Heart Failure (CHF) and Chronic Obstructive Pulmonary Disease (COPD).

- There are 15.4 million people in England with a chronic disease. Patients with chronic diseases account for 52% of GP appointments, 65% of outpatient appointments and 72% of inpatient bed days.

- Diabetes on its own takes up approximately a tenth of the NHS budget each year, a total exceeding £9bn.

- Wilson et al. (BMJ, 2005): “The evidence backing the use of disease-specific self-management programmes like diabetes is strong. The challenge is how to move to a programme that can support the many millions of patients who might benefit.”
Diabetes apps from iTunes store
Diet and blood glucose tracking

Only 1% of people who download a healthcare app from the iTunes store are still using it one month later.

Main reasons?

- Self-recorded data does not go anywhere
- No healthcare professional involved in reviewing the data
The requirements for self-management apps

- High compliance is enabled by providing (real-time) feedback to the individual.

- The use of the technology must be integrated within clinical pathways (healthcare professional in the loop).

- To gain acceptance with the medical professional, the apps must be supported by clinical trial evidence.
Diabetes self-management apps
Closing the loop

- (Real-time) feedback to the individual
- Review of data by healthcare professional (and alerting when appropriate)
Oxford Diabetes Type 1 clinical trial
Young Adult Population

Principal Investigators:
- Prof. L. Tarassenko
- Prof. A. Neil
- Prof. A. Farmer

Division of Public Health and Primary Care
University of Oxford

The Oxford Centre
for Diabetes, Endocrinology and Metabolism

Number of readings received per patient
Weeks spent in trial
Intervention
Control

Weeks spent in trial
0 5 10 15 20 25 30 35

Number of readings received per patient
0 5 10 15 20 25 30

Intervention
Control

[Graph showing the number of readings received per patient over weeks spent in trial for intervention and control groups]
Oxford Diabetes Type 1 clinical trial
Young Adult Population

Principal Investigators:
- Prof. L. Tarassenko
- Prof. A. Neil
- Prof. A. Farmer

Difference in change in proportions - P=0.0002
OXVASC clinical trial
Elderly Population

- All patients with acute Transient Ischaemic Attacks and minor stroke in the Oxford Vascular Study (OXVASC) are being monitored post discharge.

- After leaving hospital with a prescription of standard BP lowering therapy, post-TIA patients measure their blood pressure three times daily at home with a Bluetooth BP Monitor for one to three months, depending on control.

- Measurements transmitted automatically in real time by the mobile phone are checked daily on a secure web page by nurses in the Stroke Unit.
203 (92.3%) of 220 patients (mean age = 70; 29% ≥80 years) were willing and able to undertake Bluetooth home monitoring, and all continued for at least one month.

Monitoring led to 192 changes in BP lowering medication in 128 patients (63%).

Mean systolic BP was 148/82 mmHg at entry and 127/73 mmHg at the 6-month follow-up clinic.
The requirements for self-management apps

- High compliance is enabled by providing (real-time) feedback to the individual.

- The use of the technology must be integrated within clinical pathways (healthcare professional in the loop).

- To gain acceptance with the medical professional, the apps must be supported by clinical trial evidence.

- For longer-term self-monitoring, the technology must be integrated into the activities of daily living.
A new type of healthcare app “Healthskype”

Measurement of light reflected from a region of interest on the human face (e.g. forehead) using a simple webcam
The amplitude of the light reflected from a subject’s face is modulated not only by the blood volume changes associated with the cardiac cycle, but also at a lower frequency by the blood volume changes associated with the *respiratory* cycle.

The blood oxygen saturation value (SpO₂) is obtained by calculating the ratio of the intensity of the cardiac-synchronous reflected light at two different wavelengths.

**Current work:** Validate the three vital sign measurements from the webcam (heart rate, respiratory rate and SpO₂) from patients who are double-monitored during dialysis in the Oxford Kidney Unit.
“Healthskype”
Heart rate estimation
Innovation in self-management

14th November: NHS Direct app downloaded 1 million times

- But closing the loop (receiving information as well as sending data) is important...

- **Recommendation**: Mobile operators to offer “healthcare data bundles” (£5 a month?) which would be paid for by the Personal Health Budgets (currently being piloted in the NHS) for those patients regularly sending data.