Empathy Series

Technology: A help or hindrance to empathic healthcare?

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Background

John Preece was the first British general practitioner to use a computer in the consulting room 1970.[1] Since then technology in healthcare consultations has advanced tremendously. There has been continuous progression with computerization of notes, results, imaging, and much more. This has allowed information to be in a central place allowing for better preparation and understanding before, during, and after the consultation.[2] More recent technological advances include video consultation,[3] smart phone applications and the use of artificially intelligent (AI) robot doctors.[4] Due to recent progress in technology, it is unsurprising that many bold claims about its ability to improve healthcare consultations have been made. For example Alemi et al.[5], have suggested that humanoid robots can alleviate childrens' stress and depression, while Crain and colleagues[6] report that nurse robots can express empathy to patients. Can we believe these claims? In this instalment of the empathy series, we will focus on the relationship between technology and empathy, and examine whether technology may help or hinder empathic healthcare.

Examples of where technology has enhanced empathy in healthcare

The diagnostic process has been an obvious target for the development of automated and AI systems.[4] Over a hundred trials have shown that 'computer aided diagnosis' can out-perform 'expert' diagnostic skills which in turn may free up time for the vital human interactions and hand-holding that is sometimes needed to deliver diagnoses or treatment.[7] It is also hypothesised that AI systems may in turn reduce the growing administrative burden that arguably detracts clinicians from empathic consultation skills. Teleconsultations (TCs) are another technology with significant potential. This has been demonstrated in a recent qualitative study of palliative care at home, using long-term direct observations and patient interview.[8] Teleconsultations enabled multidisciplinary team (MDT) approaches to be utilised to include specialists and primary-care providers centered around 18 palliative care patients within their own

homes. In this example, teleconsultations facilitated honest discussions in which distress or physical deterioration might otherwise not have been revealed during routine telephone check-ups. Further, the practicalities of enabling more frequent consultations meant that patient-clinician relationships deepened and patients were able to co-design their consultations. Despite clinician concerns about the lack of physical proximity which made them wary of being unable to provide comfort if they raised sensitive issues, patients actually expressed being more at ease to "pour out one's heart" and resume "normal life" at home.

Another area where technology can help is in the teaching and training of empathy skills. This is exemplified by a neuroscience-informed curriculum that was developed for teaching empathic consultation skills to 99 trainee physicians.[9, 10] The course used various technologies, including video recordings of consultations using real-time physiological response monitoring. A randomized controlled trial of this intervention showed that the empathy training group had greater changes in patient-rated empathy scores than a control group who received standard communication training. Another medical school in the US examined how to supporting the teaching of professionalism to 249 medical students. This included the use of virtual classrooms using social networking and online learning technologies to overcome barriers posed by large class sizes and a dispersed student population, who were at various clinical attachments.[11] The learning platform that was created allowed peer support in a safe environment to facilitate sharing of experiences around stressful clinical training situations, and strategies for coping with these challenges. This was an uncontrolled study and compared empathy and self-reflection scores before and after the course. It showed a preservation of empathy (rather than its decline, which has previously been documented[12]) and improvement in self-reflection. Some of these studies provide proof-of-concept for using a range of technologies to help care providers learn and improve empathic communication.

Examples where technology has not enhanced empathy, or has hindered it?

William Osler, the 19th century physician frequently described as the Father of Modern Medicine, famously said "listen to your patient, he is telling you the diagnosis".[13] However, what if the care provider is distracted by technology or the technology itself is the "listener"? The great promises often made on technology's behalf do not always translate to patient benefits, even when a goal of reducing administration to freeing-up space for meaningful human interactions, are its focus.

For example a recent cross-sectional study in the US[14] which timed various activities during more than 800 observed consultations showed that primary care physicians spent less time on face-to-face interactions with their patients than working on the electronic health record (EHR). Such findings would argue against technology acting to augment an empathic consultation by freeing up clinician time. Also the promises of symptom data collection being used by some GP practices in place of or before face-to-face consultations *aim* to improve efficiency but the data does not support that claim.[15, 16]

Other areas where technology has been implemented without evidence of benefit relate to the large scale implementation of a new paperless electronic record system at a cost of nearly £200 million in a large UK teaching hospital in 2015.[17] Failings in the technology and its implementation lead to major disruption within the hospital with clinical teams unable to provide adequate patient discharge or follow-up information or gain timely access to updated patient clinical records. The result was a previously high achieving hospital being placed into special measures and not achieving referral and treatment targets. It has been reported that some of the failures were attributed to removal of vital interpersonal elements of everyday clinical and administrative interactions.

