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International Telehealth Collaboration

Dale C. Alverson[1*], Ricardo Hidalgo Ottolenghi[2], Brian A. Bingham[3], Margaret J. Gunter[4], Paola Alexandra Santana[5], Augusto Ernesto Ittig[6], Ankit Jaiswal[7], Pedro Ramos Contreras[8]

[1]Professor Emeritus, University of New Mexico Health Sciences Center
[2]Rector, University UTE, Ecuador
[3]Yamada Consulting Group
[4]Gunter Consulting
[5]Educational Consultant, Pediatric Department, University of New Mexico
[6]Coordinator of UAR OSDE National Network of Telemedicine and Director of Telemedicine at Ministry of Health in Jujuy, Argentina
[7]Combined BA/MD student, University of New Mexico
[8]President, RISAD
[*]Email: dale.c.alverson@gmail.com

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ABSTRACT

Introduction: The concept of telemedicine and telehealth to provide healthcare services over distance has been known for some time. However, the COVID-19 pandemic significantly amplified the interest, implementation, and use of telemedicine around the world in large part due to the need to decrease in-person exposure to this contagious virus and its high incidence of morbidity and mortality. As the pandemic ended, telemedicine has remained part of a healthcare delivery system that is complementary to in-person services and care. The experience with the potential benefits of telemedicine has become global with many countries exploring collaborative efforts to integrate telemedicine effectively into each country's healthcare system both internally and through international collaborations.

Methods and Approach: In order to successfully develop international collaborative telemedicine initiatives there are basic steps that should be undertaken including 1) Developing trusted relationships among individuals representing different countries or organizations that best understand the healthcare needs, 2) Understanding cultural perspective related to health, 3) Survey of the environment and structure in which health care is provided, along with the resources financial support, and workforce available, as well as available infrastructure, 4) Awareness of public health issues and social determinants impacting population health, 5) identifying related existing gaps, 6) Fostering the political will to implement and sustain telemedicine and related collaborative efforts, and 7) Assessing the additional funding and resources needed to implement the initiatives effectively. Furthermore, these initiatives should provide systems for ongoing evaluation to demonstrate the benefits of telemedicine, and identify areas for improvement, as well as address the barriers and challenges.

Results, Present, and Future Opportunities: There are many examples of international collaborative telemedicine initiatives and programs, including successes and failures, which provide lessons learned that can be shared and applied by others seeking to develop international telemedicine initiatives. There are significant future opportunities for developing international collaborations in telemedicine and integration of telehealth within other international healthcare collaborative programs, applying new advances in the technology and related applications. If done effectively, these collaborative telehealth efforts can enhance global health, improve international relationships and mutual understanding, which lead to a more productive and peaceful worldwide community working together to create a better quality of life for the patients we serve.

Keywords: Telehealth, telemedicine, digital health, global health, international, collaboration.

Introduction

For some time, there has been global interest in telemedicine, telehealth, and digital health to enhance access to healthcare services, education, health information, and share knowledge[1-3]. Telemedicine is focused on the use of electronic information and communication technologies to provide clinical services over distance, whereas telehealth is generally defined as having a broader scope that includes telemedicine and applications to public health, patient and professional health-related education, and health administration, while digital health is focused on electronic health records, health information exchange, informatics, and data analytics[4,5]. The interest and implementation were amplified with the COVID-19 pandemic in large part due to the concerns of spread of the virus during in-person encounters considering the high level of contagion and high morbidity and mortality associated with the infection[6]. That increased utilization of virtual care and telemedicine encounters also further demonstrated the benefits of telemedicine and digital health for patients and providers through decreased need for travel and inconvenience of obtaining in-person care, ease of access to healthcare services and improved continuity of care[7]. Since the end of the pandemic there has been continued use of telemedicine coupled with the renewed increase of in-person encounters, with telemedicine providing a complementary method of allowing access to healthcare services as a hybrid model of healthcare delivery[8]. These experiences in demonstrating the benefits of telemedicine provide opportunities for its increased use in the global community within countries and international collaborative initiatives between countries. Those efforts begin to offer enhanced equity in access to needed healthcare services to people around the world that can improve overall health outcomes[9]. Telehealth can also play a role in international disaster preparedness and response and mey be another element to consider when developing and international collaboration[10]. When exploring international telehealth collaborative initiatives, this manuscript outlines the approach to developing international telehealthcollaborations, considerations of benefits and challenges, and provides a convenience sample of international telehealth programs, as wellas future opportunities, whicn may be useful in successful planning, design and implementation.

