A peek into the future of sports medicine: the digital revolution has entered our pitch

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The current wide-scale availability of the internet and connected mobile devices is revolutionising healthcare. Patients and practitioners have unprecedented access to health information; they communicate with each more than ever before. It seems as if new technology is appearing daily and with it comes the promise of greater (cost) efficiency and quality of medical practise.1 The sports medicine community is currently buzzing about ‘eHealth’, which may be defined as the practise of medicine supported by electronic processes and communication. The newest buzzword is ‘mHealth’, referring to eHealth driven by the use of mobile devices, not limited to smartphones. Indeed, we are seeing an increased use of readily available technologies such as SMS messaging, social media platforms, apps and online questionnaires in both clinical and research settings.

EXECUTING ON THE PROMISE: PATIENTS ENTERING THEIR OWN DATA!

Grindem et al2 illustrate how online technologies can aid clinical practice. Specifically they monitored return-to-sport after an anterior cruciate ligament (ACL) injury; one of the clinical ‘success’ measures of postinjury rehabilitation. Current methods that register sports activity after ACL injury are usually restricted to knee-demanding sports alone to limit the time-burden for patients and to ensure valid data collection. Participation in multiple sports is normally not considered, thereby ignoring potentially important information on treatment outcome. In contrast, Grindem et al2 therefore developed an online activity survey to prospectively record the monthly participation in all sports relevant to their patient-group. They found that the survey was a highly reliable method to capture sports participation, and also provided more complete data than a routine ‘paper’ activity questionnaire. The study authors also hinted at the numerous benefits of employing online questionnaires, both for clinical practise as well as research.3 They found that

▸ Data are entered directly into a database by the athlete/patient eliminates manual data entry by researchers. This saves time and money.
▸ Data fields can be predefined to contain a specific range of entry possibilities, lowering the risk of errors.
▸ Respondents may receive notice when they forget to answer all questions, reducing the amount of missing data.
▸ Through branching of questions (guiding respondents through a questionnaire based on their answers) the time burden for the participant is minimised and this increases the likelihood of continued study participation.

WILL RESEARCH BECOME A NO-BRAINER? NOT SO FAST!

The bottom line of what is outlined above is simple: electronic registration of data is highly efficient. Yet, there are also potential drawbacks or weaknesses to online questionnaires and surveys that should not be ignored. Most revolve around validity and sampling issues,3 with a particular concern that such tools only reach a highly motivated population. Arguably, this may become less and less of a problem as digital access and literacy continues to grow.4

However, validity issues continue posing a reason for concern. Often, what happens is that a traditional ‘paper’ questionnaire is simply digitised, neglecting the fact that text is read differently onscreen than on paper. Oscreen reading is defined by short and concise text, while paper reading allows for longer paragraphs. Also, through branching, the interpretation of some questions may get lost while a subset of questions remains hidden after a specific answer. These are just two examples of why an established and valid traditional questionnaire might behave differently when presented online.5 6

FUTURE DIRECTIONS: IMPLICATIONS FOR SPORTS MEDICINE RESEARCH

What influence will these spectacular digital developments have on the design and scope of sports medicine research? Kumar et al7 describe employing mHealth in almost all fields of medical research; big data, ecological measurement, remote and portable diagnostics, implementation of treatment and preventive interventions and information dissemination.1 Most of these opportunities are highly applicable to sports medicine and inroads are certainly being made in many areas. The majority of data collected through mobile and online technologies can be obtained remotely and, depending on the mode of registration, it may even be possible to collect data in (near) real-time, moving towards a ‘big data’ approach. Big data refers to a high volume, velocity and variety of seemingly independent data points.7 Through inductive statistics and concepts from non-linear system identification, relationships and dependencies within this data can be revealed. Ultimately predictions can be made.

Real-time data analysis can be used, for instance, to adapt a treatment protocol based on (daily) patient-reported clinical outcomes. Additionally, from a research perspective, such streaming data can be used for real-time predictive modelling. This may be of specific interest to research on overtraining or injuries without a clear onset. So far it has been difficult to get a grip on the true onset of an overuse injury,8 let alone establish effective treatment or preventive protocols. Continuous monitoring of injury risk factors and symptoms may help us determine the causes of overuse injuries and may open the door for successful prevention strategies. The same holds true for injury exacerbations and recurrences,9 which are thought to be driven by changes in predisposing factors over time.9 By means of continuous monitoring, longitudinal changes in predisposing factors can be charted, allowing us to understand the multifactorial and dynamic nature of their interaction with injury risk.

These are exciting developments but we are not there yet. Not even close. Technological developments are moving faster than the field can adapt. As such, the practical and scientific use of eHealth technologies runs behind the technical possibilities. However, as shown by Grindem et al2 we are already able to effectively encapsulate eHealth in sports medicine research by which they provided us a peek into an exciting future.
Contributors  EA V planned and managed the writing of this manuscript. All authors contributed equally to the conception and writing of this manuscript. EA V submitted the study.

Provenance and peer review  Commissioned; internally peer reviewed.

To cite  Verhagen EA, Clarsen B, Bahr R. Br J Sports Med. Published Online First: [please include Day Month Year] doi:10.1136/bjsports-2013-093103

Accepted 26 October 2013

References
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Br J Sports Med published online November 22, 2013
doi: 10.1136/bjsports-2013-093103

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Published online November 22, 2013 in advance of the print journal.

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