

Can wearable technology help obesity treatment?

Findings from the DAPHNE project

With increasing numbers of people using wearable technology to monitor their health behaviour, the European Commission-supported DAPHNE project has developed the hardware and software to enable clinicians to monitor their patients' physical activity, rest, stress and diet during the periods between clinical appointments. What have they found?

The problem

Patients with obesity-related disease are told by their clinical care professionals to get more physical activity, reduce sedentary behaviour and improve their diets.

A common problem with these recommendations is motivation: How can clinical staff encourage their patients to develop and maintain improved health behaviour between appointments?

This means helping to

- enhance patients' motivation between appointments
- provide patients with greater empowerment over their own treatment

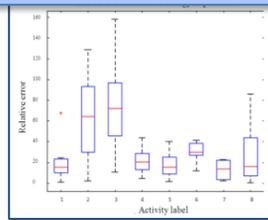
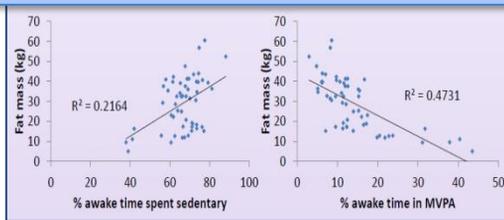
Possible solution: use wearable technology

Technology can give patients more awareness of their behaviour. It provides rapid feedback on changes in behaviour. And it can communicate the changes in behaviour directly to the health care professionals between appointments



DAPHNE project: Four actions

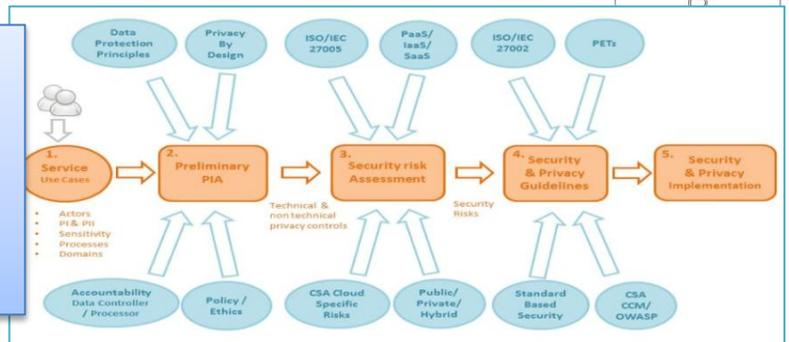
1. Provide data-collection models and intelligent algorithms to recognise behaviour related to weight management.



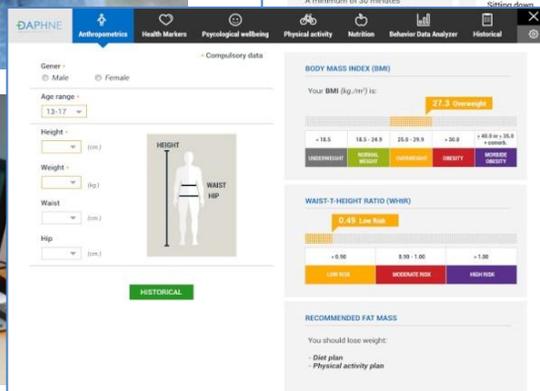
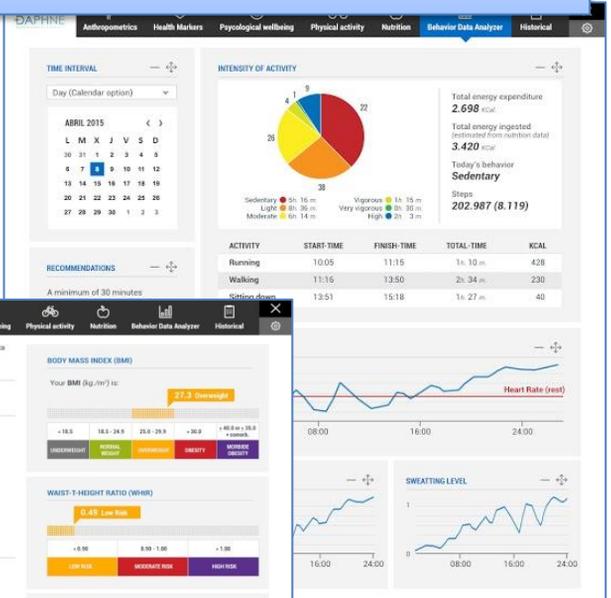
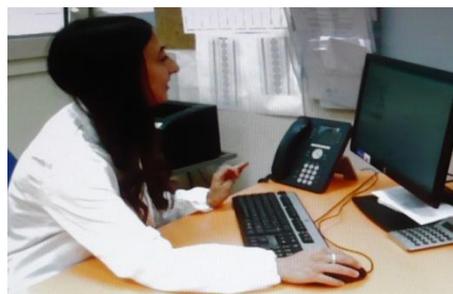
2. Design and develop sensor devices and smartphone apps to collect activity measures and nutrition information.



