Impact of information and communication technology in healthcare

> Some participants experienced technology as distancing them from patients, whereas others saw it as a challenge providing them with the opportunity to increase their clinical empathy and compassion.

A Narrative Study on the Impact of Information and Communication Technology on the Relationship between Patients and Medical Learners

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Abstract

Background: **Current medical learners are immersed in an era of tremendous technological advancements. Consequently, the use of information and communication technologies (ICTs) might impact entrustable professional activities (EPAs), such as interpersonal and communication skills between learners and patients.**

Objective: **The aim of this study was to explore medical learners' perspectives on ICTs and its impact on the relationship between them and their patients.**

Methods: **Semi-structured interviews were conducted with medical learners to elicit their perspectives regarding ICTs in a clinical setting. Interviews were recorded, transcribed and analyzed to identify key themes.**

Results: **Participants reported that ICTs implementation improved quality of care by allowing for rapid access to patient information and facilitating clinical decision making. However, technology use created a potential challenge to forging empathy toward patients and developing a rapport with them.**

Conclusion: **It is paramount to devise safeguards or milestone requirements in student evaluations for graduation.**

Introduction

Medical learners are entering training in an era of enormous technological advancements that has benefitted the science of medicine (Post et al. 2014). As the practice of medicine transitions from the information age to the age of artificial intelligence, medical learners will be required to develop new skills and expertise to ensure their readiness for successful practice (Wartman and Combs 2019). In technologically advanced practice settings, medical learners will need to understand the practice of medicine in partnership with other physicians, healthcare professionals, technology and patients (Wartman and Combs 2019).

One of the potential unintended consequences of technology integration in healthcare settings is the negative effect it may have on medical learners' development and integration of entrustable professional activities (EPAs) (Caceres and DiCorcia 2018) that allow medical learners to be entrusted with responsibilities once sufficient competence is reached. Importantly, interpersonal and communication skills (ICSs) competencies are incorporated across all the core EPAs (Caceres and DiCorcia 2018). According to Caceres and DiCorcia (2018), "It is this domain of competence [ICS] that technology in medicine may have its greatest unintended influence and require specific intervention by preceptors and residents to prevent delayed development of multiple EPA skills sets in the medical student" (p. 248).

Medical learners are required to achieve core competencies in empathy and compassion (Royal College of Physicians and Surgeons of Canada 2015). Patel et al. (2019) stated, "Empathy and compassion are foundational elements of the practice of medicine and vital cornerstones of high quality health care" (p. 2). The EPA behaviour of "anticipating, reading and reacting to emotions in real time with appropriate and professional behaviour in typical medical communication scenarios" might be compromised by being overly focused on computer screens versus making eye contact with patients (Caceres and DiCorcia 2018: 248). Assimilating this EPA is necessary to demonstrate empathy and compassion toward patients (Caceres and DiCorcia 2018).

Humber River Hospital (HRH), one of the largest community hospitals in Ontario, has implemented several healthcare technologies and is considered the first digital hospital in North America. For medical learners, it is a unique practice environment in which to build and strengthen EPA behaviours and core competencies. Empathy and compassion are core competencies that medical learners are required to demonstrate in their pursuit of a medical degree (Royal College of Physicians and Surgeons of Canada 2015). This study explored medical learners' perspectives about the effect of healthcare technology on their relationship and interactions with patients.

HUMBER RIVER HOSPITAL is one of Canada's largest community acute care hospitals, serving a population of more than 850,000 people in the northwest Greater Toronto Area. The multi-site hospital currently operates out of its Wilson Avenue acute care site and Finch and Church Street reactivation care centres with a total of 722 beds, just over 3,800 employees, approximately 700 physicians and over 1,000 volunteers.

Affiliated with the University of Toronto and Queen's University, Humber River Hospital is North America's first fully digital hospital. Part of Humber River Hospital's digital infrastructure includes completely automated laboratory services, robots sorting and mixing medications, electronic health records, tracking systems, for patients undergoing surgery, that update families through their cellphones and patient bedside computer terminals – all varieties of technologies that automate information, eliminate paper and provide a connected experience for patients, staff and families.

Humber River Hospital was awarded Accreditation with Exemplary Standing in 2018 and, since its opening in 2015, has received numerous awards and accolades for technological advancements and innovation (www.hrh.ca).

