What if your personal health tracker could save your life?

Through advances in technology, big data has become a major asset and can open up numerous opportunities in all areas, but how can we use this in the context of health care and ensure it benefits everyone?

Advances in healthcare have led to dramatic increases in life expectancy and quality of life over the last hundred years. At the same time, providing healthcare claims an ever increasing share of GDP in most countries worldwide. Big data offers exciting possibilities for the future of healthcare, promising to provide better diagnoses, increase the effectiveness of current treatment methods and allow for new cures to be found with lower effort and cost than using traditional research methods. This could ultimately avert preventable deaths and even predict epidemics.

Potential impact and developments

There are three different areas where big data could bring huge benefits:

(i) Cheaper and faster medical research

When conducting large clinical trials or surveys, to test a new drug, assess the effectiveness of new treatments, or better understand the causes of certain health conditions, considerable quantities of data are collected from large groups of patients and healthy controls, in order to answer very specific questions. Once the studies are concluded, these datasets are rarely used to help other researchers to address related research questions. Efforts are underway to make these datasets more accessible to the wider research community, allowing new insights to be gained at minimal additional costs, while respecting informed consent requirements.

Before data can be made available to the wider research community, it needs to be anonymised, which in some cases can represent a substantial workload. Using pre-existing datasets to address new research questions should, however, allow researchers to avoid duplication of effort, reducing the time and cost necessary for conducting new studies.

(ii) Easier collection of data sets with new sensors

We are increasingly surrounded by smart devices and sensors, which track our geographical location, count the steps we walk, examine our sleep quality, monitor our driving style and level of alertness when driving, and measure many other aspects of our lives. Data recorded by sensors rather than by people completing questionnaires is often much more objective, and with the ever-decreasing cost of sensor technologies, a greater number of parameters could be surveyed for ever larger groups of test candidates, revolutionising the way we conduct research and monitor the treatment effectiveness.
(iii) Individualised health care services

Besides facilitating studies about large groups of test candidates, the growing numbers of sensors and smart devices that surround us in our daily lives, in GSM devices we carry, the clothes we wear, the cars we drive, and around our homes, will also increasingly allow for the provision of personalised individual health care services. In much the same way that sensors in cars already monitor eye-blinking rates to warn drivers of sleepiness, wearable sensors could, in the future, monitor chronic diseases such as diabetes, warn us if the risk of a heart attack is particularly high, or if our immune system is weak, making us susceptible to contracting influenza. Sensors have the capacity to track our progress towards a healthier lifestyle.

While these new technologies promise great advances in healthcare, they also pose a number of challenges to society, notably in terms of data protection; already a key issue for any clinical study. If researchers share these datasets more extensively in future, it is even more important that data privacy standards provide effective protection for study participants.

The increasing number of sensors that accompany us in our daily life, and that already gather a large amount of data about our health and well-being, pose additional challenges. Cell phone manufacturers, telecom operators, and internet search engines already collect increasing amounts of health-relevant data about their clients, without being perceived as actors in the health sector to date. This will become even more critical when simple devices like mobile phones become able to derive a complete assessment of their users’ health from collected data.

**Anticipatory policy-making**

Besides the need to continuously update data protection and privacy rules as technology develops, there are wider issues to be considered about who should benefit from these technological advances. As an example, should we develop cancer, will wearable technology enable us to detect it at an earlier stage, increasing the chances for healing and lowering the cost of treatment? Or will the technology mainly work in favour of higher insurance company charges for those unfortunate to receive a diagnosis?

As we continue to update our data protection rules, in today’s increasingly interconnected world it may become increasingly difficult to limit knowledge of personal information, such as being affected by diseases like cancer. We need to find the right balance between the interest of the individual in keeping their illness confidential, and the benefit society could reap from easier access to anonymised medical data that could hold the key to medical innovation and breakthroughs.

Since even the best laws might not be able to guarantee privacy under all circumstances – and we therefore have to account for the fact that an illness such as cancer might be made public – lawmakers could provide an extra layer of protection, by enacting legislation that minimises the potential for discrimination. For example, a system that provides for sharing the treatment costs of cancer patients between all health insurance companies will reduce the likeliness that an individual patient is discriminated against by their insurance company due to a history of cancer.