The Methods in Developing International Collaborative Telehealth Initiatives

The following are the suggested steps in developing an effective and meaningful international collaborative telehealth program can be useful in developing a successful and sustainable collaboration:

1. Identify individuals and organizations in the country of interest with whom there is interest in collaboration and a trusted relationship can be developed. These individuals or organizations representing the country of interest can best identify their healthcare needs, cultural perspectives related to health, the current healthcare system, pertinent public health and social determinant issues, the political factors that may influence healthcare services, and the overall environment. Individuals in the country of interest may be healthcare providers, both indigenous healers and conventional healthcare professionals, public health authorities, epidemiologists, academicians, or community and governmental leaders. Organizations may be governmental agencies, such as ministries of health, universities, healthcare delivery organizations, hospitals, clinics and key social agencies.

2. Conduct an existing conditions assessment and survey. This assessment would include determination of healthcare work force and capabilities, current infrastructure that can support telehealth, such as communication systems and access to the internet and broadband networks, access to electricity, health statistics related to

communicable and non-communicable diseases, along with causes of morbidity and mortality within the population, the existence of a national healthcare plan, regulatory or legal issues that need to be addressed, and any current telehealth activities or prior history of telehealth activities. This survey can assist in laying the groundwork for integrating telehealth, identifying gaps in the healthcare workforce or access to healthcare services, determining related resources and infrastructure, and identifying priorities as determined by individuals and organizations representing the country of interest and where there is interest in collaboration.

3. Prioritize the telehealth technologies and applications that will meet the identified health care needs in collaboration with the country of interest along with a tentative timeline for implementation to address those needs and gaps in access to services, workforce, resources, and infrastructure along with plans for ongoing training that address staff turnover and technical problems.

4. Develop a business plan determining the costs, resources and financial support needed for implementing the telehealth program. Those sources for support could be internal governmental resources among the collaborating entities, philanthropic organizations, other international organizations or governmental programs, grants, donations, or a combination of these potential resources. As resources are identified and secured, determine how those resources will be appropriately managed, along with overall project management, roles and responsibilities, and accountability.

5. Identify the methods of documentation of the telehealth activities and collection of relevant data, including the integration of an appropriate electronic medical record system for clinical encounters and methods of sharing with others involved in the patients' care needed to enhance coordination and continuity.

6. Provide a system for data analysis, evaluation, and reporting of outcomes related both to health outcomes, cost avoidance, and return on investment. Consider methods for sharing those outcomes with key individuals and organizations, along with possible peer reviewed publications and presentations at appropriate local, national, or international conferences.

7. Provide a platform for continued quality improvement and ongoing training of the established and new users of the telehealth systems and technologies, including integration of appropriate new emerging technologies and applications, and scaling the program for expanded utilization or addressing additional healthcare needs. Develop short- and long-term strategic plans for ongoing collaboration, including an overall national plan in the country of interest into which telehealth is integrated.

Benefits and Challenges

There are several potential benefits and challenges realted to these international collaborative telehealth initiatives to consider. First, as a benefit, there is increasing access to needed healthcare services, education, and evidence-based knowledge sharing that support with both patients and their providers in a manner that provides greater equity in access to those services regardless of location, economic resources, or status, along with increased satisfaction among those offering and receiving those services. This enhanced access to healthcare services is expected to provide the benefits of improved health outcomes and quality of life that is cost effective, and which requires appropriate analysis and documentation. Furthermore, these initiatives can more effectively address global health issues, such as future pandemics or increasing effects of chronic diseases, by sharing knowledge and mitigating unfavorable outcomes throughout the global community. The perceived benefits and value of a collaboration related to telehealth depends upon the goals and objectives of the entities involved. Individual countries see the benefits in improving the health of their population and workforce productivity as well as decreasing the costs of healthcare and its economic impact. Outside