Methods

Study design and participants

This qualitative study explored medical learners' perspectives on how information and communication technology (ICTs) has impacted their relationships with their patients. A narrative approach was employed to elicit detailed accounts of personal experiences. Descriptive accounts were analyzed, and key themes were identified. Eligible criteria for medical learner participation included those who worked at HRH for a minimum of 1 month, native English speakers and those who were 18 years of age or older. Participants also possessed the capacity to consent. This study was proposed to an independent Research Ethics Board for approval prior to conducting the study.

Data collection

Semi-structured, in-depth interviews were conducted from November 2019 to January 2020 at HRH to collect data. Study participants were interviewed in a one-on-one session or in a focus group setting according to their preference. One-on-one interviews lasted approximately 20 minutes, whereas focus group interviews lasted approximately 30 minutes. Demographic data and informed consent were obtained immediately prior to conducting the interviews. Members of the research team were responsible for leading the interviews. Once data saturation was reached, the interviews were no longer continued. A qualitative study using narrative inquiry was used to explore the generational differences and similarities of adapting to technology. Narrative research provides valuable insights into how participants construct meaning through storytelling (Riessman 1993).

Data analysis

Interview transcripts were analyzed to identify common themes using a categorical-content approach (Lieblich et al. 1998). Each transcript was read by two analysts, and common themes were identified with a focus on participants' own words. Two main categories were identified.

Results

There were five participants in this study: three male and two female. Each theme is described below and supported by verbatim quotations from the participants.

Theme: Information available in the moment

One theme that emerged from the data was that technology enabled medical learners to have easy access to information. This access was seen as essential to ensuring that medical learners were able to obtain needed health information. One medical learner explained:

> Usually, when I come in in the morning, I can pull up my patient lists and look at all the different notes or blood work that came in since I looked the day before. It's a lot easier than going around to all the paper charts one at a time and just get a quick look before I … see the patients and know if they had any issues overnight. Then I … see them and then come back and write a note, and I can look up anything I need to look up – different resources, … everything. And [I] come up with a plan and write it all out on my note so [that] when it's time to present, then I'll have everything that I need.

In addition, ease of access to information was seen as a positive addition to providing care as it also helped reduce barriers and facilitate more efficient communication between learners and patients. One medical learner shared her experience of technology providing her with the ability to quickly access interpreter services through a portable tablet so that she could communicate important information with the patient:

> One of the other technology things that I used was the translator on the screen, where you can videoconference in. That's super handy. I can just get one from the basement. I had a patient who only speaks Portuguese, and her relatives weren't there when I wanted to interview her. So I just got the translator and was able to do that, and the patient was perfectly happy with it. … [S]he could see the person, and the person could see her. And it was all fine.

Another participant commented that direct access to patient information had a positive effect on the quality of communication. As gathering information was often difficult due to time limitations, technology was able to facilitate the exchange of information and develop dialogue between patients, their family members and healthcare providers:

> I was on Pediatrics [when] a child came in, quite sick, and we saw from previous notes that there were some previous admissions. ... In all my interactions that I've had with patients, technology has helped. Without those previous notes and records, you'd have to spend a lot of time doing detective work with family, and often times they wouldn't know to answer the specific dates, or what happened, or the hospital course or what was given in the [emergency room] back then. So it definitely helped in all my patient encounters.

Convenience of information was also seen as important for the patient as technology offered greater depth of information to patients, thus empowering them:

> [Patients] can actually access their records … more easily. As we try to move to more streamlined processes for accessing information between hospitals, I think that's going to empower patients. And it also empowers them in that there's a more seamless transition of communication between hospitals.

> I think technology has increased patient empowerment because [there are] options for the patients to view results [and] see doctor's notes, which they can access online through the patient portal. So they're kept in the loop, and the likelihood of their care slipping through

> the cracks [is] a lot less likely to happen with them being advocates for their own care. It keeps providers on their toes as well.

Theme: Maintaining the patient–physician relationship

A second theme emerging from the interviews was the issue of maintaining the patient–physician relationship. Technological advancements were seen as having the possibility to increase the psychological distance between doctors and patients. As participants explained:

> Well, there is a risk … that it could definitely get in the way. … [I]f you're looking at a computer the entire time you're talking to a patient, then that might hinder the relationship between the doctor and patient.

