# Ethics in telehealth: comparison between guidelines and field experience – the case for learning health

# systems

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## Abstract

**Objectives**

To understand ethical issues within the telehealth domain, specifically how well established macro level telehealth guidelines map to micro level practitioner perspectives.

**Methods**

We developed four overarching issues to use as a starting point for developing an ethical framework for telehealth. We then reviewed telemedicine ethics guidelines by the American Medical Association (AMA), the World Medical Association (WMA), and the telehealth component of the Health Professions council of South Africa (HPCSA). We then compared these guidelines with practitioner perspectives to identify the similarities and differences between them. Finally, we generated suggestions to bridge the gap between ethical guidelines and micro level use of telehealth.

**Results**

Clear differences emerged between the ethics guidelines and the practitioner perspectives. The main reason for the differences were the different contexts where telehealth was used, for example, variability in international practice and variations in the complexity of patient-provider interactions. Overall, published guidelines largely focused on macro level issues related to technology and maintaining data security in patient-provider interactions while the practitioner concerns focused on applying the guidelines into specific micro level contexts.

**Conclusions**

Guidelines on telehealth ethics have a macro level focus in contrast to the micro level needs of practitioners. Work is needed to close this gap. We recommend that both telehealth practitioners and ethics guideline developers need to understand healthcare systems better and adopt a learning health system approach that draws upon different contexts of clinical practice, innovative models of care delivery, emergent data and evidence-based outcomes. This will help develop a clearer set of priorities and guidelines for ethical conduct of telehealth.

Keywords

Ethics, telehealth, learning health system, informatics

## **Introduction**

The current paradigm of healthcare delivery focuses on establishing interactions across patients, providers, and settings in different contexts with ethical connotations [1]. Telemedicine is provision of clinical care remotely, using clinical processes such as teleconsultation, telediagnosis etc. Telehealth incorporates telemedicine but also goes beyond, with additional indirect benefits including providing preventive health support, and medical education for professionals and the public [2]

## Unintended consequences of telehealth usage have been reported including ethical issues [3–5]. These consequences occur due to complexities in remote care systems delivery by physicians, remote monitoring, and patient-provider communication through mobile health applications. Mitigating unintended consequences in telehealth practice should draw upon principles of medical ethics as well as best practices in informatics.

Thomas Percival (1803) coined “medical ethics” to describe moral principles that govern practice of medicine [6]. It was initially based on the Hippocratic Oath and included beneficence (‘do good’) and non-maleficence (‘do no harm’); principles of respect for autonomy (the right of a competent person to make informed decisions about their own medical care) and justice (notions of fairness and equality) were later added to this repertory. Codes of ethics from medical informatics, on the other hand, address more specific guidance in additional to fundamental ethical principles. For example, both IMIA Code of Ethics for Health Information Professionals as well as the AMIA Code of Professional and Ethical Conduct provide ethical guidance regarding patient care, institutions and organizations, colleagues, and scientific research [7,8]. The principles of informatics and medical ethics, together, thus represent a core set of fundamental ideals relevant to any society, regardless of culture, forming a system for moral reasoning and guidelines for professional ethics in medicine [9].

Other ethical frameworks, e.g., the ‘CoRE-values compass and grid’ incorporate important ideas and processes identified in ethical decision-making models derived from systematic review of literature and from published empirical evidence [10]. The National Health Services in the United Kingdom published “A Framework for Action” on the use of data and technology within health systems. This framework includes a roadmap for moving to a whole-system, consent-based approach, which respects citizens’ preferences and objections about how their personal and confidential data is used [11]. However, what needs to be examined is the inter-relationships of ethical frameworks with issues that telehealth practitioners and patients face during the day-to-day delivery of medicine.

The concept of learning health systems (LHS) can potentially help with this need. The premise of a LHS is that the complex system of people, processes, culture, policy, and technology can be continually monitored through data collection and analysis so that best practices and new knowledge can be generated and cycled back into care delivery [12] . Such an approach deviates significantly from research ethics and other frameworks that draws distinct lines between patient care and research. An LHS model, on the other hand, advocates for and integrates research and practice to allow for high quality and evidence-based care. This approach can be used to understand the relationship and evolution of telehealth in different contexts of clinical practice to help us understand how we can best establish a contextual fit between user needs and technology.

The goal of this paper is to provide an exploratory synthesis that compares ethical guidelines relevant to telehealth with the lived experiences of telehealth practitioners. We identify differences between three telehealth ethical guidelines and the micro level realities of clinical practice and then discuss how the differences can be reconciled by drawing on the principles of learning health systems.