countries may see the value in developing a positive relationship with other countries and that can lead to other collaborations that are mutually beneficial. Military organizations and alliances see the benefits in supporting their personnel and improving the response to a crisis or conflict, healthcare institutions, academic centers and universities see advantages in enhancing their delivery of health services and access, supporting their education, teaching and research priorities, and maintaining or expanding their market share. Technology companies that develop telehealth devices and applications see the value in collaboration to market and sell their products and realize a fair return in profit, as well as expand their market share. Insurance companies see telehealth as a means to mitigate risk by keeping beneficiaries healthier and avoiding more costly interventions and treatment. Healthcare professionals may see the benefit of providing enhanced care continuity and coordination, along with improved efficiencies. Importantly, patients may see the benefits with easier access to care, convenience, better health and quality of life. These collaborative international efforts can enhance mutual understanding, respect, and trust between countries, and lead to a more productive, meaningful, peaceful coexistence, and ongoing mutually beneficial relationships.

Challenges continue to exist which can interfere with successful implementation or sustainability of international telehealth programs. Lack of resources, including an inadequately trained healthcare and technical workforce, inadequate infrastructure, lack of connectivity, and access to the internet, lack of access to clean energy and electricity, poor underlying public health conditions, such as poor access to clean water and appropriate nutrition, inadequate waste management, poverty, and lack of education, all create barriers to using telehealth and improving health outcomes. Furthermore, being able to demonstrate the benefits of telehealth and a return on investment can support ongoing financial support for telehealth programs[11-13]. An additional challenge relates to major political and cultural differences between countries, or existing and developing internal and external conflicts that can interfere with successful implementation of these international efforts. Furthermore, changes in the government administrations and leadership may also create problems in sustainability of the international collaborative initiatives.

The social determinants of health (SDOH) are the non-medical factors that influence health outcomes[14]. SDOH can affect healthcare outcomes with or without telehealth and should be considered when developing an international collaborative initiative. They are the conditions in the environment where people are born, grow, work, live, and age as the wider set of forces and systems shaping the conditions of daily life. They affect a wide range of health functions and quality of life outcomes and risks. SDOH can be grouped into five domains: economic stability, education access and quality, healthcare access and quality, neighborhood and built environment, and social and community context. SDOH have a major impact on people's wellbeing and quality of life and greatly affect health disparities and health equity among population groups[15,16]. For example, people who don't have access to grocery stores with healthy foods are less likely to have good nutrition, which increases their risk of health conditions like heart disease, diabetes, and obesity and lowers their relative life expectancy. Examples of SDOH include safe housing, transportation, and neighborhoods; racism, discrimination, and violence; education, job opportunities, and income; access to nutritious food and physical activity opportunities; polluted air and water; and language and literary skills. SDOH have an important influence on health inequities–the unfair and avoidable differences in health status found within and between countries. Health and illness in all countries follow a social gradient: the lower the socioeconomic status, the worse the health. As noted by the World Health Organization (WHO), numerous studies suggest that SDOH account for 30-55% of health outcomes[17,18]. Addressing SDOH

appropriately is fundamental for improving health and reducing longstanding inequities in health and requires action by public health organizations and all other key sectors of civil society[19]. The advent of telehealth is one key factor in addressing health inequities since it expands access to healthcare by underserved rural and other populations.

Collaboration brings people together in order to achieve a goal and involves aspects of organizational psychology[20]. The world experienced a pandemic in 2020 that marked a new digital era and welcomed Telehealth and Telemedicine as a new tool of world collaboration. This new beginning restructures the way to collaborate and work together in a successful way. The use of new online platforms helped different industries stay connected and continue collaborating globally. Making changes is usually not easy since they can bring challenges, frustration, and a sense of isolation but still require learning how to collaborate in teams maximizing productivity and continuing to serve others. This was the case of the health industry, which more than ever needed to change the approach of how to serve patients in the middle of the chaos of the pandemic. Telehealth and Telemedicine provided healthcare services over distance that now continue serving patients in an effective way. It offered an option to establish communication between physicians and patients. This implied collaboration within the health system and the online technical support to provide secure platforms keeping confidential information and medical records secure. One of the challenges that was faced worldwide was how to make most of the technical advances patient friendly and to avoid the risk of violating privacy and address the costs of the implementation[21].

Körner, Ehrhardt, & Steger[22], in their research identify two ways of participations in the collaboration process: 1) The external participation which brings in communication, coordination and collaboration from experts and colleagues during the decision process, and 2) Internal participation and communication that involves all the members of the company in order to plan the process. To achieve a positive outcome during the collaboration process, there needs to be clarity about the goals that the team wants to achieve.

