

# **Telehealth: A game changer – Closing the Gap in remote Indigenous health in three remote homeland communities in the Laynhapuy Homelands, East Arnhem, Northern Australia.**

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**Abstract.** Benefits of telehealth have been demonstrated both internationally and through local assessments. Early diagnosis and treatment, reduced costs associated with patient travel, minimized time spent away from community and providing improved patient and staff satisfaction are key drivers for using telehealth. Uptake of telehealth in the NT has been limited, for a variety of reasons including inadequate broadband access. Through collaboration between stakeholders, high-end satellites have been deployed in three very remote clinics, uncontended internet provided and telehealth successfully implemented. Face-to-face consultation via video-conferencing, direct supervision and observation of patient examinations, showing patients and families pictures and videos from the internet allowing the supervising GP to demonstrate clearly what the problem is and the treatment required and the use of remote diagnostic systems for patient assessment in acute care is a “game changer” in remote Indigenous health service delivery. Early identification and decision making of malignancies can facilitate earlier intervention with better prognosis for the patient. Through collaboration, this program has demonstrated the value of uncontended and unlimited internet access in implementing telehealth. The question was: Is high quality internet required to improve service delivery? The service recognises the value and now relies heavily on this service and is committed to improving connectivity and implementing telehealth in more of their communities.

**Keywords.** Telehealth, Remote Primary Health, Telemedicine, Laynhapuy Homelands, Remote Telecommunications.

## **Introduction**

The Northern Territory (NT) population is approximately 32% Indigenous, of which approximately 79% live in remote Indigenous communities (RICs)<sup>1</sup>. with over 100 remote clinics RICs (as defined by ABS<sup>2</sup>) often have limited access to teleconferencing

and bandwidth<sup>3,4,5,6</sup>. The NT Government reported that in 2015 there were at least 30 communities in the NT with over 100 people and no internet available through ADSL and/or NextG mobile<sup>7</sup>. Many RICs have inadequate Internet bandwidth to reliably use video-conferencing services, access remote “dial a doctor” type video services or new innovative telehealth solutions.

The benefits of telehealth are recognised with about 26 specialties operating within NT with telehealth as a component of their model of care<sup>8</sup>. Possible uses for telehealth and videoconferencing for remote health centres are: 1) Primary Health - Increased access to GP services; 2) Acute Care - Cardiology emergency management, Emergency cameras, other Internet connected diagnostic equipment used for emergencies; 3) Tertiary Services -outpatient appointments and patient travel, cardiology recovery, wound management, palliative care, outreach services, mental health, social and emotional well-being; 4) Support Services - staff connectivity, education and training, access to government services<sup>8</sup>.

Significant savings within the health budget can be made using telehealth. The Evaluation of the PATS-Telehealth Project<sup>9</sup> has identified \$1.2 million savings over 1100 consults. The preferred model for specialist consulting is to establish regular clinics so booking staff from both primary health and hospital-based services can plan groups of consultations for efficiency reasons. In many clinics the additional workload for administering telehealth appointments falls to an overloaded clinical staff (eg Aboriginal Health Practitioners or Remote Area Nurses). Due to this extra workload, additional roles may be required in communities such as Telehealth Coordinators and Digital Inclusion/Support Officers.

Savings generated by telehealth implementation in RICs has the potential to increase employment in remote communities. In its recent demographic paper to the NT Chief Minister’s department, the Northern Institute has observed an increasing number of working- age Aboriginal people migrating from the NT<sup>10</sup>. Work is in process to develop new jobs in these communities to help encourage qualified and competent Aboriginal people from leaving the NT due to a perceived need to move interstate to gain better job opportunities. More work is required to create more challenging jobs and identify case study evidence that supports real career paths for local Aboriginal people in remote communities.

## 1. Significance

There has been limited uptake of telehealth by community health clinics, the NT health system and by individuals in remote locations for a variety of reasons particularly inadequate access to broadband. There is a paucity of quantitative and qualitative analysis of telecommunication use in the remote primary health sector. Through collaboration, this program has demonstrated the value of uncontended and unlimited internet access in implementing telehealth and continues to build on current knowledge by evaluating the uptake of telehealth and developing a model of innovative service delivery to increase expansion of telehealth and access to internet resources (including videoconferencing) for local health, education and other community-based organisations, evaluating video-conferencing, diagnostic devices, communications hardware and software used in telehealth.

