

## THE INTERNATIONAL DIGITAL TRANSFORMATION OF HEALTHCARE: TELEHEALTH DEVELOPMENT IN THE GLOBAL COMMUNITY

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### Abstract

Using advances in information and communication technologies (ICT), telemedicine and eHealth are providing a means to transform systems of care for people throughout the world by providing greater access to clinical service, consultation, sharing knowledge, education and training, public and community health, health systems development, epidemiology and research. Leap-frogging over prior barriers, rapid advances in information communication technologies (ICT), computing, and wireless networks are offering greater continuity in access to these services in both developed and developing countries. The use of telehealth must be put in the context of the critical health needs in each country, cultural perspectives, current and future communication infrastructure, other supportive resources, and likelihood for sustainability. Furthermore, these telehealth efforts should be aimed at improving the local capacity in providing ongoing health services in each country and blend into that country's current and future health care strategies. As the world continues to "shrink", developing this international telehealth "network of networks" offers an opportunity for cooperation, collaboration, knowledge sharing and improving the health of every individual in the world, applying information technologies for peace and the betterment of mankind. The time is now for open and constructive dialogue designed to facilitate that coordination between key stakeholders and other international organisations. These types of international exchange experiences enhanced with telehealth offer significant opportunities for understanding the common denominators, as well as unique differences, related to global health among countries and cultures around the world. These programs can promote international understanding and mutual respect in a manner that can improve the health of the entire global community.

**Keywords:** telemedicine; telehealth; mhealth; digital health; international telehealth; global health

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### Introduction

Advances in communication and information technologies (ICT) have created opportunities to improve access to healthcare services in countries around the world, although challenges still exist.<sup>1-3</sup> The interest in using telehealth for virtual encounters has increased even more with the emergence of the COVID-19 pandemic.<sup>4</sup> However, in order to develop a meaningful and sustainable telehealth program, a number of steps should be addressed. These critical steps are outlined in this report, along with examples of regions of the world where this has been implemented.

**Approach: Planning, Design, and Implementation Steps to address:**

#### 1. Build Upon Relationships, Existing Programs, and Systems of Care

It is important to develop a collaborative relationship with individuals and organisations in the countries with an interest in telehealth. This may include established telehealth organi-

sations, academic centers, and governmental organisations, such as the Ministry of Health, Social Security, or Foreign Affairs and appropriate telehealth and communication industry partners. Building upon those relationships will assist in appropriate integration of telehealth programs within the existing national healthcare systems. Furthermore, these relationships can ensure that appropriate cultural, social, and political issues are addressed and build trust in the collaboration.<sup>5</sup>

#### 2. Team Building

A collaborative team should be established that will assist in the planning, design, and implementation of the telehealth applications and overall program with the country. These teams generally will include individuals with medical and public health expertise, technical and information/communication technology experience, project administrative organisers, evaluation/research expertise, business planners, and representatives of the appropriate government organisations and universities. Considering

patient/consumer representation may be helpful. Effective dialogue in the planning will also provide a platform for improvements and sustainability.<sup>6</sup>

### **3. Needs Assessment and Cultural Perspectives**

Working with healthcare organisations and healthcare professionals in the country of interest will help define the priority healthcare needs and appropriate approach in providing telehealth services to meet those needs. Again, needs assessment should address cultural and social perspectives, such as indigenous healing practices along with conventional medical approaches.<sup>7-9</sup>

### **4. Planning for Implementation**

Choosing the most appropriate affordable technologies and platforms that meet the defined healthcare needs is an important effort. This may be done in collaboration with telehealth industry partners but should be done with appropriate competitive bidding or analysis. Approaches may include a combination of real-time live interactions and asynchronous, “Store-and-Forward,” or Web-based interactions, regarding consultations, second opinions related to diagnoses and treatment in context to the resources available within a country or region.<sup>10-14</sup>

Determining the needed or available communication and connectivity available or could be developed needs to be addressed to ensure that there is adequate and realistic communication infrastructure to support the telemedicine applications programs. This is frequently a challenge when attempting to reach rural or remote locations with telehealth. This may require hybrid integrated communication platforms to reach the last mile and provide internet access, both wired and wireless, such as fiber, microwave, satellite, or cellular networks.<sup>15, 16</sup>

Education and Training in the use of telehealth and integration into workflow is critical to implementation, maintenance, and sustainability of a telehealth program. All too often, telehealth technology is purchased for use in a country’s healthcare delivery system but is not used or not sustained due to lack of adequate training in using these tools and constant turnover in personnel that are not trained in the use of the technology. Therefore, ongoing training and education become important for successful integration into the healthcare delivery system of a country.<sup>17</sup>

