

The Current Status of Telehealth and Distance Learning in Palau

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Abstract

In 2017 the Republic of Palau installed fiber optic cables, allowing access to high speed internet for the first time and the capacity for growth in telehealth. Given Palau's poor access to specialists and resources, telehealth has the potential to radically change health care delivery. Currently, the status of telehealth in Palau is unknown. This study describes telehealth resources utilized at the Ministry of Health in Palau and potential future directions for telehealth. Thirty-four people, mostly health professionals at the Belau National Hospital in Palau were interviewed, including physicians, information technology personnel, public health department staff, department managers of allied health, and telehealth experts in the Pacific. Standardized questions and surveys were conducted in-person during July 2019. All departments utilized some form of telehealth. Common needs for the advancement of telehealth included: a telehealth champion, a resource facilitator, successful distance learning for auxiliary staff, dedicated telehealth space, technological help, and better telehealth communication with rural clinics. Survey respondents indicated that they would like to use some sort of distance learning, most commonly for professional betterment (86%) and upskilling of staff (86%). There are numerous distance learning and telehealth opportunities available, yet recurrent barriers to these opportunities were noted across all departments. The barriers identified in the current study and recommendations to overcome them may be applicable to other Pacific nations who face similar challenges.

Keywords

Telehealth, telemedicine, rural, under-resourced communities, Pacific Islands

Abbreviations and Acronyms

CMU = Carnegie Mellon University
MOH = Ministry of Health
NGO = Non-governmental Organization
PBTRC = Pacific Basin Telehealth Resource Center
POLHN = Pacific Open Learning Health Net
PCC = Palau Community College
Project ECHO = Project Extension for Community Healthcare Outcomes
Shriners = Shriners Hospital for Children
TCGC = Technology and Consulting in the Global Community
TAMC = Tripler Army Medical Center

Introduction

Pacific Island countries face multiple health care crises: 7 of the top 10 diabetes-prevalent countries in the world reside in these island nations; infectious disease outbreaks, such as the recent measles outbreak in Samoa, have caused hundreds of deaths; and the percentage of people with noncommunicable diseases is rising substantially.¹⁻³ These issues are further complicated by the geographic isolation of these island countries and the medical provider shortage across the Pacific.^{4,5}

Telehealth may be a solution; it has proven to reduce costs, increase access to care in remote areas, and promote evidence-based practices.^{6,7} Telehealth is a broad term that refers to a range of technologies and services that provide patient care and improve health care delivery. Under this umbrella term, there is telemedicine, which is the provision of clinical health care services through telecommunication technology, and distance learning, which can include continuing education, degree programs, or learning through pre-recorded or live audio/video.⁸ In countries with limited resources, telehealth can help meet the rising demands of non-communicable diseases and mental health disorders among the community.⁹

In December 2017, the Republic of Palau installed undersea fiber optic cables, allowing the country to access high speed internet for the first time. With this advancement, came the potential for growth in telehealth initiatives.¹⁰ Telehealth may improve health care delivery to the 18 000 citizens, primarily located on 8 principal islands, spread over 700 miles of ocean. As of 2014, there are 25 physicians in the fields of internal medicine, pediatrics, obstetrics, and surgery. All of the medical staff are located at Belau National Hospital. This is the only hospital in the country, affiliated with several small satellite clinics located across the island of Koror and other islands.¹¹ Given this centralization, patients must travel to Koror for care or wait until a physician is scheduled to staff the nearest satellite clinic. For cases that require specialty care, Palau relies on volunteer physicians who travel to the country, referral programs to Taiwan, Philippines, Shriners Hospital for Children (Shriners), or agreements for specialty surgery cases at Tripler Army Medical Center (TAMC). The latter 2 are both located in Honolulu, Hawai'i, over 4500 miles away. In a country as geographically isolated as Palau, with poor access to specialists and resources, telehealth has the potential to radically change how healthcare is delivered.