**Methods**

The IMIA Telehealth Working Group constitutes over 60 members from across the globe working in the telehealth arena as entrepreneurs, promoters, academics as well as practitioners. During the telehealth working group meeting at Medinfo 2019, a proposal was made to develop set of guidelines on the use of telehealth for practitioners in a bid to answer some general concerns. The WG members were particularly interested in comparing existing ethics guidelines with the experiences of practitioners using telehealth.

After discussion of ethical issues, the WG came up with four overarching issues to use as a starting point for developing an ethical framework for telehealth.

First, telehealth-mediated interactions should facilitate patient-provider relationships. For example, digital interventions such as eCoaching of patients towards healthy behaviours for patient groups use monitoring and management of chronic illness [13]. While patient-provider telehealth monitoring may achieve positive outcomes for the patient, such a process nevertheless has the potential to create undesired outcomes if patients are passively steered towards outcomes driven by an “app” rather than acting in a participatory manner [14]. Thus, there is a need to frame the boundaries between passively steering patients towards adopting practices as opposed to empowering them.

Second, telehealth professionals should consider the construction, nurturing, and development of patient-provider communication via telehealth technology. For example, consider an event reported in 2019. A patient was informed of their imminent death by a physician using a telehealth application [15]. The patient’s family and the general members of the public responded with overwhelming outrage, particularly on social media, accusing the physician and hospital of delivering grim news with a lack of dignity. Going beyond the shortcomings by the hospital – which were duly acknowledged, two questions arise. One, what are the ethical imperatives of such communication processes and channels? One cannot always predict the outcomes from telehealth-mediated interactions; further, no matter how well-intentioned, messaging in the context of a distance-based care cannot be value-free. Two, it begs the question whether it is ethically appropriate for clinicians to communicate with their terminally ill patients via telemedicine. A relative of the patient who was informed over a telemedicine consultation that he was near death told a reporter that in her opinion, critically ill patients should not see a screen, rather that such individuals should be seen by “a human being with compassion.” [16].

Third, telehealth-mediated interactions have implications for indirect outcomes such as patient data being collected or shared inappropriately by either the patient, the provider, or yet other stakeholders who may be engaged within the telehealth applications [1,17]. Issues around data integrity and security can be contentious as implications of inappropriate sharing will only be noticed downstream by which time significant harm may have already occurred. This calls for deliberations on the issues of data protection and privacy tailored towards telehealth applications, distinct from other data privacy and data sharing considerations, leading to laws such as the Health Insurance Portability and Accountability Act (HIPAA) in the United States and Digital Information and Security in Healthcare Act (DISHA) in India [18,19] . Furthermore, increasing trends of incorporation of artificial intelligence based algorithms within telehealth raise new ethical challenges, including how such algorithms affect the fiduciary relationship between the patient and the provider.

Fourth, any discussion around ethical imperative around telehealth needs to take into account that telehealth serves a range of health systems and populations with respective variations of age groups, cultures, and ethnicities within the systems. For example, privacy of patient-provider communication is especially important for telehealth clients in Asia who have medical problems associated with social stigma such as genitourinary and behavioural diseases [14]. Another subgroup of interest to telehealth is the aging population and those with behavioural health conditions.

We used the four issues described above to develop four open-ended questions to compare ethical guidelines for telehealth with issues from clinical practice in different care delivery contexts.

1. What cultural and regional differences impact ethical issues in telehealth?
2. What are the ethical implications of big data and artificial intelligence generated by telemedicine services?
3. In what ways does ethics of telehealth differ from face-to-face medical practice?
4. What are the ethical issues involved in special populations? Here, we use care of elderly as an exemplar special subpopulation using telehealth services.

We use the four questions to synthesize perspectives of telehealth practitioners (practice-based evidence) and a review of telehealth ethics guidelines for telehealth from three sources: (1) AMA guidelines as reported by Danielle Chaet et.al (2017), (2) and the telehealth component of the Ethics guidelines from the Health Professions Council of South Africa (2014), and (3) The WMA (2018) statement on the Ethics of Telemedicine [9,20,21]. We selected these three documents as exemplars of written guidelines for telehealth ethics.

**Results**

Our results are presented according to each of the four questions described above. The practitioner perspectives were selected as indicative responses from the WG members. These do not present a comprehensive picture of global practices nor are the findings presented in a specific order of importance.

1. **What cultural and regional differences impact ethical issues in telehealth?**

We discuss cultural and regional differences with respect to telehealth practices in four respective countries.