The main purpose of cooperation needs to be established based upon effective communication. Friess[23] mentions three main elements needed to keep respectful and considerate communication during the collaboration process: 1) Formal written communication such as letters, memos, or manuals, which although it is not face to face communication, still allows the other collaborators to understand the perspectives of the initiative by the leader or the Chief Executive Officer (CEO), 2) Maintain politeness and collegiality by communicating information using less formal venues such as through e-mails or instant messaging, and 3) The last element is the actual spoken communication and interaction which entails listening to other member perspectives, ideas and concepts with respectful acknowledgment and meaningful integration into the collaborative initiative.

It is important to keep the team informed during the collaboration and ongoing process since this keeps all the members of the team in sync. Benavides, De Eskinazis, & Swan[24], identify six steps that help companies use a better approach during the collaboration process: 1) Collaboration of the team using each member's established expertise and strength areas, 2) Turn a win-lose situation into win-win opportunities, which includes sharing models that benefit all members of the team, 3) Select partners based on their capability, strategic goals, and value potential, which means that all the members should have a common interest in supporting the company or initiative, 4) Invest in the right infrastructure and people, although this can be the most challenging step since often most of the members come from different cultures, experiences, and perspectives, at the same time understanding that the main goal is to run the organization and collaboration successfully, 5) Establish an effective performance

and management system that assists the team in working on a long-term project, and 6) Collaborate for the long term by continuing to review objectives, performance, manuals, policies, procedures, and financial status in order to make the appropriate changes if they are needed. This step should also increase effectiveness and decrease costs to the company or entity supporting the collaboration.

An additional challenge in developing international collaborative telehealth programs is having and developing the required workforce to support the technology and infrastructure, provide the healthcare services, and respond to consultative guidance from other healthcare professionals, along with having the resources needed to support appropriate diagnosis, treatment, and management. This is particularly a challenge in limited resource low-and middle-income countries and requires a realistic, respectful, and understanding approach in those collaborative interactions.

Ultimately, there is a challenge in identifying and securing the financial support needed to implement, sustain or expand these international collaborative telehealth initiatives. Potential funding can come from a variety and combination of sources including government-based public health and social programs, external government international cooperative programs, such as US Agency for International Development (USAID)[25], Japan International Cooperation Agency (JICA)[26], or China's Belt and Road initiative (BRI or B&R)[27], philanthropic foundations and donations along with volunteerism, internal and external institutional or international organization grants, the World Bank Group[28] and the Inter-American Development Bank[29] providing loans and grant, and actual reimbursement and payment for telehealth services from insurance programs, corporations and companies receiving those services, or patients themselves. When securing funding it is equally important to understand the expectations of the funding organization and any related obligations, as well as being able to demonstrate appropriate and successful use of those funds. Therefore, developing a realistic business plan is essential to successfully implement and sustain these international collaborative initiatives.

Results-A Convenience Sample of International Collaborative Telehealth Programs and Initiatives

Worldwide there are many public and private organizations, countries and their governments, universities, and other academic institutions involved in international collaborative initiatives and programs that include telehealth and include a variety of operational and financial models. These can be categorized as 1) International public or private membership and sponsorship organizations, 2) Public government, private corporation, or grant sponsored and funded telehealth service programs, and 3) Philanthropic programs that depend upon donations and volunteerism. Although not meant to be all inclusive, based upon the authors' experience, the following is a Convenience Sample[30] of several representative examples that can be categorized by their operational and financial model which can be useful to consider in the planning, design and implementation of an international telehealth collaboration.

1) INTERNATIONAL PUBLIC AND PRIVATE MEMBERSHIP/SPONSORSHIP ORGANIZATIONS

World Health Organization (WHO)[31] As the World Health Organization (WHO) states, that in order to ensure the sustainable use of telemedicine beyond the COVID-19 pandemic and amongst multiple complex global health challenges, from conflict and disease outbreaks to climate change, they have released a new resource to help guide policy-makers, decision makers, and implementers in designing and overseeing telemedicine implementations[32]. They further note that "this consolidated guide provides a comprehensive overview of the key planning, implementation and maintenance processes to inform a costed investment plan and support countries across different stages in their telemedicine journey."