Currently, there is no collective database or knowledge of the use of telehealth or distance learning in Palau. This study explores the experiences that providers in Palau have with telehealth, examines Palau's telehealth needs, and explores future directions. The barriers identified and recommendations made may be applicable to other countries facing similar challenges, particularly in the Pacific.

Methods

The authors conducted semi-structured interviews with 34 interviewees during June and July 2019. In-person interviews

were conducted in Palau with 12 physicians and representatives from physical therapy, nursing, behavioral health, public health, laboratory sciences, radiology, and the Palau Community College (PCC). Medical providers were all from the Ministry of Health (MOH) at the Belau National Hospital in Koror, Palau. Participants were selected based on positions held in the MOH, such as department chairs or heads of programs. Included in the 34 interviewees were 2 telehealth resource consultants from the Pacific Basin Telehealth Resource Center (PBTRC) and a telehealth consultant from Shriners, who were chosen for their work in Palau and expertise in telehealth. Those 3 specific interviews were conducted over a video conferencing platform. MOH interviews were 30 minutes to 1 hour, and conducted and audio recorded in a semi-structured setting in the individual's office or department. The interview consisted of 5 standardized questions but with flexibility for follow-up or clarifying questions. The standardized questions were:

1. What telehealth or distance learning services are you already using or do you have experience using? (ie, phone calls with patients, phone or video consultations with specialists, educational learning sessions, etc)
2. How do you envision telehealth assisting the mission of your bureau or department? How can telehealth be used as a tool to meet your goals and objectives? (Examples of goals include: better patient outcomes, saving time and money, better education for patients or providers, etc)
3. What types of telehealth services (clinical consultation / distance continuing professional development / accredited-degree learning) would you or your staff like to use? Are there particular topics that you or your staff would like to cover?
4. Do you feel you have the equipment necessary for telehealth?
5. If telehealth services were offered to you, would you utilize them?

Interview recordings were reviewed and discussion points were summarized and categorized into a spreadsheet by interviewee, department, and question. Concerns that were raised and not associated with one of the standardized questions were summarized separately. Data from all interviews were reviewed by the authors and common or recurring responses were identified.

A paper survey was completed by the interviewees at the conclusion of the interview to evaluate current telehealth knowledge, use, and future interests. The survey included questions on telehealth delivery, types of patient care performed via telehealth, distance learning platforms, current equipment, and equipment needs. See Table 1. Paper survey responses were also entered into a spreadsheet by department, interviewee, and question and reported as the percentage of participants who indicated "yes." Any individual "yes" within a department was indicated "yes" for the entire department. For example, 1 of the public health interviewees indicated that they were using telehealth

for radiology but no other individuals from that department indicated "yes." In this situation, it was documented "yes" that the public health department utilized telehealth for radiology and 1 individual within that department was doing so.

Data management and calculation of the percent of positive responses by department was performed using Microsoft Excel software, Version 16.42 (Microsoft Corporation, Redmond, WA). The study was conducted as a hospital-based, quality improvement survey and Institutional Review Board approval was not required.

Results

Interview Results

Of the 34 individuals contacted for an interview, all 34 (100%) agreed to be interviewed.

Despite telehealth's use in a majority of departments, there was little awareness between departments about programs or equipment available. There were some resources that were available to all providers but that many staff members were unaware of, such as the Ocean Medicine Foundation that provides free access to UpToDate evidence-based clinical support software (Wolters Kluwer Health Division, Philadelphia, PA). Of clinical providers surveyed, 54% obtained continuing medical education and conducted distance learning through online resources such as the Pacific Open Learning Health Net (POLHN), Project Extension for Community Healthcare Outcomes (Project ECHO), and the PBTRC. While 46% of providers were unaware of these resources or had tried to obtain distance learning certificates through POLHN, they were unsuccessful due to lack of technical support and time. Of the departments surveyed, 71% utilized a variety of patient care models such as live video conferencing, a store-and-forward technology with TAMC remote patient monitoring, and direct texting or calling patients. The other 29% responded "N/A or I don't know". Physicians had the highest utilization rates of telehealth consultations, primarily using the consultant as a second opinion for a medical specialty not available in Palau or to refer patients to care centers outside of Palau.