Sri Lanka:

Medical ordinance in Sri Lanka (1927), Cosmetics Devices and Drugs Act no 27 of 1980, and National Medicines Regulatory Authority Act, No. 5 Of 2015 do not provide information on digital health, neither have provisions to regulate internet-based prescriptions. Electronic Transactions Act No. 19 of 2006, which is the common law for any electronic transaction is currently used as the base legal act for practicing telemedicine and issuing internet-based prescriptions. Even though telemedicine continues to expand in Sri Lanka, the Sri Lankan National eHealth Guidelines and Standards document [22] by the Ministry of Health Sri Lanka 2016 does not mention about regulations on Telemedicine consultations. In absence of Telehealth regulations or guidelines, the practicing physician’s code of conduct will be governed by routine ethical practices which will ensure physician gets sufficient patient information before prescribing, obtain valid informed consent, ensure privacy and confidentiality of patient information, ensure patient know the limitations of telecare intervention and ensure that medical records are maintained properly.

United States:

The Federation of US State Medical Boards (FSMB) has prioritised telemedicine as an important medical regulatory topic that need to be addressed since 2016 [23]. The Federal Council of Medicine, the regulatory and professional body, issued a new regulation for telemedicine in February 2019 but was met with resistance from some physicians and they had to revoke it, falling back to a 2001 regulation. It is now set for a new trial next year. However, in 2019, the Center for Medicare and Medicaid Services updated the Physician Fee Schedule in order to expand telehealth reimbursement services and restore the doctor-patient relationship [24]. Most recently, the Department of Veteran Affairs (DVA) in the United States implemented a federal rule that will allow providers to care for veterans across state lines, overriding any regional or state restrictions [25].

While it is not fully clear how licensure across state lines will work and what the implications of cross state licensing may be, this new federal regulation is a step forward in increasing healthcare access to veterans and service members.

Colombia:

The Colombian Ministry of Health Resolution 1448 had set agenda for telehealth [26]. In Colombia, telehealth is delivered complementary to face-to-face interactions and only as an additional resource when the physical encounter is limited in some way. An informed consent is mandatory for enrollment for patients, and telehealth delivery is mediated by a health care provider. In Colombia, the most common risks related to telehealth include loss of privacy (right of the patient), loss of confidentiality (duty of provider), and loss of data.

Argentina:

In Argentina, telehealth is governed by The National Directorate of Health Information Systems under the Ministry of Health and Social Action. The overall impact on access measures, acceptability, cost and supplier satisfaction remain positive. Argentina’s eConsult services has been extended both geographically and in terms of specialized services offered. The Ministry of Health promotes telemedicine as a tool to expand the window of opportunity for people to access health services using eConsult [27].

In summary, despite prevalence and utilisation of telehealth services, there is little uniformity around the legal frameworks or ethical guidelines or best practices. This places onus on clinicians to adopt ethical practices in telehealth care.

Ethics of not offering remote support due to cross border, legal or regulatory issues

The existing regulations on telemedicine around the world concentrate on limiting cross border practice. Conventionally, in all of those regulations, the physician should be registered in the country (or in some cases, the state) where patient is situated [28]. In the US, individual state licenses are required, requiring licenses across 50 states, the aforementioned DVA example of cross state licensing being an exception to this rule. Canada has similar problems around physician licensing across Provinces or Territories although discussions are ongoing around a national license for virtual care [29].

Such licensing practices raises the ethical question whether a professional who is approached for a remote consult can ever refuse to offer advice or services when requested. The request made could be based on false information about the capabilities of the physician, albeit intentional. For a professional, once financial transaction is completed, it is unethical to refuse to tender advice. On the other hand, the context of telecare makes for easy negotiation or settlement of grievance due to in-built documentation around the care process.

1. **What are the ethical implications of using artificial intelligence based solutions in telemedicine services?**

In face-to-face care, clinicians rely on history, evaluation of symptoms and signs to arrive at a differential diagnosis, further refined by special investigations and imaging to plan care. In telehealth, such processes are constrained by time, technology, and lack of comprehensive clinical data available for AI-based systems. Besides, there are increasing concerns about computer algorithms perpetuating existing racial and gender disparities by amplifying human biases and other risks inherent in the training data [30,31].

Synchronous telehealth consultation relies on real-time video conversations between providers and patients. Some telehealth offerings incorporate face recognition algorithms to enable ascertaining the mood and psychological status of the patients. Although face recognition and affective computing recognition of mood disorders, depression, or other psychiatric illnesses, facial recognition algorithms can result in profiling patients and misuse of the same by law enforcement authorities, e.g. in prisons. Facial recognition systems also perform sub-optimally and at the risk of reinforcing gender and racial biases, raising significant ethical issues around anonymity and confidentiality of patients who receive care through these services. Besides, as Klare (2012) argued, many telehealth systems rely on proprietary “closed source” solutions for decision or prediction algorithms, these approaches multiply risks [32].