Similar concerns have been reported in primary care. Since the introduction of computerized systems into the UK primary care consulting room, a number of studies have reported a negative impact on the quality of doctor-patient communication. Video recordings of consultations suggest that the presence of technology can result in a particular preoccupation by the practitioner with the computational tasks, delayed responses to cues, slow utterances of empathic statements and delayed non-verbal cues (such as withholding gaze from patients).[18] It has been hypothesized that this reduction in empathy relates to increased demands that technology may place on practitioners' time which in turn could undermine their ability to simultaneously interact with their patients. Moreover, patients themselves may begin to adapt communication and behavior adjusting to a computer-centric consultation.

Outside of the consulting room, enhanced technology has been proposed as key to improving access to practitioners through electronic appointment systems, email consultations and tele-medicine. However, since 2012 the UK GP patient survey has shown a year on year increase in the number of patients dissatisfied with access to health care providers and quality of their consultation owing to the lack of personal, holistic and empathic care which some argue can only be achieved in person rather than through the mobile apps, emails or telephone consultations.[19, 20] Where technology has appeared to be of most benefit in this context, is in providing the facility for consultations where there were none, such as in the MDT video consultations for terminal care described above. However what the results of the annual UK GP patient survey might point towards is dissatisfaction when technology is used to *replace* what were valued face-to-face interactions. At a population level, technology might open up more consultation time but for the individual this might come at a loss of valued human relationships.

The ideal would be for technology in healthcare to promote empathic consultation by directly improving communication between care provider and patient and by reducing administrative burden and freeing up time for human interaction. AI systems in health are currently a hot topic with much funding going into such projects and the AI health market is expected to reach $6.6bn by 2021.[21] These systems have already been shown to help with diagnosis,[4] and currently act as health assistants.[22] Extensive research is going on lately in the field of applying human features, emotions, gestures, and reactions to digital technology.[23, 24] Could smart as well as emotional algorithms or robots appear in healthcare soon? How might these impact the doctor-patient relationship or the role of the human consultation?

The future with technology and AI within the healthcare consultation raises the possibility of profound benefits but also the potential for significant harms, a few described above. The development of this area and the introduction of this technology should involve all stake holders including: patients, carers, healthcare providers, managers, policy makers and technologists. These groups need guidelines for helping to identify evidence-based empathy-enhancing technologies so that the potential benefits can be realised.

Limitations of the evidence for the benefits or harms of technology and how to address them

Most of the evidence for the benefits and harms in this paper have come from individual small-scale studies rather than large randomised controlled trials or systematic reviews. This means that the claims made about technologies' usefulness are somewhat limited by the quality of evidence. The rapid advances in technology, combined with the pressures to improve healthcare, mean that scientific evaluation of new technologies will need to keep up with the pace at which technologies are developing. Trial and error is common and implementation without adequate evaluation is more frequent. Patients are already accessing symptom checker algorithms online and e-doctors are currently available to mobile phone Apps 24 hours a day. Home diagnostic tests are additionally available to purchase online at any time. Whilst embracing these technologies in healthcare, it is also necessary to ensure that the speed of doing so does not distract us from utilizing well-honed evidence based medicine principles to accurately determine whether technology truly does help or harm patients.

Conclusion

Empathy is important, the extent to which it is expressed varies, and its expression is becoming more difficult as time pressures increase. Technologies have the potential to enhance empathy. However they are not ubiquitously beneficial, and the evidence used to evaluate them is generally inadequate. Technology's future role in enhancing empathy is an exciting field that is yet to realize its full potential but it will require rigorous evaluation.