There were specific examples of telehealth usage. One was the physical therapy department's electronic medical record. The database was established in 2005 by Carnegie Mellon University (CMU), a university that sends students trained in different areas of science and technology abroad to help build sustainable technical models through the Technology and Consulting in the Global Community (TCGC) program. The department uses the electronic medical record to track patient progress and consolidate patient medical records. Another example was the nursing department's successful bachelor degree program in 2015, via partnership with the MOH, PCC, and Fiji National University. This was a 2.5-year hybrid program, combining

Table 1. Telehealth Survey Results, Palau								
	Lab (n = 1)	Public Health (n = 6)	Behavioral health (n = 1)	Physicians (n = 6)	Physical Therapy (n = 1)	Radiology (n = 1)	Nursing (n = 1)	Total (%)
What would you like to use distance learning for?								
Upskill staff	x	x		x	x	x	x	86%
Maintain licensure		x	x	x			x	57%
Professional betterment	x	x	x	x	x	x		86%
Case presentations	x	x	x	x	x		x	86%
Not Interested								0%
Other								0%
Do you have telehealth/distance learning equipment available in your health care location?								
Yes	x	x		x		x	x	71%
No					x			14%
N/A or I don't know			x					14%

distance learning modules with live class sessions. All 18 nurses who entered the program graduated. The pharmacy technician program also ran a successful certification program with the University of Alaska Anchorage in 2007. Both department heads expressed that their respective programs' successes were due to having a cohort, having a facilitator, dedicated study time off from work responsibilities, and proper motivation (including pay increases). One physician described his plan to set up a nationwide screening for rheumatic heart disease in all elementary students in Palau.

Physicians also engage in telehealth consultations with TAMC and Shriners, both located in Honolulu, Hawai'i. For TAMC, physicians at the MOH are able to upload patient information, including radiology images, through TAMC's website for evaluation in their medically complex patient program. This process of taking information and relaying it elsewhere is known as store and forward. Shriners provides pediatric orthopedic surgery services to Palau. Physicians come to Palau annually to examine and refer patients into the program where patients may have expense-free, corrective surgery in Honolulu, and then have post-surgical examinations via teleconferencing after they return to Palau.

Overall, 71% of all departments utilized some form of telehealth, 100% of departments needed more telehealth equipment, and physicians utilized telehealth the most. Although obstacles were not included as a standardized interview question, this was a common theme that emerged during interviews. Interviewees spontaneously raised the topic of obstacles to overcome in order to advance telehealth and 6 common challenges were identified: (1) lack of telehealth leader, (2) lack of telehealth facilitator, (3) unsuccessful distance learning, (4) lack of dedicated space, (5) lack of technological support, and (6) lack of infrastructure to utilize telehealth with the rural clinics.

The first obstacle noted was the need for a telehealth leader. Of those interviewed, 18% directly stated that telehealth was limited by a lack of leadership or mentioned how previously successful programs were discontinued upon the departure of the leader who implemented the program. A second obstacle identified was the lack of a telehealth facilitator. Almost every respondent was unaware of the available telehealth options and several mentioned wanting resources to which they already had access to but were unaware. Respondents stated that having a dedicated telehealth facilitator could help with these issues. A third obstacle was the lack of successful distance learning for auxiliary staff. At the MOH, many departments had previous students who attempted to pursue certificates for higher education through online resources like POLHN or Project ECHO. However, due to lack of funding, time, and incentives, they were unsuccessful in pursuing these opportunities. A fourth obstacle was the lack of dedicated telehealth clinical space. Of interviewees, 27% of departments and 100% of clinical providers noted that post-surgical evaluations completed by Shriners were limited by lack of telehealth dedicated space. Follow-up examinations were conducted in the open space of the hospital library, where onlookers could observe and hear the encounter. A fifth obstacle was the need for technological help for staff. Given the relatively recent introduction to the internet, computer illiteracy was a problem for many of the older respondents. Throughout the MOH, many staff members did not feel confident or understand technology sufficiently enough to take advantage of telehealth opportunities. Finally, the sixth obstacle was infrastructure issues making telehealth communication with the rural clinics difficult. Each physician mentioned this as a major concern as physicians must travel to distant and rural clinics, the farthest being an entire day's boat ride away.