The question for the Laynhapuy Homelands Health Service (LHS) was: ***Do we really need high quality internet connectivity to improve health service delivery?*** The

question is now: *How do we afford the cost of high quality internet connectivity to maintain the quality improvement?*

## **2. Methods**

Testing of nbn satellite services in remote communities early in 2017 found the services were inadequate for telehealth. Subsequently, REIF funded the installation of 3 high-end satellite services to establish telehealth for the LHS. Significant funding has been made available to the government sector to implement telehealth, but there has been limited support for expansion of telehealth in the very remote primary health sector. This program provided high quality internet and established telehealth in three very remote communities in the Laynhapuy Homelands, East Arnhem. Three mining grade (uncontended) Gilat satellites were deployed at clinics in Gan Gan, Yilpara and Wandawuy. The satellite equipment and 12 months connectivity were supported by the REIF grant, video-conferencing equipment, videoconferencing (NTCS) and a video end point for the head office in Yirrkala were supplied by Telstra Health as part the AMSANT/Telstra RAP Program.

Implementation of telehealth has required extensive technical intervention, training and support from project team members. There have been a number of issues that have delayed the implementation and interfered with video-conferencing access such as: Culturally sensitive training delivery, the need to provide on-call high-level technical assistance, late wet season rain, limited SLA with organisational ICT vendor, freight and transporting sensitive hardware to very remote sites, logistics of having the technical expertise on site at the required time, difficulties in configuring the ground-based satellite equipment on installation, router configuration, cables being un-plugged, equipment failure due to extreme weather conditions, internal network configuration issues, NTCS configuration issues, unscheduled upgrades to software and incompatibility issues.

## **3. Results**

A fundamental component of the underlying technology that supports telehealth is high bandwidth network connections. Twelve months connectivity for the three remote clinics in the Laynhapuy Homelands has provided an opportunity to demonstrate the value of telehealth and video-conferencing prior to the service incurring costs. Staff now regularly use video-conferencing for telehealth. Diagnoses are being aided by smart phones - camera optics and digital capabilities have provided adequate video quality to do triage and significant diagnostic assessment.

John Kelly, GP/Physician, LHS is based in Sydney for the majority of time. Typically between 3 and 8 consults are done daily using telehealth. Additionally, video-conferencing is used to share images and videos with patients, family and staff in the homeland clinics to address diagnostic and treatment issues. Video clips from the internet are used to demonstrate examination and treatment techniques. Access to video-conferencing has changed the way LHS deliver services to their remote clinics (Jeff Cook, pers. comm.).

Telehealth is providing opportunities for: Family, patient and clinician meetings to facilitate joint, more informed and speedier decision making; patients being able to see familiar faces – even if it is via video-conference, earlier diagnosis and treatment, more

accurate assessments for evacuations and acute care retrievals, staff training and support, the ability to access a wider range of services, induction of new staff, increased patient safety, facilitate consultation with specialist services on community, training and direct observation of trainee GPs.

Decision making in RICs involves the whole family. Decision making processes in the cultural context for Aboriginal people are different to that of Europeans. Often when a family member is diagnosed with an illness that requires medical intervention the whole family are informed so they can make the necessary joint decisions and arrangements. This ensures the patient understands what the practitioners are conveying and consequences of the diagnosis, treatment, any time critical issues and consequences of no treatment. The initial process may take some time to locate the correct family members to interpret for the patient as often English is a 3<sup>rd</sup> or 4<sup>th</sup> language. The medical terminology and some concepts are often lost to Indigenous people so it is critical to find a cultural conduit to liaise between the health practitioners, patient and family members.

Due to the remoteness of many of the communities and families being spread over large geographical distances, it is important to ensure the right family members are present for the diagnosis, ensuing discussions and joint decision making. Therefore it may take some time (eg months) to facilitate family meetings. By using telehealth this reduces the trauma associated with travel, facilitates family discussions and consultations with specialists and other health professionals in major centres. Additionally, if the correct family members are in a different community, they can be involved in case conferences, consultations and decision making via video-conferencing. This results in less travel from community, more informed, thorough and effective decision making and improving health outcomes for remote Indigenous people.

#### **4. Discussion**

The use of telehealth has been fundamental to the delivery of health services in remote Australia for many years using technologies such as telegraph, radio, fixed line, satellite phones and centralised clinical information systems. The next generation of telehealth is using video-conferencing and digital devices to provide more effective diagnostic and treatment processes. A significant effort is being made to work collaboratively to develop and share these approaches across the community controlled health sector.

The NT leads the country in the use of standards-based secure messaging for clinical information (eg specialist referrals, hospital discharge and pathology reports), shared health patient records and other internet connected diagnostic devices such as the iStat machine (blood analysis) and internet connected electrocardiography. Currently the NT DoH is working to expand the number of acute, allied health and specialist services that provide telehealth solutions to remote patients. RPHCs are expanding the use of video-conferencing within their organisations to support management, training, induction of new staff, registrar clinical supervision, internal and external clinical support. Multiple organisations are currently interacting to provide remote communities with primary health services. Individuals who require access to specialist and acute/emergency clinical interventions benefit from the expansion of these connected digital solutions.