WHO also provides several other documents related to implementation of telehealth. WHO gets its funding from two main sources: Member States paying their assessed contributions (countries' membership dues), and voluntary contributions from Member States and other partners.

Pan American Health Organization (PAHO)[33]: The Pan American Health Organization (PAHO) is proposing its telehealth program, which has been planned from a systemic vision, to offer a versatile solution for adoption that is adaptable and usable. As they state, one of the greatest deficiencies detected in the countries of their region is not having an adequate technological environment specifically designed to make the different telehealth services available from a single solution. PAHO also depends upon contributions from member countries. This program is based on a package of resources to address the different realities faced by health services to reduce inequalities and position people at the center of their healthcare in the Member States.

American Telemedicine Association (ATA) and the Global Health Collaborative[34]: The American Telemedicine Association (ATA) depends upon membership fees and sponsorships, along with funds raised from registrations for events. Through the Global Health Collaborative, ATA has provided a forum to collaborate on international initiatives, build relationships, and address healthcare disparities regardless of geography, involving the use of telehealth. The Collaborative offers a series of webinars featuring panels that share experience, expertise, and the challenges of working in the global community and using telehealth. Attendees of these webinars, although encouraged, need not be members of ATA but do need to register for each webinar with a link provided. Webinars have included presentations of other international telehealth programs and international legal and regulatory perspectives that need to be considered when working with different countries.

International Society for Telemedicine and eHealth (ISfTeH)[35]: ISfTeH was founded in 1997 and also depends upon membership fees and sponsorships including registration fees from events. They were established to facilitate the international dissemination of knowledge and experience in Telemedicine and eHealth and providing access to recognized experts in the field worldwide. 144 countries and territories participate in this organization. They also have several corporate sponsors, institutional, and associate members. ISfTeH supports several international telemedicine and digital health conferences and events each year in collaboration with other organizations.

European Connected Health Alliance (ECHAlliance)[36]: The Alliance formed the Global Health Connector as a member organization to bring the global community together in a network of ecosystems that match need and solution, break down silos, transform healthcare and create economic opportunities. Their programs and events focus on four key areas 1) Women's Health, 2) Digital Health & Data, 3) Healthy Ageing, and 4) Green Health, driving innovation and collaboration across the healthcare sector. Additionally, they address a wide range of other essential themes to ensure comprehensive healthcare solutions. By concentrating their efforts on those critical domains, they aim to foster groundbreaking advancements and enhance cooperative efforts. They also have the Digital Health Society as the data arm of the ECHAlliance Group that enables multi-stakeholder dialogue, round tables, reports, initiatives and events on healthcare data policies and practices[37].

Red Iberoamericana de Salud Digital (RISAD /Iberoamerican Network of Digital Health[38]: Founded in 2017, RISAD is a non-profit organization dedicated to promoting the knowledge and development of digital health in Ibero-America and serves as an important example of an international collaborative program that deserves detailed description. Composed of health professionals, researchers, academics, and companies from the public and private sectors, RISAD works to advance the digital transformation

of the health sector in the region that includes Latin American countries of South and Central America, Dominican Republic, Mexico, Spain and Portugal, as well as representation from the United States, and currently has members from 16 countries. RISAD has weekly webinars, "Sabados de Conocimiento" (Saturdays of Knowledge), with international speakers, particularly from the Iberoamerica countries, with an educational focus related to digital health. They have also held two International Digital Health Congresses. The networking process during these sessions has allowed sharing of relevant topics in workshops and round tables such as digital medical records and interoperability; HL7 and FHIR (Fast Healthcare Interoperability Resources), cybersecurity, as well as examples of telehealth programs and applications from a spectrum of Ibero American universities and organizations. All the following initiatives are being shared and developed between Ibero American countries and serve as important examples and models of the value of international telehealth collaborations.

Asociación Iberoamericana de Telesalud y Telemedicina/Ibero-American Association of Telehealth and Telemedicine[39]:

The Ibero-American Association of Telehealth and Telemedicine (AITT) is another non-profit (501c3) and independent association with a similar mission of promotion and coordination of programs and telehealth and telemedicine activities between the countries of Latin America, the U.S., Spain and Portugal, according to priorities of each region, congruent with their natural environment, and without interference with the cultural and specific heritage of each country. Like RISAD, they sponsor and organize several events to share experience in telehealth and telemedicine among member countries.