Use of AI in telehealth would need careful assessment of the risks from such emerging technologies. With the emerging hype around AI, this poses a risk of propagation of further inequity that already exists some health systems.

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### **Ethical Telehealth Issues related to care for the elderly**

Older adults often prefer to continue living in their place of residence rather than other options such as assisted living as “aging in place” has demonstrated better health outcomes [33–36]. Monitoring an individual to detect falls or changes in health and wellbeing is an important use of telehealth that can enable an older adult to live in their own home. However, ethical issues exist with telehealth support for ageing in place including remote monitoring and passive data collection, empowerment of the older adult and even limited telehealth access in some locations. Privacy and security of health information exchange between an older adult, their family members, and their healthcare providers can also be an important ethical issue as privacy restrictions may prevent a family member from accessing necessary information about their family member.

While home care may enable the elderly to live longer, a key ethical question is to what extent quality of life (QoL) is improved for the patient. Mere prolonging of life without notable improvement in QoL can lead to associated suffering that affects not only the patient themselves, who in some cases due to problems such as dementia maybe oblivious of the suffering, but also care givers and family. Further, monitoring with sensors, cameras, and similar technologies can also intrude on an individual’s right to privacy, especially if imposed by well-meaning family or healthcare providers without including the older adult in the decision making process around questions such as what to monitor, how often, and who can access the data. A research team from Massey University (2018) sought to investigate ethical issues among 31 members of elderly population in NZ using semi-structured interviews and determined 15 requirements for technology to support older adults’ ageing in place. They found most of these requirements were unmet by existing commercial telehealth systems [37].

Access to telehealth to support care of the elderly implies either the ability to access telehealth systems via a local health care provider (e.g. getting access to specialist medical care via telehealth from a family physician), or having telehealth technology in the home. The latter can be challenging due to the digital divide and high costs of telehealth enabled care. Many telehealth systems have an initial purchase cost and then ongoing licence fees and may require qualified installation and ongoing technological support [34,38,39].

Finally, current telehealth systems tend to be ‘one size fits all’ and requires the older adult to adapt to the technology rather than the technology fitting the context of the individual. Telehealth enabled communication can also focus on formal health care providers while neglecting an older adults’ informal support networks of family and local community [40,41]. These informal social systems and support networks can play an important role in a person’s care continuum [37].

1. **In what ways does ethics of telehealth differ from face-to-face medical practice?**

Telehealth lacks the in-person face-to-face contact that takes place in traditional healthcare delivery. With a virtual and possibly unknown patient, physicians must try to personalize the telehealth patient as best they can. Ethical medical practice therefore remains focused on the patient as a whole person who is more than a data set or collection of digital images [42]. It is imperative that physicians ensure that they have the information they need to make well-grounded clinical decisions and diagnoses when they cannot personally conduct a physical examination, such as by having another health care professional at the patient’s site when they conduct the exam or by obtaining vital information through remote technologies.

Irrespective of the emergence of new technologies and models of care, the physicians’ fundamental ethical responsibilities remain the same [43]. The responsibility rests with the healthcare providers to appreciate the difference between how fundamental responsibilities play out in the context of telehealth compared with face-to-face interactions. In as much as physicians’ fundamental ethical responsibilities remain invariant, the continuum of possible patient-physician interactions in telehealth/telemedicine give rise to differing levels of accountability for physicians [20].

In principle, ethical issues will exist whether care delivery is via telehealth or traditional face-to-face care. These include maintaining a strong patient/client-physician/caregiver/relationship, protecting patient privacy, promoting equity in access and treatment, and seeking the best possible outcomes.

**Comparison of Ethical Guidelines and Practitioner Perspectives**

Clinicians are more concerned with direct care delivery which falls under the narrower definition of Telemedicine. Ethical concerns in telehealth have to consider the issues on a broader perspectives and some are beyond the control of the clinician which sadly does not decrease the clinician’s liability. We found differences in priorities expressed by the practitioners and our analysis of ethical guidelines. While the ethical guidelines and vignettes both use broad terms such as ‘telehealth’, ‘information’ and ‘care’, the practitioner vignettes took them a step further by describing challenges to using telehealth in a specific context, one example being how telehealth use varies across different international settings. The ethical guidelines also do not consider the fact that telehealth implementation is not a one-time event but rather takes place over a temporal dimension. To that end, the way that telehealth technologies integrate with clinical processes will develop and evolve over time and acknowledging this growth curve is an essential part of the implementation process.