> When you have all these technologies available to you, you may be tempted to not ask or spend as much time with the patient because you already have all their information online. There are opportunities … to bypass a lot of the communication that's done face-to-face.

Interestingly, several participants did not perceive that the patient–physician relationship would be at risk given the advanced technology of clinical environments. Instead, participants viewed this element as a positive challenge to increase their clinical empathy. Participants recognized that it was essential to connect with patients through continuous communication to build that bond of compassion and trust. Participants stated:

> I'm talking to all my patients every day ... I'll look for any changes in their notes or their blood work and then talk to them: "So, do you have any constipation or anything?" Things you can't really see in the blood work. Or if there's something weird in the blood work, [I'll] ask them about symptoms that might be related to that. So it's all part of the puzzle. And I feel like you can't just do half.

> It's important to take the time to talk to patients instead of just trying to figure everything out based on their labs and blood works. I guess [that] having all the information in front of you, … it's easy to [say], "Oh, I don't need to talk to the patient." But, really, it's good to, even if you already have an idea [of] what's going [on], because they'll definitely have more to add, and then they just feel like they're being heard.

Another participant rationalized that engaging with a patient is no different in traditional hospitals using conventional paper records as physicians may still avoid eye contact and interactions with the patient:

> It comes down to the individual physician and how they use [technology]. Because they could be staring at a computer screen, or they could just be staring at a paper chart the whole time as well. In that instance, I wouldn't say it's the technology as much as it's … the physician not being attentive. So it's about ensuring [that] you use [technology] ... in ways that could enhance the relationship with the patient.

Discussion

Our study explored medical learners' perspectives about the effect of healthcare technology on their relationship and interactions with patients at one large community, digital hospital. Two themes emerged: information available in the moment and maintaining the patient–physician relationship. Access to point-in-time patient information and resources was experienced as a positive outcome of technology integration by medical learners participating in this study. Similar to previous studies, we found that rapid access to patient records and medical information, along with resources and tools to support clinical decision-making, was viewed as reducing barriers and creating facilitators for effective communication with patients (Tierney et al. 2013). Snyderman and Gyatso(2019) suggested that medical learners' ability and desire to provide compassionate care are diminished by a rigid healthcare delivery system focused on volume, which leaves little time for meaningful engagement with patients. Our findings suggested that the efficiency gained by immediate access to patient information and resources may allow medical learners to sustain their focus on developing skills associated with ICS competencies because they have the time to do so. Conversely, Caceres and DiCorcia (2018) suggested that medical learners who become accustomed to templates and prompted order sets might not successfully acquire the core physician competency of knowledge for practice. According to Caceres and DiCorcia (2018), "This [templates and prompted orders] affects their [medical learners'] ability to communicate their rationale for recommendations and treatments for patients and to engage in clinical discussion that go beyond the templated note or the structured order sets" (p. 248).

Based on our results, there is reason to suggest that in the digital healthcare setting, medical learners' integration of two core competencies, ICS competencies and knowledge for practice, might be impacted. With the growing presence of technology in many healthcare settings, medical learners will need to incorporate technology into their workflows

and interactions, and this may come at the risk of insufficient skill and knowledge acquisition. Our findings support the concept suggested by previous authors that adequate exposure to direct patient and preceptor encounters must be maintained to maximize the potential for medical learners to develop fundamental therapeutic communication and clinical reasoning skills (Caceres and DiCorcia 2018; Post et al. 2014; Tierney et al. 2013).

The views of medical learners participating in this study about the influence of technology on the patient and physician relationship were mixed. Some participants perceived that technological advancements had the possibility of distancing them from patients. Interestingly, however, several participants experienced the integration of technology in healthcare as a positive challenge to increase their clinical empathy. Similar to previous research, some participants in this study perceived that the use of technology might distract from face-to-face interactions with patients and the expression of attentiveness, empathy and concern through body language. As stated by Post et al. (2014), "The electronic health record replaces the jotting of notes by hand in a face-to-face interaction with the patient, with eye-gaze-and-search on a monitor seeking the right screens, typing or clicking on drop downs" (p. 877).