2) PUBLIC GOVERNMENT, PRIVATE CORPORATIONS, OR GRANT SPONSORED AND FUNDED INTERNATIONAL TELEHEALTH SERVICE PROGRAMS

Extension for Community Healthcare Outcomes Project (Project ECHO):

Extension for Community Healthcare Outcomes project (Project ECHO)[40] telehealth program was developed by Dr. Sanjeev Arora to assist primary care providers in the diagnosis and management of complex chronic disease using a panel of related experts for education and case reviews of de-identified patients and involving several primary care providers simultaneously on a video conference platform. It was originally started in the State of New Mexico to address patients with hepatitis C[41]. Since then, the ECHO model has expanded into many other chronic diseases[42]. The program has collaboratively expanded nationwide in the United States and internationally, now serving over 200 countries with over 1,400 sites and continuing to expand[43], as well as supporting nine out of 17 of the United Nations development goals[44]. The project has been supported by the University of New Mexico, grants, and corporate and foundation sponsorships.

University-based Telehealth and International Programs:

In addition to the organizations highlighted, many universities in countries throughout the world have been involved in international collaborative initiatives that include telehealth and can be found on their websites[45]. These programs are supported by the universities involved, international programs and grants. An example is a telehealth collaboration between Universidad UTE and University of New Mexico in the USA[46].

Binational Development Plan for the Ecuador-Peru Border Region:

As part of a Comprehensive Boundary Integration, Development and Neighborliness Agreement[47], the governments of Ecuador and Peru signed a commitment to address the populations of both countries through a telemedicine and telehealth program in the Amazon Region, which improves the integration of the communities located along the border.

The Binational Development Plan for the Peru-Ecuador Border Region[48] led to the creation of a Binational Technical Committee made up of

institutions from both countries, which has been working on the Binational Telemedicine Network Interconnection Project for the Napo River Basin, to ensure digital interconnection and healthcare for the populations on the Peruvian banks of the Napo River and Franklin Tello Hospital in Nuevo Rocafuerte. Currently, the populations of Cabo Pantoja (Peru) and Nuevo Rocafuerte (Ecuador) are being served. The Binational Plan acts as a coordinating and promoting mechanism for the development of that region; integrating the public sector (national government, regional governments and local governments), international cooperation and local communities, in order to make a joint effort to guide and channel resources to binational and national projects of a social, economic and productive nature.

The initial result of this project was the reduction of the incidence of infectious and communicable diseases and maternal and infant morbidity and mortality in rural populations on the boundary. Additionally, the disease registration, control, and prevention system, as well as the diagnostic and treatment capacity have been improved since doctors, from both Peru and Ecuador, are carrying out assessments and analyses of their patients in 12 health facilities via telephone, webcam or the internet in real time, ensuring timely patient care. To this end, a telecommunications network was installed with the capacity to support the transmission of medical information and images between border health centers and between Franklin Tello Hospital and the Cabo Pantoja Health Center, both located on the banks of the Napo River. This rural telemedicine project is the beginning of a joint effort that, thanks to integration, will improve the health conditions of indigenous communities in the border area (1,500 kilometers of jungle territory, mostly with difficult access), promoting comprehensive development.

Private sector model as an international program: Organización de Servicios Directos Empresarios/ Organization of Direct Services Entrepreneurs (OSDE)[49] a private health service provider has a program in Argentina founded in 2014 that depends upon reimbursement from corporations with remote locations. This private initiative developed the National Telemedicine Network for providing medical care for workers in remote locations through collaboration with the employees' companies and OSDE, Unidad de Asistencia Remota (UAR). Starting with two mining locations, the network has expanded to 35 locations that include:1) lithium, gold, silver, and soon copper mines; 2) oil rigs, both onshore and offshore; 3) hydroelectric dams; and 4) factory fishing ships at sea for periods of over a month, with future plans to add wind and solar farms. The OSDE headquarters and hub for this telemedicine service is located in Buenos Aires with consultant physicians on 12-hour shifts who provide assistance to these 35 locations where there is medical service with consists of a doctor, nurse, an ambulance and driver, some sites without a doctor or, in some cases, only a trained non-healthcare worker, helping these local healthcare workers manage their patients.