The following are three essential elements we found missing in the four ethical frameworks we reviewed: (1) responsible strategies that will allow for research and enable “learning” from clinical care experiences and underlying data, (2) ways to use telehealth to reduce health disparities, and (3) involving patients and care providers in the process of improving the overall telehealth system.

## **Discussion**

Telehealth will continue to be an essential part of healthcare delivery as patient care delivery becomes more complex and requires care coordination and information sharing over time across providers and settings. However, telehealth introduces ethical issues due to changes in patient-provider communication patterns, access to care delivery services, and how patients interact with telehealth tools [3]. While we are often quick to criticize these new care delivery models, we must remember that healthcare is a learning health system and therefore we must learn from past experiences (both positive and negative) to improve care delivery moving forward [44]. While we always strive for positive outcomes from telehealth usage, it is not rational to assume that we can always predict, or even fully understand, how technology may change the relationship between patients, providers and processes when implemented into complex settings [45]. Rather, we must acknowledge that unintended consequences will occur from telehealth usage and our strategy going forward must be to embrace the notion of learning health systems (LHS) in order to better understand the new interactions and relationships that develop from telehealth usage in different contexts [1,4,5]. An LHS based approach will enable us to better develop evidence-based approaches for managing unintended consequences from telehealth usage.

This paper used a set of four discussion questions to compare telehealth guidelines from the World Medical Association, the American Medical Association, and the South African guidelines with practitioner perspectives. We identified ethical issues that may arise from applying the guidelines in different contexts of telehealth use and how we can use these issues to better design and manage telemedicine delivery going forward.

The key finding from our work was that there was a difference in priorities expressed by the practitioners and what is often contained in ethical guidelines. While the ethical guidelines and practitioner perspectives contained similar terminology such as ‘telemedicine’, ‘information’ and ‘care’, the guidelines were more focused on the structural aspects of telehealth whereas the practitioner perspectives focused on behavioural challenges and implications of using telehealth in specific contexts. The practitioner perspectives provide an important source of “practice based evidence” that helps us contextualize the use of telehealth in specific settings to better understand the how relationships and interactions develop between patients and providers, the ethical ramifications of using telehealth in specific contexts such as aging in place, and the challenges of integrating AI applications into actual care delivery.

Many of the practitioner perspectives described the prominent challenge to using telehealth technologies as the one size fits all nature of technology, where the patient and provider are expected to adapt to the technology, rather than having a meaningful co-design between end user and technology. Research needs to continue to explore the nature of connected health delivery so we can understand the complexity of it and how to best configure the equation of people, processes and technology. The gap between the ethical guidelines and practitioner perspectives of telehealth usage we identified are consistent with literature that has described the need to look at HIT implementation from micro and macro perspectives, both pre and post implementation [46]. The ethical guidelines were for the most part focused on macro dimensions of telehealth usage, which makes sense as guidelines, particularly broad guidelines such as the World Medical Association or the American Medical Association, are intended to be used across multiple settings. However, this leads to scalability issues when the guidelines are implemented into micro contexts of use. The guidelines did not consider the temporal dimension of technology implementation. Implementation of HIT such as telehealth tools is a longitudinal process where we must study and learn about successes and failures to enable us to accentuate the former and address the latter. The principles of a learning health system can provide the structure to engage in the ongoing formative evaluation needed to properly develop and evaluate HIT. We also need to ask ourselves what is the value statement for patients and families from telehealth usage? While telehealth can provide patients access to services not otherwise available, it could be used to prolong life that does not bring a notable increase in quality of life. Many of the ethical challenges from telehealth use such as around monitoring or profiling remain works in progress that require ongoing meaningful conversations with patients, families and providers.

As an example we refer back to the earlier example of the patient informed of his impending death by a physician via a telehealth application [15]. While the use of telehealth was certainly not ideal in this situation, the public reaction of excessive criticism of the physician and hospital was also not appropriate. To truly embrace the notion of a LHS we have to accept that healthcare is a complex system and HIT implementation will lead to unintended consequences. Our focus as an informatics community must then be to work together with patients, providers, policy makers and vendors to understand and manage them. We cannot just be a learning health system when it suits us nor is a LHS approach intended to be a venue for unconstructive criticism of people or systems. Rather, the LHS mind set must be used to improve healthcare delivery by promoting collaboration and building meaningful relationships to enable all stakeholders to contribute to health system transformation.

Strengths of our paper are that we took a global look at ethics in telehealth and combined telemedicine guidelines with practitioner perspectives. Limitations of our approach is that we only used a selected set of guidelines and practitioners who are members of our IMIA Telehealth WG. This limits generalizability of our work and next steps will be evaluating our findings against a larger set of guidelines and practice-based evidence.