The NI/AMSANT/B4BA Telehealth and Digital Inclusion Program has evolved from a cross-sector collaboration<sup>11</sup> between a number of stakeholders. The collaboration continues to evolve and recently the project team has commenced work with nbn co and the Regional, Rural and Remote Communications Coalition to address remote

telecommunications issues. This research will inform policy development to improve service delivery to remote communities and provide support to RPHCs to expand telehealth and digital inclusion.

Uptake of telehealth has improved significantly with the deployment of 3 high-end (uncontended) satellites through this collaboration. The collaboration is assisting RPHCs to establish telehealth and aid them in evaluating the costs/benefits of reliable internet and telehealth as well as expanding digital inclusion. It is promoting telehealth enabled health outcomes into the future and has a significant research component: Assessing the costs and benefits of telehealth implementation including financial and non-financial; identifying barriers and enablers for implementing telehealth; identifying other potential and perceived outcomes and successes: assessing if additional roles (eg Telehealth Coordinators) can be developed and sustainably funded through patient travel savings and additional Medicare income; developing strategies to deal with technical issues such as delay in communications with satellite solutions and developing an innovative model of health service delivery for very remote areas.

Program partners are keen to establish an incentivised remuneration system to reduce the financial burden on remote primary health clinics. Medical transfers are usually through the Patient Assisted Travel Scheme (PATS) and are primarily funded through the NT DoH. Outpatient visits to major centres often requires provision of accommodation that further adds to the costs of service delivery. Historically, there has been an uncontrolled increase in patient travel costs<sup>8</sup>. Using telehealth to reduce travel to appointments can significantly reduce the costs to the PATS.

Increased telehealth consultations in primary health clinics transfer costs from acute and outpatient to primary health services. This may gain overall health system efficiency but adversely affects primary health services due to costs incurred for connectivity and video-conferencing and staff time to manage telehealth consultations. There have been a number of studies to indicate the cost and benefits of telehealth but the cost model does not take into account where the savings are made. Generally the savings exist in the patient travel budget controlled by the state and territory governments. Primary health services do not tend to benefit from these savings as they are funded through federal government programs and Medicare. Additionally, many remote clinics access GP services via telehealth (video-conferencing where it is available) but these are currently not claimable under MBS. Savings from reduction in PATS and additional Medicare income could support the establishment of more “on community” jobs for local Indigenous people. It is recommended that the MBS be expanded to include more item numbers for very remote telehealth including telehealth services by GPs and a significant proportion of PATS savings be returned to the primary health service.

Future potential activities using video-conferencing could include commissioning of high-end video-conferencing interface solution used to access other NT department video networks (eg Corrections, Children and Families and Education), measure and monitor internet use through router report generation, and establish evidence collection for case study/use case/benefits analysis. Improved access to internet and other technologies could improve access to government services. Many government services (eg CentreLink) are managed through a web-based interface. In the past, CentreLink staff visiting remote communities were able to assist remote clients in accessing resources. However, many of these services have ceased remote community visits and therefore people in these areas who are eligible to access Centrelink support are unable to access the Internet to complete the mandatory registration and approval process. It has been recommended that access to government services be unmetered<sup>12</sup>.

The expansion of telehealth is anticipated to produce productivity gains, increases in the number of telehealth consults, health and social benefits, decreases in patient travel costs, provide an opportunity for group decision making by extended family members at the community clinic, decreases in Did Not Attend rates, development of training/engagement/change strategies to introduce video-conferencing as standard practice in day-to-day business, increased Medicare income for primary health clinics increase availability of internet based clinical systems, improve remotely based business efficiency through better recruitment, increased availability of services provided through videoconferences, improved specialist efficiency and patient waiting times, better supported remote staff through increased personal interactions from service providers and management, identification of barriers and enablers to implementing telehealth models of care in remote Australia.

As demand for more broadband services increases, additional resources will need to be allocated to telecommunications. Currently few very remote health clinics are connected to the internet by satellite and using telehealth in the NT. A number of sites have the satellite quality to be used for telehealth but not the bandwidth as it is currently being used to access datacenter base clinical information systems. To adequately serve both videoconferencing and datacenter traffic connection bandwidth will need to increase. The costs and benefits of additional bandwidth need to be determined and the financial viability to implement telehealth demonstrated. The technology available with current satellite services has been found adequate, but is very expensive<sup>13</sup>. Increased resource to expand access to greater bandwidth needs to be allocated to expand access to telehealth and e-health.