Determining integration of telehealth with existing electronic health records is also important as countries around the world are transforming their record keeping from hand-written documents to digital formats. This provides platforms for maintaining health records, making them more legible and consistent, as well as easier health information exchange and public health analytics. Similar to in-person visits, telehealth virtual encounters need access to the most comprehensive view of a patient’s health history and appropriate documentation.<sup>18</sup>

### **5. Sharing Knowledge, Cultural Exchange; internal and external**

The use of telehealth technologies provides a means to share

knowledge and experience within and between countries in a timely manner both for communicable and non-communicable chronic diseases. In addition, aspects of preventative medicine can be introduced to address primary, secondary, and tertiary prevention. These approaches can mitigate development and progression of disease and avoid more expensive and serious health problems or complications. Projects such as the Extension for Community Health Care Outcomes (ECHO) uses telehealth for provider education and case reviews.<sup>19-24</sup> These approaches are being shown to decrease the need for emergency care and hospitalisation or necessary transport to a higher level facility. Even better integration of traditional and conventional healthcare can be enabled through the sharing of knowledge and experience, as well as engaging the general population that may be accustomed to using both approaches. For example, during a pandemic, countries can quickly share their knowledge and experience, and explore best practices that can mitigate the spread of a disease.<sup>25, 26</sup>

### **6. Data Collection, Analysis, and Evaluation**

In order to determine the impact and potential benefits of telehealth, as well as a return on investment, systems are needed to collect pertinent data for analysis, evaluation, and demonstration of the value. Programs should clearly define their goals and objectives in using telehealth. This should include determining the metrics and data that needs to be collected. The National Quality Forum (NQF) published a document that can be useful in developing an evaluation framework.<sup>27</sup> This report outlines the domains, subdomains, and priority measure concepts that should be considered and applied in evaluating a telehealth application and program. Feedback from patients, healthcare providers and other users, as well as leadership are important aspects of determining satisfaction and usefulness of the telehealth applications, as well as addressing solutions to problems encountered.

### **7. Sustainability**

In order to sustain a telehealth program, it requires a well-developed business plan that outlines costs, benefits, costs savings, and cost avoidance. Furthermore, ongoing analysis and evaluation of the program is critical, along with continued quality improvement that addresses the challenges, weaknesses, and strengths of the program. As the technologies used advance and evolve, additional experience and feedback is obtained, continued quality improvement can be an integral part of any telehealth program.<sup>28</sup>

### **8. Implementation and Getting Started**

Building upon the plan and design of the telehealth program, a realistic timeline for implementation can be prepared and adjusted as the program moves forward. The importance of prior planning that ensures successful implementation and utilisation of telehealth will be critical for maintenance, expansion, and sustainability.

Examples of International Telehealth Programs and emerging possibilities have been outlined in several countries in Ibero-America, Africa, Asia, China, and the Middle East,

as well as in developed countries such as in Europe and the United States. We have formed a non-profit organisation, Health Information Associates International-Telehealth Outreach for Unified Community Health (HIAI-TOUCH: <https://www.healthinformationinternational.org>) that can provide consultation for planning, design, and implementation of telehealth with other countries and organisations with interest in integrating digital health into their operations. Opportunities to collaborate with other international organisations, such as the World Health Organization (WHO),<sup>29-33</sup> Pan American Association (PAHO),<sup>34</sup> Doctors without Borders,<sup>35</sup> the Swinfen Charitable Trust,<sup>36</sup> The International Society for Telemedicine and eHealth (ISfTeH),<sup>37</sup> American Telemedicine Association (ATA),<sup>38</sup> and many other regional and national organisations to provide a robust framework for advancing the meaningful use of telehealth globally.<sup>39</sup>

**CONCLUSIONS**

**Opportunities and Challenges**

By applying these important concepts and steps in planning, design, and implementation, telehealth programs are more likely to be successful and sustainable. Integrating telehealth, and digital health in general, as part of an overall healthcare strategy can provide a platform for improved healthcare delivery, access, and ultimately, better health outcomes and quality of life in countries around the world. Since most health issues are global and universal, sharing knowledge and experience can assist in developing realistic programs that can add real value and benefit to people everywhere. Collaboration among countries also adds value in developing telehealth programs that are culturally appropriate and address the critical health needs and priorities of each country and region of the world.<sup>40-44</sup>

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**References**

1. Wootton R, Patil NG, Scott RE, Ho K (eds). *Telehealth in the Developing World*. London: Royal Society of Medicine Press and Ottawa: International Development Research Center, 2009.
2. Mills A. Health Care systems in low- and middle-income countries. *N Engl J Med* 2014; 370:552-557. DOI: <https://doi.org/10.1056/NEJMra1110897>.
3. Alverson DC, Mars M, Rheuban K, et al. International pediatric telemedicine and ehealth: transforming