References

1. Benson T. Why general practitioners use computers and hospital doctors do not—Part 1: incentives. *BMJ : British Medical Journal*. 2002; 325: 1086-9.
2. Choe EK. Empathy in Health Technologies. https://terpconnect.umd.edu/~choe/download/WISH-10-Choe.pdf.
3. Greenhalgh T, Vijayaraghavan S, Wherton J, et al. Virtual online consultations: advantages and limitations (VOCAL) study. *BMJ Open*. 2016; 6.
4. Miller DD and Brown EW. Artificial Intelligence in Medical Practice: The Question to the Answer? *The American Journal of Medicine*. 2018; 131: 129-33.
5. Alemi M, Ghanbarzadeh A, Meghdari A and Moghadam LJ. Clinical Application of a Humanoid Robot in Pediatric Cancer Interventions. *International Journal of Social Robotics*. 2016; 8: 743-59.

6. Crain DR. Adults' Perception of Empathy When Interacting with a Nursing Robot or a Physically Present Nurse: A Randomized Non-Inferiority Comparison. The University of Arizona., 2015.
7. Grove WM, Zald DH, Lebow BS, Snitz BE and Nelson C. Clinical versus mechanical prediction: a meta-analysis. *Psychological assessment*. 2000; 12: 19-30.
8. van Gurp J, van Selm M, Vissers K, van Leeuwen E and Hasselaar J. How Outpatient Palliative Care Teleconsultation Facilitates Empathic Patient-Professional Relationships: A Qualitative Study. *PLOS ONE*. 2015; 10: e0124387.
9. Riess H, Kelley JM, Bailey R, Konowitz PM and Gray ST. Improving empathy and relational skills in otolaryngology residents: a pilot study. *Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery*. 2011; 144: 120-2.
10. Riess H, Kelley JM, Bailey RW, Dunn EJ and Phillips M. Empathy Training for Resident Physicians: A Randomized Controlled Trial of a Neuroscience-Informed Curriculum. *Journal of General Internal Medicine*. 2012; 27: 1280-6.
11. Duke P, Grosseman S, Novack DH and Rosenzweig S. Preserving third year medical students' empathy and enhancing self-reflection using small group "virtual hangout" technology. *Medical teacher*. 2015; 37: 566-71.
12. Neumann M, Edelhauser F, Tauschel D, et al. Empathy decline and its reasons: a systematic review of studies with medical students and residents. *Academic medicine : journal of the Association of American Medical Colleges*. 2011; 86: 996-1009.
13. Sturdy S. William Osler: A Life In Medicine, Michael Bliss. *BMJ: British Medical Journal*. 2000; 321: 1087.
14. Young RA, Burge SK, Kumar KA, Wilson JM and Ortiz DF. A Time-Motion Study of Primary Care Physicians' Work in the Electronic Health Record Era. *Family medicine*. 2018; 50: 91-9.
15. Edwards HB, Marques E, Hollingworth W, et al. Use of a primary care online consultation system, by whom, when and why: evaluation of a pilot observational study in 36 general practices in South West England. *BMJ Open*. 2017; 7: e016901.
16. Banks J, Farr M, Salisbury C, et al. Use of an electronic consultation system in primary care: a qualitative interview study. *British Journal of General Practice*. 2017.
17. Care Quality Commission. Addenbrooke's and the Rosie Hospitals Quality Report 2015. https://www.cqc.org.uk/sites/default/files/new_reports/AAAD0111.pdf.
18. Greatbatch D, Heath C, Campion P and Luff P. How do desk-top computers affect the doctor-patient interaction. *Family Practice*. 1995; 12: 32-6.
19. NHS England. GP Patient Survey 2017. https://www.england.nhs.uk/statistics/2017/07/06/gp-patient-survey-2017/.
20. The King's Fund. Public Satisfaction with GP services drops to lowest level in 35 years. https://www.kingsfund.org.uk/blog/2018/02/public-satisfaction-gp-services.
21. Tempest M. Believe in Unicorns. *Indepth*. https://www.candesic.com/media/articles/LBOct17.pdf: LaingBuisson.com, 2017.
22. Ackerman ML, Virani T and Billings B. Digital Mental Health - Innovations in Consumer Driven Care. *Nursing leadership (Toronto, Ont)*. 2017; 30: 63-72.
23. Mamoshina P, Ojomoko L, Yanovich Y, et al. Converging blockchain and next-generation artificial intelligence technologies to decentralize and accelerate biomedical research and healthcare. *Oncotarget*. 2018; 9: 5665-90.
24. Medical Futurist. Should algorithms and robots mimic empathy. http://medicalfuturist.com/algorithms-robots-mimic-empathy/2018.