Survey Results

Seventeen (50%) of the 34 of the interviewees completed the paper survey. The 17 consisted of: 1 from laboratory services, 6 from public health, 1 from behavioral health, 6 physicians, 1 from physical therapy, 1 from radiology, and 1 from nursing. The individuals from those with a single respondent were the heads of those departments. For statistical analysis regarding departments with multiple responses (public health and physicians), responses were combined. See Table 1 for a summary of responses.

Generally, 71% of departments had some access to telehealth or distance learning resources. While there was a high utilization rate, 100% of the departments stated they needed more equipment to conduct telehealth. Furthermore, most departments wanted to use telehealth for professional improvement (86%) and staff education or training (86%).

Discussion

The MOH has a variety of telehealth services predominantly in the form of consultations and distance learning platforms. There are numerous consultation and distance learning programs available, highlighting the need of a telehealth facilitator to organize and distribute these resources. Additionally, there were many ideas of how staff could utilize telehealth but needed someone to assist in the action of these projects. Consultation services like Shriners and TAMC were the most utilized and sustainable. In order to assist with future consultations, almost all departments, including Shriners, requested a dedicated clinical telehealth room to improve teleconsultations. This would allow medical staff to offer a full range of physical exams while protecting the patient's privacy. Distance learning programs have had mixed success. Many distance learning services have depended on the efforts of a single individual. This led to the programs ending once the individual left. Successful distance learning programs had a cohort, a facilitator, dedicated study time, and motivation.

Telehealth Champion

A common theme noted in the interviews was that successful telehealth programs have a local leader. This is supported in the literature and described as a telehealth champion: one who takes personal responsibility of moving the adoption of these telehealth resources along.^{12,13} These champions generally describe themselves as “just doing their jobs” and are innovators who are already involved in telehealth.¹⁴ The need for a champion was noted in Palau and has been identified as an issue in the adoption of other telemedicine initiatives. A European case-study compared the adoption of 2 telehealth systems, 1 was a picture archiving and communication system used to send radiological images, and the other was a community nurse information system designed to assist with digital record keeping.¹⁵ While both filled a need in the health care system, only

the picture archiving and communication system was successfully implemented. The archiving and communication system had a single strong leader who advanced the directive, while the other case study had multiple leadership changes and no central leader to ensure the adoption of the telehealth resource. Similarly, in Palau, strong leadership of both the pharmacy technician program and the bachelor of nursing program led to the success of those programs.

Strong leadership is essential to the adoption of a telehealth initiative, and in the Pacific, there has already been a concerted effort to train and support telehealth champions. In 2016, a 3-day workshop called USAffiliated Pacific Islands Telehealth Champion Building and Planning was held in Honolulu. Thirty-four Pacific Island health administrators and health care providers were in attendance and telehealth potential and barriers were discussed. During the event, multiple telehealth champions came forward to improve the telehealth capabilities of their home countries.¹⁶

Telehealth Facilitator

Another resource that would be essential for the progress of telehealth is a telehealth facilitator, who is different from a telehealth champion. The facilitator is an individual who provides administrative support for available telehealth resources including distance learning, consultation scheduling, technical support for setting up telehealth platforms, and disseminating information on telehealth resources to staff. The Ocean Medicine Foundation resource is an example of how a facilitator could be beneficial. This foundation provides resources such as Up-ToDate, which was highly requested by MOH staff. However, due to lack of awareness, most staff did not know they already had access to the tool. A facilitator could help make telehealth accessible and efficient for staff.