## **Conclusion**

The scope and importance of telehealth has increased in recent years due to the need to delivery more healthcare services across people and settings. However, a consequence of increased telehealth usage is the emergence of unintended consequences such as ethical issues. This paper compared macro level ethical guidelines for telehealth with micro level practitioner perspectives. We found that a gap exists between the guidelines and practitioner perspectives, largely due to the challenges in contextualizing the use of telehealth in specific settings. We suggest a learning health system approach can help us better understand how to bridge the micro and macro dimensions of telehealth usage.

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## References

1. Kuziemsky CE, Randell R, Borycki EM. Understanding Unintended Consequences and Health Information Technology:. Contribution from the IMIA Organizational and Social Issues Working Group. Yearb Med Inform [Internet]. 2016 Nov [cited 2019 Nov 4];(1):53–60. Available from: http://dx.doi.org/10.15265/IY-2016-027

2. Gogia S. Fundamentals of Telemedicine and Telehealth. Academic Press; 2019.

3. Kuziemsky CE, Gogia SB, Househ M, Petersen C, Basu A. Balancing Health Information Exchange and Privacy Governance from a Patient-Centred Connected Health and Telehealth Perspective. Yearb Med Inform [Internet]. 2018 Aug [cited 2019 Oct 31];27(1):48–54. Available from: http://dx.doi.org/10.1055/s-0038-1641195

4. Coiera E, Ash J, Berg M. The unintended consequences of health information technology revisited. Yearb Med Inform [Internet]. 2016 Nov [cited 2019 Nov 4];(1):163–9. Available from: http://dx.doi.org/10.15265/IY-2016-014

5. Gogia SB, Maeder A, Mars M, Hartvigsen G, Basu A, Abbott P. Unintended Consequences of Tele Health and their Possible Solutions. Contribution of the IMIA Working Group on Telehealth. Yearb Med Inform [Internet]. 2016 Nov [cited 2019 Oct 31];(1):41–6. Available from: http://dx.doi.org/10.15265/IY-2016-012

6. Pellegrino ED. Percival’s Medical Ethics. Arch Intern Med [Internet]. 1986 Nov [cited 2019 Oct 31];146(11):2265. Available from: http://archinte.jamanetwork.com/article.aspx?doi=10.1001/archinte.1986.00360230211030

7. IMIA. The IMIA code of ethics for health information professionals [Internet]. Available from: https://imia-medinfo.org/wp/wp-content/uploads/2015/07/IMIA-Code-of-Ethics-2016.pdf

8. Petersen C, Berner ES, Embi PJ, Fultz Hollis K, Goodman KW, Koppel R, et al. AMIA’s code of professional and ethical conduct 2018. J Am Med Inform Assoc [Internet]. 2018 Nov 1 [cited 2020 Feb 14];25(11):1579–82. Available from: https://academic.oup.com/jamia/article/25/11/1579/5134082

9. World Medical Association. WMA Statement on Guiding Principles for the Use of Telehealth for the Provision of Health Care – WMA – The World Medical Association [Internet]. 2009 [cited 2019 Oct 31]. Available from: https://www.wma.net/policies-post/wma-statement-on-guiding-principles-for-the-use-of-telehealth-for-the-provision-of-health-care/

10. Manson HM. The development of the CoRE-Values framework as an aid to ethical decision-making. Med Teach [Internet]. 2012 [cited 2019 Oct 24];34(4):e258-68. Available from: http://dx.doi.org/10.3109/0142159X.2012.660217

11. Personalised health and care 2020: a framework for action [Internet]. GOV.UK. [cited 2020 Feb 14]. Available from: https://www.gov.uk/government/publications/personalised-health-and-care-2020/using-data-and-technology-to-transform-outcomes-for-patients-and-citizens

12. Engineering I of M and NA of. Engineering a Learning Healthcare System: A Look at the Future: Workshop Summary [Internet]. 2011 [cited 2020 Feb 14]. Available from: https://www.nap.edu/catalog/12213/engineering-a-learning-healthcare-system-a-look-at-the-future

13. DeJesus RS, Clark MM, Rutten LJF, Hathaway JC, Wilson PM, Link SM, et al. Wellness Coaching to Improve Lifestyle Behaviors Among Adults With Prediabetes: Patients’ Experience and Perceptions to Participation. J Patient Exp. 2018;5(4):314–319.