- systems of care for children in the global community. *Pediatric Annals* 2009;38:10: 579-585. DOI: <https://doi.org/10.3928/00904481-20090918-11>.
4. Mann DM, Chen Ji, Chunara R, Testa PA. COVID-19 transforms health care through telemedicine: Evidence from the field. *J Am Med Inform Assoc* 2020;27(7):1132-1135. DOI: <https://doi.org/10.1093/jamia/ocaa072>.
5. Branagan L, Chase LL. Organizational Implementation of Telemedicine Technology: Methodology and Field Experience. In: 2012 IEEE Global Humanitarian Technology Conference. Seattle, Washington USA; 2012;271-276.
6. Hidalgo R, Alverson DC, Cartagena G, Maldonado L. Development of a Collaborative Telehealth Network in Ecuador: Programa Nacional de Telemedicina. American Telemedicine Association National Annual Meeting, Seattle, WA, April 6-9, 2008. *Telemed J e-Health* 2008;14 (suppl1):51. DOI: <https://doi.org/10.1089/tmj.2008.9979.supp>.
7. Hopkins KS, Alverson DC, Hidalgo RO, Cartagena G, Johnson-Moser S. Integrating cross-cultural indigenous and Western healing with modern technology update. American Telemedicine Association National Annual Meeting, Seattle, WA, April 6-9, 2008. *Telemed J e-Health* 2008;14 (suppl1):52-53. DOI: <https://doi.org/10.1089/tmj.2008.9979.supp>.
8. Wootton R. Telemedicine support in the developing world. *J Telemed Telecare* 2008;14:109-114. DOI: <https://doi.org/10.1258/jtt.2008.003001>
9. Alverson DC. The Role of Telehealth in International Humanitarian Outreach. In: Rheuban KS, Krupinski EA, editors. *Understanding Telehealth*. McGraw Hill Education; 2017;251-266.
10. Marshall C, Lewis D, Whittaker M. mHealth technologies in developing countries: a feasibility assessment and a proposed framework. Herston, Australia: University of Queensland. 2013 Jun:1-47. Available at: [http://www.academia.edu/download/43930706/Strengthening\\_health\\_systems\\_in\\_mHealth\\_20160320-19913-1esu4pz.pdf](http://www.academia.edu/download/43930706/Strengthening_health_systems_in_mHealth_20160320-19913-1esu4pz.pdf) accessed 13 December 2020.
11. Center for Connected Health Policy. (2020). Store and Forward Asynchronous Telehealth. Available at: <https://www.cchpca.org/about/about-telehealth/store-and-forward-asynchronous> accessed 11 December 2020.
12. NZ Telehealth. (2020) Store and Forward. Available at: <https://www.telehealth.org.nz/what-is-telehealth/store-and-forward/> accessed 11 December 2020.
13. Center for Connected Health Policy. (2020). Remote Patient Monitoring. Available at: <https://www.cchpca.org/about/about->