The term telehealth facilitator was not found in the literature but the term facilitator was brought up by multiple interviewees citing a lack of organization in regards to the different resources. A previous study on the role of telehealth champions across 37 diverse telehealth services found that many did not succeed due to repeated technical and organizational barriers; barriers that could be overcome with a telehealth facilitator.¹² Furthermore, 2 studies cited the need for a clinical and managerial champions, highlighting the difference between a telehealth champion and a facilitator to manage the resources.^{17,18}

Distance Learning for Auxiliary Staff

Continuing education was a priority for many department heads, 86% cited “upskilling staff” as a reason for wanting to utilize distance learning. Many staff members at the MOH learn “on the job” and have no formal education in the field they are working. Education of staff is key to improving patient outcomes. In a study among 300 hospitals in 9 European countries, it was found

that for every 10% increase in bachelor degree trained nurses, there was a 7% decrease in inpatient deaths within 30 days of admission.¹⁹ Increased training of staff could reduce preventable hospital deaths and also decrease referral costs. Currently in the MOH, physicians refer patients with possible malignancies off-island prior to receiving a confirmatory diagnosis from pathology samples that take many weeks to be analyzed and are often lost in transit due to shipping errors. However, if laboratory personnel were trained to become histotechnicians, specimens could be fixed at the MOH and diagnosed in-house or electronic images could be sent to a pathologist.

Distance learning can also save learner time and money, as staff can stay in Palau rather than having to relocate. This has the added benefit of keeping workers in Palau as, according to many of those interviewed, many Palauans obtaining education abroad often do not return. Migration of skilled workers and those with advanced degrees has been noted across the Pacific, and online learning platforms have been proposed to help counter this trend.^{20,21}

Multiple resources have been used for continuing education. POLHN provides fully funded telehealth educational opportunities in medical laboratory sciences, dentistry, nursing, epidemiology, and more. Project ECHO incorporates clinicians in a continuous learning system and connects them to specialist mentors at an academic medical center or hub. And the PBTRC provides access to resources and consultation on use of telehealth services. While there are a variety of distance learning sources for MOH personnel, few departments utilize such services due to lack of knowledge of resources or previously high failure rates of the courses. However, 2 examples of successful distance learning programs at the MOH were the pharmacy technician program and the nursing department's bachelor of nursing program.

Dedicated Telehealth Clinical Space

Currently, the only telehealth space available to most of the staff is the library. Almost all departments at the MOH and a representative from Shriners Hospital expressed the need for a dedicated telehealth clinical room. This would be beneficial because it would allow increased access to telehealth services, improve the quality of such telehealth services, offer better internet connectivity, and protect patient privacy.

While the library is equipped with certain telehealth resources such as a computer and projector, it is often used for other events not related to telehealth. This makes it difficult for staff at the MOH to reserve the space when needed. If a dedicated telehealth clinical space were created, bandwidth could be diverted to the telehealth room when it is being used, ensuring strong connectivity. Furthermore, having such a room would allow physicians to conduct physical exams in an appropriately private place during live video consultations.

Dedicated telehealth clinical spaces have already been completed in other under-resourced, remote Pacific Island countries. Dr. Payne Perman, a physician in Pohnpei, created a dedicated telehealth space following a workshop by the PBTRC.¹⁶ The first teleconsultation he did with Shriners Hospital resulted in 3 expedited referrals to Honolulu. In addition, due to the press from the event, donations came in to support further telehealth initiatives. Furthermore, the momentum behind this room spurred initiative for other telehealth programs. For example, the laboratory service in Pohnpei was able to expedite training and set up a program to visualize cervical histopathology and go through a backlog of cervical specimens.

