Letters to the editor

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Compassion through tele-empathy: technology-mediated symptom transference

As medical students, we learn that we should be empathetic when caring for our patients. But what does this really mean? Clinical empathy is a combination of three discrete skills:

1 understanding the patient's circumstances, thoughts and feelings
2 verifying those with the patient
3 responding both appropriately and helpfully to the patient.[1]

The benefits of clinical empathy are wide-ranging. Among patients, clinical empathy can facilitate trust and engagement resulting in greater reporting of symptoms and concerns, increased education and higher levels of satisfaction.[2,3] More objective benefits include increased diagnostic accuracy, improved adherence to medical recommendations and better outcomes.[2,3] For physicians, clinical empathy can lead to less depression, increased quality of life and even lower medical-legal risk.[2,3] The benefits of clinical empathy extend to caregivers as well. A caregiver's appreciation for the patient and their emotional situation can lead to a shared understanding of the patient's response to illness.[4]

Evidently, it is very beneficial to cultivate empathy among both physicians and caregivers. However, empathy for a condition and symptoms we have never experienced can be elusive and easy to misjudge. But, what if we had emulators that could transmit a patient's actual experience in real time?

Enter tele-empathy, an emerging field of technology-mediated symptom transference. A tele-empathy system can be illustrated using a Parkinson's disease (PD) example, with a wireless electromyogram (EMG) on the patient's arm and a programmable electrical muscle stimulator (EMS) on a physician or caregiver's arm (novel real-time Parkinson's disease empathy transfer through 8-channel bioimpedance and upper extremity electro-stimulation, in preparation, Fig 1). The system captures continuous EMG data from the patient's PD tremors and transmits it wirelessly via an EMS to a physician or caregiver to induce involuntary muscle activity mimicking the patient's tremors in real time (data unpublished, Supplemental Video S1). Allowing physicians and caregivers to experience the difficulty of a seemingly simple task, such as buttoning a shirt, can generate empathy and insights previously unattainable.

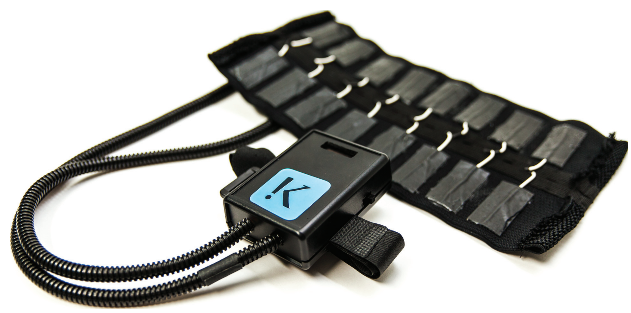

Fig 1. Parkinson's disease tele-empathy device.

Table 1. Potential applications of tele-empathy in medicine

Condition/symptom	Method of symptom data capture	Symptom transference technology
Ataxia	Motion capture Gait analysis wearables Connected insoles	Virtual reality gait simulation
Disfluent speech	Acoustic/voice recognition	Electrical larynx stimulation
Chronic obstructive pulmonary disease	Spirometry	Air flow restriction
Inflammatory bowel disease	Acoustic/vibration sensors	Electrical stimulation
Eye disorders	Vision test Autorefractometer Amsler grid	Augmented reality
Peripheral neuropathy	Neurological exam	Electrical stimulation
Psychiatric conditions	Patient history	Augmented reality
Dyskinesia	Motion capture camera	Electrical stimulation Transcranial magnetic stimulation
Tremors	Electromyogram	Electrical stimulation

The tele-empathy opportunities in medicine are far-reaching. Tele-empathy can be valuable for clinical manifestations that can be seen and interpreted through the lens of data science, which includes many of our senses (Table 1). However, tele-empathy is more than just symptom simulation. It has the potential to improve our ability to control patient symptoms by allowing us to fine-tune and titrate treatments. We could, additionally, record data from patients on a specific treatment, and use machine learning to digitise the treatment through mathematical modelling. This could enable us to not only sense what the patient is experiencing, but to also predict what effect specific treatment may have on a patient via the digitised treatment. This has tremendous implications for future research and clinical trials.

Our research group recently initiated a study that aims to quantify the level of empathy experienced by neurologists both before and after use of the PD tele-empathy device. Future studies will measure the longitudinal retention of empathy. In addition, new tele-empathy devices for diseases where the need for empathy is great are currently in development, including diabetes (peripheral neuropathy), chronic obstructive pulmonary disease (shortness of breath) and pruritus (dermatologic and systemic diseases).

Tele-empathy can harness the power of technology to cater to specific needs within a wide range of clinical areas, stimulating new knowledge and insights in the process. This fosters invaluable opportunities such as the cultivation of empathy, more precise treatment titration, and more accurate treatment result predictions, benefitting physicians, caregivers and, more importantly, patients themselves. ■

Supplementary material

Additional supplementary material may be found in the online version of this article at http://futurehospital.rcpjournal.org/:

S1 – Video showing EMS inducing involuntary muscle activity to mimic a patient's Parkinson's disease tremors in real time.

Conflicts of interest

Yan Fossat, with Klick Inc, has a patent pending on the SymPulse PD tele-empathy device. The other authors have no conflicts of interest to declare.

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Public health in hospitals – can informatics bridge the gap?

The NHS England *Five Year Forward View* emphasised the need for a 'radical upgrade in prevention and public health'.[1] Community health and social care are both engaged in preventative care, but hospitals also play a key role in this agenda.[2] In 2014–15 alone, hospitals in England served 16 million finished admission episodes and over 100 million outpatient appointments.[3] These encounters represent huge opportunities to provide health promotion at scale to individuals at high risk of preventable morbidity and mortality.

There are a number of barriers to health promotion in hospitals, such as limited resources and a tendency to focus on diagnosis and treatment of specific diseases, rather than risk factors. This is reflected in the findings of the national health promotion in hospital audits in England, which found that few hospitals met the standards for assessment and health promotion practice for important modifiable risk factors, including smoking and alcohol misuse.[4]

Clinical information systems may help overcome some of these barriers by facilitating the accurate documentation of risk behaviours in electronic health records. Standards are required to ensure these data are validated, consistent and clinically useful. A national project is being undertaken by the University of Birmingham and Queen Elizabeth Hospital Birmingham, in partnership with the Royal College of Physicians Health Informatics Unit, to develop national data standards for recording alcohol and tobacco use in electronic health records.[5] National consultation with patients, healthcare professionals, public health professionals, IT system suppliers and informaticians, as well as literature reviews, and pilot work are being undertaken to ensure the standards are evidence and consensus based, acceptable to end users, and implementable.

The objectives of these standards are to record information on alcohol and tobacco use that:

- enables healthcare staff and clinical information systems to identify at-risk patients, and provide preventative and therapeutic interventions
- is relevant to public health and healthcare organisations to inform commissioning and delivery of preventative services and clinical audit of health promotion practices
- enables epidemiological and clinical research on alcohol and tobacco consumption among patients in primary and secondary care
- enables patient-relevant information to be shared across the healthcare system to improve coordination and continuity of care.

Implementation of these standards could enable the systematic identification of patients with ongoing exposure to modifiable behavioural risk factors and automated delivery of evidence-based interventions. For example, documentation of current smoking in an electronic health record could trigger an automated SMS message to patients containing advice on how to access NHS smoking cessation services. Recording harmful alcohol use could automatically prompt an alcohol support worker to give brief advice to patients prior to discharge. Use of health informatics in this way could potentially be more cost-effective than solely relying on healthcare staff to deliver health promotion and could be an efficient gateway to preventative services.