- [telehealth/remote-patient-monitoring-rpm](#) accessed 11 December 2020.
14. SearchHealthIT. (2020). Remote Patient Monitoring. Available at: <https://searchhealthit.techtarget.com/definition/remote-patient-monitoring-RPM> accessed 11 December 2020.
  15. Pan American Health Organization. eHealth in the Region of the Americas: breaking down the barriers to implementation. Results of the World Health Organization's Third Global Survey on eHealth. Washington, D.C.: PAHO, 2016
  16. World Health Organization. Global diffusion of eHealth: making universal health coverage achievable: report of the third global survey on eHealth. Geneva, World Health Organization. 2017.
  17. Goklani B. MindInventory. (2020). Internet of Medical Things (IOMT). Available at: <https://www.mindinventory.com/blog/internet-of-medical-things-will-change-face-of-healthcare/> accessed 11 December 2020.
  18. Akter S, Ray P. mHealth - an ultimate platform to serve the unserved. *Yearb Med Inform* 2010;94-100. PMID: 20938579.
  19. Arora S, Kalishman S, Thornton K, et al. Expanding access to hepatitis C virus treatment—Extension for Community Healthcare Outcomes (ECHO) project: disruptive innovation in specialty care. *Hepatology* 2010;52(3):1124-1133. DOI: <https://doi.org/10.1002/hep.23802>.
  20. Arora S, Thornton K, Murata G, et al. Outcomes of treatment for hepatitis C virus infection by primary care providers. *N Engl J Med* 2011;364:2199-2207. DOI: <https://doi.org/10.1056/NEJMoa1009370>.
  21. Arora S, Geppert CM, Kalishman S, et al. Academic health center management of chronic diseases through knowledge networks: Project ECHO. *Acad Med* 2007;82(2):154-160. DOI: <https://doi.org/10.1097/ACM.0b013e31802d8f68>.
  22. Arora S, Thornton K, Jenkusky SM, Parish B, Scaletti JV. Project ECHO: linking university specialists with rural and prison-based clinicians to improve care for people with chronic hepatitis C in New Mexico. *Public Health Rep* 2007;122(Suppl 2):74-77. DOI: <https://doi.org/10.1177/00333549071220S214>.
  23. Arora S, Kalishman S, Dion D, et al. Partnering urban academic medical centers and rural primary care clinicians to provide complex chronic disease care. *Health Aff (Millwood)* 2011;30(6):1176-1184. DOI: <https://doi.org/10.1377/hlthaff.2011.0278>.
  24. Arora S, Kalishman S, Dion D, Thornton K, Murata G, Fassler C, Brown J. Knowledge networks for treating complex diseases in remote, rural, and underserved communities. In: *Learning Trajectories, Innovation and Identity for Professional Development*. Springer Netherlands; 2012;47-70.
  25. Simmons S, Alverson DC, Poropatich R, D'Iorio J, DeVany M, Doarn CR. Applying telehealth in natural and anthropogenic disasters. *Telemed J e-Health* 2008;14(9):968-971. DOI: <https://doi.org/10.1089/tmj.2008.0117>.
  26. Alverson DC, Edison K, Flournoy L, Korte B, Magruder C, Miller C. Telehealth tools for public health, emergency or disaster preparedness and response: A Summary Report. *Telemed J e-Health* 2010;16(1):112-114. DOI: <https://doi.org/10.1089/tmj.2009.0149>.
  27. Creating a Framework to Support Measure Development for Telehealth, NQF Report. (2017). Available at: [http://www.qualityforum.org/Publications/2017/08/Creating\\_a\\_Framework\\_to\\_Support\\_Measure\\_Development\\_for\\_Telehealth.aspx](http://www.qualityforum.org/Publications/2017/08/Creating_a_Framework_to_Support_Measure_Development_for_Telehealth.aspx) accessed 11 December 2020.
  28. Wootton R, Patil NG, Scott RE, Ho K. *Tele-health in the Developing World*. Royal Society of Medicine Press IDRC; 2009. ISBN 978-1-85315-784
  29. World Health Organization. Health-for-all Policy for the Twenty First Century (Document EB101/INF.DOC./9). Geneva: WHO, 1998
  30. World Health Organization. Strategy 2004-2007. E-health for Health Care Delivery. Geneva: WHO, 2004
  31. WHO Sustainable Development Goals. Available at: <https://sustainabledevelopment.un.org/sdgs> accessed 11 December 2020
  32. United Nations. Millennium Development Goals. Available at: [www.un.org/millenniumgoals/](http://www.un.org/millenniumgoals/) accessed 11 December 2020.
  33. WHO Library Cataloguing-in-Publication Data Management of patient information: trends and challenges in Member States: based on the findings of the second global survey on eHealth. (Global Observatory for eHealth Series, v. 6)
  34. PAHO. (2020). Available at: <https://www.paho.org/en> accessed 11 December 2020.
  35. Doctors without Borders or Medecins Sans Frontieres (MSF). Available at: <https://www.doctorswithoutborders.org/> accessed 9 November 2019.
  36. Swinfen Charitable Trust (SCT). Available at: <http://swinfencharitabletrust.org/> accessed 9 November 2019.
  37. International Society for Telemedicine and eHealth (ISfTeH). (2020). Available at: <https://www.isfteh.org/> accessed 11 December 2020.
  38. American Telemedicine Association (ATA) and its international Chapters. Available at: <https://www.americantelemed.org/> accessed 9 November 2019.
  39. Asociacion Iberoamericana de Telesalud y Telemedicina (AITT). (2020). Available at: <http://teleiberoamerica.com/index.html> accessed 11

December 2020.

40. World Health Organization. mHealth New horizons for health through mobile technologies: Based on the findings of the second global survey on eHealth, Global Observatory for eHealth series - Volume 3. Geneva, WHO. 2011.
41. World Health Organization. Telemedicine: opportunities and developments in member states. Report on the second global survey on eHealth. World Health Organization. 2010
42. Ghani MKA, Mostafa SA, Mustapha A, Aman H, Mohamed MA, Jaber MM. Investigating telemedicine approaches: a 10-country comparison. *Int J Eng Technol* 2018;7 (3.20):451-460. DOI: <https://doi.org/10.14419/ijet.v7i3.30.19093>.
43. Alverson DC, Holtz B, D'Iorio J, DeVany M, Simmons S, Poropatich R. One size doesn't fit all: bringing telehealth services to special populations. *Telemed J e-Health* 2008; 14(9): 957-963. DOI: <https://doi.org/10.1089/tmj.2008.0115>.
44. DeVany M, Alverson D, D'Iorio J, Simmons S. Employing telehealth to enhance overall quality of life and health for families. *Telemed J e-Health* 2008;14(9):1003-1007. DOI: <https://doi.org/10.1089/tmj.2008.0107>.