14. Adams S, Niezen M. Digital ‘solutions’ to unhealthy lifestyle ‘problems’: the construction of social and personal risks in the development of eCoaches. Health Risk Soc [Internet]. 2016 Feb [cited 2019 Nov 3];17(7–8):530–46. Available from: https://www.tandfonline.com/doi/full/10.1080/13698575.2015.1136409

15. Man told he’s going to die by doctor on video-link robot - BBC News [Internet]. [cited 2019 Nov 7]. Available from: https://www.bbc.com/news/world-us-canada-47510038

16. Jacobs J. Doctor on Video Screen Told a Man He Was Near Death, Leaving Relatives Aghast - The New York Times [Internet]. 2019 [cited 2019 Nov 3]. Available from: https://www.nytimes.com/2019/03/09/science/telemedicine-ethical-issues.html

17. Denecke K, Bamidis P, Bond C, Gabarron E, Househ M, Lau AYS, et al. Ethical issues of social media usage in healthcare. Yearb Med Inform [Internet]. 2015 Aug [cited 2019 Nov 3];10(1):137–47. Available from: http://dx.doi.org/10.15265/IY-2015-001

18. Ministry of Health and Family Welfare. Placing the draft of “Digital lnformation Security in Healthcare, act (DISHA)” in public domain for comments/views-reg [Internet]. 2018 [cited 2020 Jan 31]. Available from: https://www.medinfo-lyon.org/en/

19. Edemekong PF, Haydel MJ. Health Insurance Portability and Accountability Act (HIPAA) [Internet]. StatPearls Publishing; 2019 [cited 2020 Feb 14]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK500019/

20. Chaet D, Clearfield R, Sabin JE, Skimming K, Ethical C on, Association JAAM. Ethical practice in Telehealth and Telemedicine. J Gen Intern Med [Internet]. 2017 Oct [cited 2019 Oct 14];32(10):1136–40. Available from: http://dx.doi.org/10.1007/s11606-017-4082-2

21. Ethics HR, Professional Practice Committee. General Ethical Guidelines for good practice in Telemedicine [Internet]. Pretoria: Health Professions Council of South Africa; 2014 [cited 2019 Oct 21]. Available from: http://www.hpcsa.co.za/

22. How Sri Lanka’s Healthcare Industry Is Experimenting With Technological Solutions [Internet]. [cited 2019 Nov 7]. Available from: https://roar.media/english/life/in-the-know/how-sri-lankas-healthcare-industry-is-experimenting-with-technological-solutions/

23. United States Federation of State Medical Boards. US Medical Regulatory Trends and Actions, 2018 [Internet]. Federation of State Medical Boards; 2018 [cited 2019 Nov 6]. Available from: https://www.fsmb.org/siteassets/advocacy/publications/us-medical-regulatory-trends-actions.pdf

24. Physician Fee Schedule - Centers for Medicare & Medicaid Services [Internet]. [cited 2019 Nov 6]. Available from: https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/PhysicianFeeSched/

25. Affairs O of P and I. VA Expands Telehealth by Allowing Health Care Providers to Treat Patients Across State Lines [Internet]. [cited 2020 Feb 14]. Available from: https://www.va.gov/opa/pressrel/pressrelease.cfm?id=4054

26. DIJ - tienda terminos [Internet]. [cited 2019 Nov 7]. Available from: https://www.minsalud.gov.co/sites/rid/Lists/BibliotecaDigital/Forms/tienda%20terminos.aspx?RootFolder=%2fsites%2frid%2fLists%2fBibliotecaDigital%2fRIDE%2fDE%2fDIJ&FolderCTID=0x012000D4CDD61CAE671A41B3532ECA51ACD38E

27. Econsult [Internet]. [cited 2019 Nov 6]. Available from: http://www.econsultar.com.ar/#!/-links/

28. Economics E. Regulatory Approaches to Telemedicine. GMC; 2018.

29. Task force launching to examine national licensure for virtual care | CMAJ News [Internet]. [cited 2020 Feb 14]. Available from: https://cmajnews.com/2019/03/26/task-force-launching-to-examine-national-licensure-for-virtual-care-cmaj-109-5738/

30. Vartan S. Racial Bias Found in a Major Health Care Risk Algorithm [Internet]. 2019 [cited 2019 Nov 7]. Available from: https://www.scientificamerican.com/article/racial-bias-found-in-a-major-health-care-risk-algorithm/

31. Yu K-H, Kohane IS. Framing the challenges of artificial intelligence in medicine. BMJ Qual Saf [Internet]. 2019 [cited 2019 Nov 6];28(3):238–41. Available from: http://dx.doi.org/10.1136/bmjqs-2018-008551

32. Klare BF, Burge MJ, Klontz JC, Vorder Bruegge RW, Jain AK. Face recognition performance: role of demographic information. IEEE Trans Inf Forensics Secur [Internet]. 2012 Dec [cited 2019 Nov 6];7(6):1789–801. Available from: http://ieeexplore.ieee.org/document/6327355/