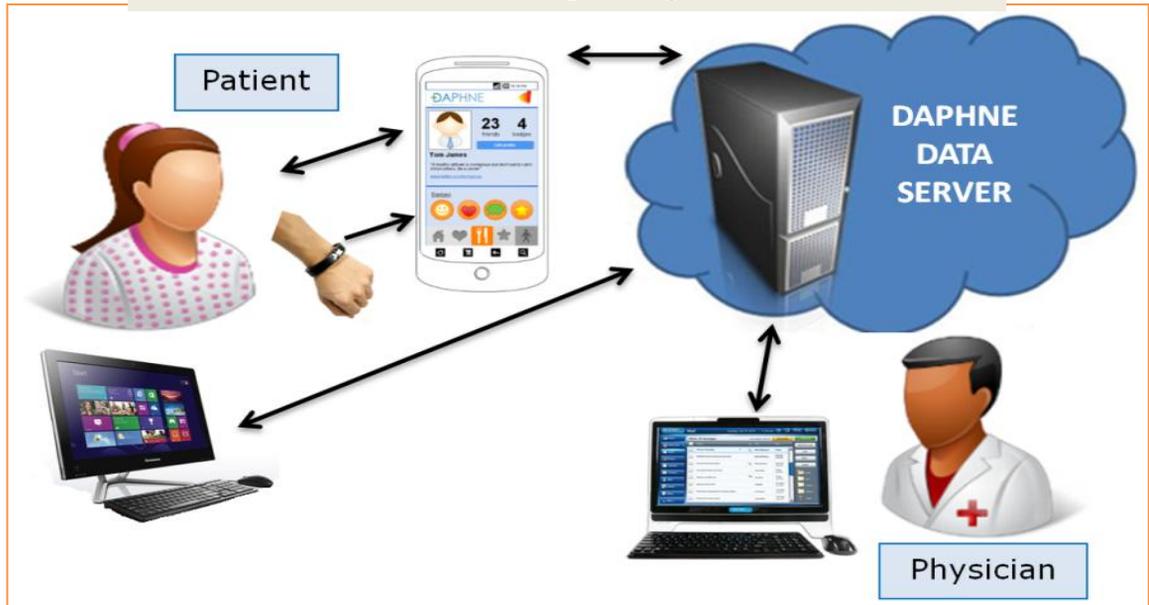
3. Build the data Cloud to make the data available to the patients and health professionals, with built-in security procedures.



4. Develop user interfaces and show the feasibility of using the DAPHNE system in practical trials with adults and adolescents.



The DAPHNE project model



DAPHNE results

One in every twelve adults in Western Europe uses wearable technology to support and change their health behaviour. Clearly the technology is sufficiently mature to be used in clinical practice for patients trying to manage their bodyweight... ***Or is it?***

The DAPHNE project identified both strengths and weaknesses in using wearable technology for weight management.

1. Physical activity. The DAPHNE sensors work in clinical use.

The DAPHNE project demonstrated the feasibility of using only one sensor, worn at the hip and providing accelerometer signals. The DAPHNE algorithms can estimate energy expenditure with performance as good or better than other equipment on the market.

2. Dietary patterns. The accuracy of dietary intake is poor.

The DAPHNE diet app asks the user to identify the foods they have eaten, and the amounts of each food. Finding the right description can be tedious and complex foods, such as a pizza or mixed salad, are hard to code.

In future, it may be sufficient to record the number of snacks, sweet drinks, and fruits and vegetables eaten, and monitor their trends.

3. Data collection in real life. Two months may be too long.

Adolescents attending a weight management clinic in an Italian hospital wore the DAPHNE movement sensors and completed food diaries over a period of two months. The physical activity and dietary data were made available to the young person and to their health professionals in the clinic. By the end of the second month they were wearing the sensors on fewer than two days per week, and using the dietary diaries only once per week.

Despite this apparent lack of motivation, the young people described the experience as empowering, giving them control over their own clinical treatment and using digital systems they were familiar with. “The DAPHNE system is an improvement on treatment for obesity,” they said.

4. The results were good. Some participants lost weight.

The clinical trials were not designed to be a full-scale validation of the DAPHNE system for weight management, and there was no control group. However, despite gaps in wearing the sensors and inadequate completion of the dietary diaries, several of the participants lost weight.

Does that mean the system works? Patients knew they should wear their sensors and record their diets, and the information was sent to the clinical staff. These factors alone can be motivational. In short, ‘virtual supervision’ appears to increase the effectiveness of treatment.

5. But it may not work for those that need it most

Like any treatment that depends on patient motivation, those who fail to respond may be the ones with the greatest need. Technology-enabled behaviour change may work best for the young and better informed patient, but may widen the health divide that already exists between people of different educational levels, and between younger and older people.

Further information

The DAPHNE website is <http://www.daphne-fp7.eu/>

Open access scientific papers from the DAPHNE project are available:

- <http://www.sciencedirect.com/science/article/pii/S1877050916322049>
- <http://www.sciencedirect.com/science/article/pii/S1877050916321974>