In creating this telehealth room and other telehealth initiatives, Dr. Perman sought support from local non-governmental organizations (NGO) that already had relationships with the hospital due to insufficient hospital funds to support the project.¹⁶ This allowed Dr. Perman to rapidly advance Pohnpei's telehealth services. One of the NGOs he received support from was MAHI international, an organization whose mission is to improve the quality of life of citizens in underdeveloped communities of the Pacific Island region.²²

Technological Help for Staff

Given that Palau obtained high-speed internet in 2017, just 2 years prior to the survey of the current report, many staff members at the MOH were not sufficiently familiar with technology to take advantage of telehealth opportunities. Basic computer courses, training on distance learning software, and education on using computers for academic pursuits, such as search engines to support students academically, are important to the advancement of telehealth. PCC and PBTRC are 2 resources that can offer help in this area. PCC offers in-person computer classes at their college through the Maintenance Assistance Program, a training course that requires a 10-person minimum enrollment and provides needed maintenance and troubleshooting services in technology. PBTRC can also assist with specific challenges through resources on their website, like how to connect to telehealth platforms or finding funding for telehealth projects. In the past, PBTRC has assisted Pacific Island nations through various means. For example, in 2018, when the Pacific Islander Health Officers Association held their 63rd annual executive board meeting, 2 PBTRC members assisted in providing technical support and presented information on telehealth basics and telehealth programs within the Pacific region.

In addition, the TCGC program at CMU is a resource that could be explored again with the MOH. In the past, not only has the TCGC program helped create the physical therapy electronic medical record but it also helped redesign the website for PCC and increase internet speed for the college. For example, an interviewee from the department of epidemiology had many ideas of how to utilize telehealth, including the creation of a public health application to map dengue outbreaks by tracking

recent infections and mosquito breeding grounds through community efforts. Dengue is endemic to Palau and is a high risk year round.²³ Such an application may help control infections and identify areas where the mosquito population needs to be controlled. However, she lacked the technical skills to make this idea into a reality. Through collaboration with CMU, this disconnect between ideas and appropriate tools may be fixed. Currently, lack of funding and lack of knowledge of available resources are the largest obstacles to developing such technology.

Telehealth Communication with Rural Clinics

Telehealth communication with the rural clinics is an idea supported by multiple departments within the MOH. The behavioral health department in particular wanted to better develop this communication as many of their patients often do not come to the MOH due to the cultural stigma against mental health disorders. Palau has one of the highest rates of schizophrenia diagnoses in the world and the Western Pacific accounts for a disproportionately high amount of total global suicides at 25%.^{24, 25}

Currently, the rural clinics, staffed by 1 physician and 1-2 nurses, do not have the internet or technological capabilities to do direct face-to-face consultations with Belau National Hospital. These clinics act as primary care providers and urgent centers for rural communities in Palau. Connecting the rural clinics to the hospital via high speed internet would increase patient access to care, support the nurses, and cut down on costs and time spent for physicians traveling to the clinics. A 2013 meta-analysis found that not only did telehealth support used for mental health services in American rural communities help with reduced travel time, reduced family separation, and reduced number of missed appointments, but also that patients expressed greater satisfaction with telehealth resources and a willingness to use these same resources again.²⁶ While staff at the MOH have hopes for these capabilities, funding and lack of a dedicated telehealth staff member to manage such a project are current barriers.

Conclusion

This study offers insight into the current telehealth status in the Republic of Palau and examines common obstacles to overcome to further telehealth at the MOH. Palau has a high utilization rate of different telehealth and distance learning programs, coordinated independently in the different departments within the MOH, and the department of health. Across all departments, a lack of equipment and infrastructure are barriers to the adoption of telehealth. To promote the advancement of telehealth 6 common challenges were identified: (1) lack of telehealth leader, (2) lack of telehealth facilitator, (3) unsuccessful distance learning, (4) lack of dedicated space, (5) lack of technological support and (6) lack of infrastructure to utilize telehealth with the rural clinics. Despite these, Palau is on the forefront of expanding telehealth in the Pacific. Telehealth has the ability to provide care to rural populations, streamline consultations, and increase staff training and skill. Many other Pacific Island communities face similar challenges in the adoption of telehealth, and Palau is poised to further develop its own programs to serve as an example of telehealth's capabilities in the Pacific.

Conflict of Interest

None of the authors identify a conflict of interest.

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