33. Wiles JL, Leibing A, Guberman N, Reeve J, Allen RES. The meaning of “aging in place” to older people. The Gerontologist [Internet]. 2012 Jun [cited 2019 Nov 5];52(3):357–66. Available from: http://dx.doi.org/10.1093/geront/gnr098

34. Peek STM, Luijkx KG, Rijnaard MD, Nieboer ME, van der Voort CS, Aarts S, et al. Older Adults’ Reasons for Using Technology while Aging in Place. Gerontology [Internet]. 2016 [cited 2019 Nov 5];62(2):226–37. Available from: http://dx.doi.org/10.1159/000430949

35. Boldy D, Grenade L, Lewin G, Karol E, Burton E. Older people’s decisions regarding “ageing in place”: a Western Australian case study. Australas J Ageing [Internet]. 2011 Sep [cited 2019 Nov 5];30(3):136–42. Available from: http://dx.doi.org/10.1111/j.1741-6612.2010.00469.x

36. New Zealand Ministry of Health. Healthy Ageing Strategy [Internet]. New Zealand Ministry of Health; 2017 [cited 2019 Nov 5]. Available from: https://www.health.govt.nz/system/files/documents/publications/healthy-ageing-strategy\_june\_2017.pdf

37. Elers P, Hunter I, Whiddett D, Lockhart C, Guesgen H, Singh A. User requirements for technology to assist aging in place: qualitative study of older people and their informal support networks. JMIR MHealth UHealth [Internet]. 2018 Jun [cited 2019 Nov 5];6(6):e10741. Available from: http://dx.doi.org/10.2196/10741

38. Kapadia V, Ariani A, Li J, Ray PK. Emerging ICT implementation issues in aged care. Int J Med Inf [Internet]. 2015 Nov [cited 2019 Nov 5];84(11):892–900. Available from: http://dx.doi.org/10.1016/j.ijmedinf.2015.07.002

39. Yusif S, Soar J, Hafeez-Baig A. Older people, assistive technologies, and the barriers to adoption: A systematic review. Int J Med Inf [Internet]. 2016 Jul [cited 2019 Nov 5];94:112–6. Available from: http://dx.doi.org/10.1016/j.ijmedinf.2016.07.004

40. Carretero S, Stewart J, Centeno C. Can technology-based services support long-term care challenges in home care. Anal Evid … [Internet]. 2012 [cited 2019 Nov 5]; Available from: https://www.researchgate.net/profile/Francesco\_Barbabella/publication/249315045\_Can\_technology-based\_services\_support\_long-term\_care\_challenges\_in\_home\_care/links/02e7e51e460a309801000000.pdf

41. Fischer SH, David D, Crotty BH, Dierks M, Safran C. Acceptance and use of health information technology by community-dwelling elders. Int J Med Inf [Internet]. 2014 Sep [cited 2019 Nov 5];83(9):624–35. Available from: http://dx.doi.org/10.1016/j.ijmedinf.2014.06.005

42. WP Cheshire J. Telemedicine and the Ethics of Medical Care at a Distance. Ethics Med [Internet]. 2017 [cited 2019 Nov 5]; Available from: http://search.proquest.com/openview/9f7705b81c9faf8d4cc0cd9e6298aac7/1?pq-origsite=gscholar&cbl=44457&casa\_token=jRBV45dDgU8AAAAA:GystvwzQWYDEp-0ctTlUVlD-xoPqLmqet9iqEgrQbv7TUgcCZolG-PpMXhMUoe-cj2A2rumiZ8A

43. Mills R. AMA adopts new guidance for ethical practice in telemedicine [Internet]. 2018 [cited 2019 Nov 3]. Available from: https://www.ama-assn.org/ama-adopts-new-guidance-ethical-practice-telemedicine

44. Friedman CP, Allee NJ, Delaney BC, Flynn AJ, Silverstein JC, Sullivan K, et al. The science of Learning Health Systems: Foundations for a new journal. Learn Health Syst [Internet]. 2016 [cited 2019 Nov 5]; Available from: http://doi.wiley.com/10.1002/lrh2.10020

45. Kuziemsky C, Abbas RM, Carroll N. Toward a Connected Health Delivery Framework. In: 2018 IEEE/ACM International Workshop on Software Engineering in Healthcare Systems (SEHS). IEEE; 2018. p. 46–49.

46. Kuziemsky CE. Review of social and organizational issues in health information technology. Healthc Inform Res. 2015;21(3):152–160.