This telemedicine service has provided significant assistance for emergency situations and lower acuity consultations. Prior to this service, many of these cases involved unnecessary transfer of patients to a medical center who were subsequently returned to their remote location which had required significant effort at significant cost without benefit to the patient who had been removed from their work site. Since this service has been instituted a significant number of those transfers have been avoided. In case of a real emergency, this telemedicine service assists the remote caregivers to stabilize and prepare the critically ill patient for transfer and helps to determine the best location to transfer the patients to receive the specialty care needed.

This program has improved the quality of care at these remote locations and was transformative, since not only did it improve health outcomes and kept more workers on site, it also saved corporations time and money. OSDE demonstrated

the importance of collaboration between medical professionals, technology providers, and industry stakeholders in ensuring the success of telemedicine initiatives. OSDE has now expanded beyond rural workers to the general population where clients pay a monthly service fee to get immediate access to direct care from medical professionals virtually. Similar models are being duplicated in other countries such as Chile.

3) PHILANTHROPIC PROGRAMS THAT DEPEND UPON DONATIONS AND VOLUNTEERISM

Medecins Sans Frontieres (MSF)/Doctors Without Borders[50]: MSF applies an asynchronous telehealth model using a secure website that provides healthcare professionals in MSF projects with access to expert clinical and medical advice on a case-by-case basis. MSF depends upon philanthropic donations for their operations and volunteerism. This platform allows primary care providers in low- and middle-income countries with limited resources to request consultation with a volunteer panel of certified specialists regarding diagnosis and management of difficult patient cases[51]. The referring provider requests consultation by inputting text describing the patient's medical problem and can attach other data such as photographs, images or laboratory findings on the website. The MSF coordinator then selects the appropriate specialist(s) from the MSF panel, who are then notified through an email and password protected link to the case indicating there is a consultation that could benefit from their expertise. The specialist(s) are generally expected to respond within 48 hours or less to accept or decline the consultation. If accepted, the specialist can insert a text response, ask for additional information or input from other MSF specialists, and provide tentative diagnoses and suggest management and treatment. This interaction between the consulting primary care provider and specialists can continue asynchronously through the website linked to that specific case using ongoing e-mail notification to the specialists that additional information is available to which they can respond until the case is resolved. This program serves 290 projects in 56 countries using a panel of over 400 volunteer specialists. In 2023, more than 4000 patients were impacted.

The Swinfen Charitable Trust (SCT)/ Open Telemed.org[52]: SCT is similar to MSF and depends upon philanthropic donations and volunteerism using an asynchronous secure website that allows primary care professionals in over 400 hospitals and clinics in 96 low and middle-income countries to obtain consultations from over 500 certified specialists. Founded by the late Lord and Lady Swinfen in 1998 and operating since 1999. The platform used is similar to that of MSF where the referring provider can request consultation regarding a complex case using the secure SCT Website by inserting text information about a patient's case and attaching other data, such as images or photos. The appropriate specialist(s) are notified with a link to the case on the website and are generally expected to accept or decline the case within 48 hours or less. If accepted, the specialist can respond by text on the website as to possible diagnosis and management recommendations, ask additional questions or request input from other SCT specialists. The interaction can continue asynchronously between referring provider and specialist until the case is resolved. Starting in 2024, the platform was supported by a new international non-governmental organization (NGO), OpenTelemed[53], under the directorship of their original system architect. The Swinfen Network now uses this new initiative encouraging others to join the network including assisting other major NGOs to develop their own telemedicine system under this umbrella organization.

World Telehealth Initiative (WTI)[54] The World Telehealth Initiative (WTI) is also a nonprofit organization that provides telehealth technology, equipment, and services to reduced resource communities worldwide. The program also depends upon corporate and philanthropic donations, and volunteerism. As they state, their mission is to offer sustainable medical expertise,

build local capacity, and advance core health services through a network of volunteer healthcare professionals supported by state-of-the-art technology. They strive to transform healthcare access for impoverished communities. Their programs are made possible through their network of philanthropic physicians, telehealth technology companies, and collaboration with other global health organizations. They connect volunteer medical specialists with clinics and hospitals in underserved areas in real time, providing quality healthcare, upskill local providers, and build the capacity of their health systems for patients today and future generations.