Potentially, healthcare technology may stimulate the conditions by which the dialogue between patients and medical learners is reduced (Caceres and DiCorcia 2018; Post et al. 2014; Tierney et al. 2013; Wald et al. 2014). Effective and focused communication between medical learners and patients is essential for building relationships and developing empathetic and compassionate care (Sinclair et al. 2016). Sinclair et al. (2016) found that healthcare providers felt that approaching and understanding the patient as a fellow human being was a critical aspect of compassionate care (p. 6). Our findings emphasize results from previous studies that suggested communication and engagement of patients must be fostered to support the development of compassionate care delivery, elevate quality and enhance satisfaction (Post et al. 2014; Snyderman and Gyatso 2019). The consequence of medical learners lacking the skills and behaviours necessary to deliver empathetic and compassionate care is a healthcare environment of the future that reduces the potential for improved patient outcomes. According to Post et al. (2014), "Patient experience of compassionate care correlates positively with both prevention and disease management" (p. 878).

Wald et al. (2014) suggested that medical learners are concerned about their capability of integrating healthcare technology in clinical encounters without compromising the patient–physician relationship. Conversely, the findings from our study suggest that the growth and spread of healthcare technology might be a challenge that can be met with the opportunity to reinforce the benefits associated with the delivery of empathetic and compassionate care. One participant made the poignant comment that irrespective of practising in the paper or electronic setting, it is ultimately the individual physician's attentiveness to the patient that fosters effective patient relationships. This suggested to us that ensuring that healthcare is practised with empathy and compassion goes beyond identifying the potential barriers to effective patient–physician interactions, such as technology, to the foundational skills and knowledge that are necessary to stimulate compassionate practice. According to Burridge et al. (2017), "[T]he current culture of health care has framed the practising of healthcare with compassion as an aspirational ideal rather than the foundation of care" (p. 86). Patel et al. (2019) suggested that a "compassion crisis" exists in healthcare in which physicians focused on biomedical inquiry are missing opportunities to show empathy and compassion. Patel et al. (2019) further stated that "empathy and compassion are not simply inherent traits, which health care providers intrinsically either do or do not possess, but can be enhanced through training interventions" (p. 2). We agree with previous studies that suggested the need to develop specific competency- and EPA-based expectations for medical learners that incorporate technology into patient encounters to ensure empathetic and compassionate practice (Caceres and DiCorcia 2018; Post et al. 2014; Tierney et al. 2013; Wald et al. 2014).

Limitations

Although the study provided insights for the subject matter, there were some limitations. The results were based on data collected from in-person interviews, which may lead to social desirability bias. As well, the small sample size and the restriction to a single hospital site preclude generalizability.

Conclusions

One of the potential unintended consequences of healthcare technology integration is the negative effect it may have on medical learners' development and integration of EPAs, specifically, ICS competencies. This study explored medical learners' perspectives about the effect of healthcare technology on their relationship and interactions with patients. Two themes emerged: information available in the moment and maintaining the patient–physician relationship. Participants experienced the positive outcome of technology integration, similar to previous research, that rapid access to patient records and medical information, along with resources and tools to support clinical decision-making, reduced barriers and created facilitators for effective communication with patients (Tierney et al. 2013). However, electronic templates and prompted order sets might impede medical learners' ability to acquire the core physician competency of knowledge for practice (Caceres and DiCorcia 2018). We found mixed views of medical learners participating

in this study about the influence of technology on the patient and physician relationship. Some participants experienced technology as distancing them from patients, whereas others saw it as a challenge providing them with the opportunity to increase their clinical empathy and compassion. Empathetic and compassionate physician practice requires training and education. Our study aligns with previous research suggesting that specific competency- and EPA-based expectations must be created to safeguard the development of empathetic and compassionate physician practice in the future.

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What We Learned:

1. The efficiency gained by immediate access to patient information and resources through ICTs may enable medical learners to sustain their focus on developing skills associated with interpersonal and communication competencies because they have the time to do so.

2. In the digital healthcare setting, medical learners' integration of two core competencies, ICSs and knowledge for practice, might be impacted. Similar to previous studies, our findings suggested that adequate exposure to direct patient and preceptor encounters must be maintained to maximize the potential for medical learners to develop fundamental therapeutic communication and clinical reasoning skills.

3. Based on our findings, the growth and spread of healthcare technology might be a challenge that can be met with the opportunity to reinforce the benefits associated with the delivery of empathetic and compassionate care.

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