## **5. Conclusion**

The program has provided project support to communities to implement telehealth and has expanded by building on existing relationships to develop stronger alliances with program partners, community organisations and members; building and extending current networks, relationships and research opportunities and has generated trans-disciplinary outcomes through collaboration<sup>14</sup>.

The use of telehealth in the Laynhapuy Homelands has resulted in early diagnosis and treatment, more accurate assessments for evacuations and acute care retrievals, provided video-conferencing for case consultations, allowing patients to see familiar faces (eg clinicians they have known for years), family meetings to facilitate more informed and timely decision making, provide more opportunities for staff and patient education, assistance in the induction and supervision of new staff, improved patient safety and direct observation of staff and trainee GPs.

The benefits of telehealth have been demonstrated in the Laynhapuy Homelands and are seen as a way to improve service delivery in RICs as well as reducing costs of health care. Through collaboration, this program has demonstrated the value of uncontended and unlimited internet access in implementing telehealth. LHS are committed to expanding access to high quality internet, access to telehealth for all their remote clinics and improving health outcomes for their RICs using innovative models of service delivery.

The NT has led the way in eHealth with its adoption of shared medical record systems<sup>7</sup> and telehealth. Demonstration of innovative telehealth solutions could represent a national strategy to expand telehealth in remote areas. Innovative models of

care developed in the NT may be useful for countries such as China and Indonesia which are looking to telehealth to address remote service delivery issues.

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## References

- [1] ABS (Australian Bureau of Statistics), Census Data: <http://www.abs.gov.au/AUSSTATS/abs@.nsf/web+pages/statistics?opendocument#from-banner=GT>, 2011
- [2] ABS (Australian Bureau of Statistics), The Australian Statistical Geography Standard (ASGS) Remoteness Structure: <http://www.abs.gov.au/websitedbs/d3310114.nsf/home/remoteness+structure#Anchor1>, 2006.
- [3] ACCAN Survey, <http://www.accan.org.au/news-items/media-releases/1160-broadband-speeds-and-performance-leaving-consumers-disappointed>, 2016
- [4] Park, S., Digital inequalities in rural Australia: A double jeopardy of remoteness and social exclusion. *Journal of Rural Studies*, 2016.
- [5] Bandias, S. and S. Ram Vemuri Telecommunications infrastructure facilitating sustainable development of rural and remote communities in Northern Australia, *Telecommunications Policy* 29(2–3): 237–249. <http://dx.doi.org.ezproxy.cdu.edu.au/10.1016/j.telpol.2004.11.008>, 2005.
- [6] Bryant, L., Garnham, B., Tedmanson, D., & Diamandi, S., Tele-social work and mental health in rural and remote communities in Australia. *International Social Work*, 0020872815606794, 2015.
- [7] Northern Territory Government Northern Territory Government - Public Submission RTIRC 2015 <https://communications.gov.au/sites/g/files/net301/f/Northern%20Territory%20Government%20-%20Public%20Submission%20RTIRC%202015.pdf>, 2015.
- [8] Murtagh, D. P., St Clair, M and Marchant, N., Expansion of Telehealth in remote Northern Australia and the potential for international collaborations. *Proceedings of the 14<sup>th</sup> Rural Health Conference*, 26-29 April, Cairns, 2017.
- [9] Department of Health, Evaluation of the PATS-Telehealth Project December, 2015.
- [10] Taylor, A. and Carson, D., Synthesising Northern Territory Population Research: A report to the Northern Territory Department of the Chief Minister: A report on twelve years of populations research, the causes and consequences of population change in the Territory, and evidence based policy options to address these changes. Northern Territory Government, Darwin, 2018.
- [11] Bryson, J.M., Crosby, B.C. and Stone, M.M., Designing and Implementing Cross-Sector Collaborations: Needed and Challenging. *Public Administration Review* 75(5):647-663, 2015.
- [12] B4BA Remote, Connected and Savvy!, Broadband for the Bush Forum VI, Fremantle 21-23 June, 2017. <http://broadbandforthebush.com.au/wp-content/uploads/2013/05/Broadband-For-The-Bush-Communique-2017.pdf>, 2017.
- [13] AMSANT (Aboriginal Medical Services Alliance NT Aboriginal Corporation), AMSANT eHealth Forum, Darwin, 2015.
- [14] Gray, B., Enhancing Transdisciplinary research through collaborative leadership. *American Journal of Preventive Medicine*, 35: S124-S132, 2008.