Conclusion

As this article began with the concept of developing opportunities for international *collaboration* in telehealth, we conclude by defining the value of *collaboration*. Most human achievement has been the result of collaborative action and attentive focus upon what could, and hopefully would, benefit humanity over time. Consider as one example the identification of DNA in 1869 by Friedrich Miescher and its double helix structure by Watson and Crick in 1953[55]. Without collaboration in developing useful man-made change through the millennia, in parallel with nature's evolutionary changes occurring simultaneously, such as viral and genetic mutation, humanity might not have experienced these monumental milestones that have impacted our health.

As the global population grows increasingly larger every year, projected by the United Nations to reach 10.4 billion in 2086 when the growth rate declines to zero[56], and if the resources available to serve that population fail to grow at an equivalent pace, only through collaborative efforts to intervene in solving the problems occurring internationally, such as food security, water availability, energy supply, and environmental pollution, can there be a major impact on global health. In the realm of international opportunities to collaborate, telehealth presents global healthcare systems with an alternative complementary method of care that would serve patient populations, recognize the efficiencies and effectiveness of medical technologies, provide greater access to care, reinvigorate the relationship between patient and provider, reduce systemic cost, and improve health outcomes. The opportunities focus on common areas in which innovation can take place, find solutions to problems, and benefit any patient population.

International collaboration in the use of telehealth can be transformative to the institutions delivering care in a particular healthcare system. It can cause governments and private sector medical facilities to come together to extend collaborative practices beyond just an immediate crisis and seek permanence in the shared purpose of attending to the public good.

As noted, transformation is happening in healthcare delivery systems around the world as the demand for access to continuous and appropriate care increases. The development of telehealth as a complementary method of delivering care has benefited many patient populations, often made possible by international collaborative efforts. Progress in balancing out the issues of uneven development in advancing telehealth requires forming of opportunities to collaborate and focused action that begins with the acknowledgement, where relevant, of the often inadequate supply and variety of physicians and other health professionals, technological insufficiencies, infrastructural challenges, cultural and social determinants of health at the societal level, a lack of resources to fund programs envisioned, and the strength of public and private institutions to engage in a meaningful, productive manner.

By working together, the provision of financial resources could be organized from a variety of sources, diagnostic attention and treatment necessary to care for the underserved could be mobilized, solutions to critical medical issues could be shared, the difficulties of access to care could be largely eliminated, and systemic costs could be dramatically reduced. This collaborative approach of public/private partnerships responsible for

delivering public health to host nations could flourish and potentially save additional costs to a host country's healthcare system, institutions could be strengthened, and health outcomes of patient populations could improve[57].

Considering the resource demands of population growth that can push nations' healthcare systems to profound levels, acting upon identifiable international opportunities to collaborate and advance the use of telehealth services presents a significant and reasonable option to address our collective healthcare challenges. These collaborative telehealth efforts will require developing national and international short-term and long-term strategic plans along with identifying and securing financial support for implementation and sustainability.

There is the potential for integrating artificial intelligence (AI) with telehealth that could be incorporated into international collaboration initiatives. Amjid, et.al.[58] provide a comprehensive overview of the potential benefits and challenges of using AI with telehealth, which is lacking in many existing studies that focus on a specific aspect of AI or telehealth. AI creates the possibility of improving patient outcomes and reducing healthcare costs, and when combined with telehealth, can enhance access to these benefits as well as enhance decision support, diagnosis, monitoring, and personalized treatment, which is valuable information for both researchers and practitioners. By leveraging the combination of these technologies to provide better care along with cost reduction, we can create a more sustainable healthcare system that benefits both patients and their providers globally.

Developing a successful international telehealth program requires applying an appropriate collaborative approach to planning, design, and implementing an appropriate telehealth program developed to meet the significant needs of a given patient population, along with data collection and analysis to demonstrate the effects, impact and return on investment, incorporating opportunities for improvement and sustainability. We can learn from successes and failures of other telehealth initiatives and existing telehealth programs. Many of the organizations and their associated individuals referenced here in this manuscript have provided the foundation for future opportunities to create additional international collaborative telehealth programs that can also incorporate new advances in technology and applications that, in turn, can benefit the global community, as well as enhance mutual understanding and consideration as we address common challenges. By working together in the Global Community, we now have the unique opportunity to use these telehealth tools as part of the solution to improve Global Health within each country and between countries. As we continue looking toward the future, now is the time to seize the moment to develop further international collaboration in telehealth, "Carpe Diem"!

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