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Conducting a Global Quadruple Aim Thematic Analysis of Telemedicine Performance in Rural Indigenous Populations and Evidence-based Recommendations for Improvement

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Abstract: *The literature on electronic information and telecommunication technologies reveals that telehealth houses many elements of support, benefit, and care delivery into rural indigenous communities. As per the Canada Health Act (1984), healthcare must be equally accessible for all groups without significant accessibility costs, and that healthcare must incorporate all "medically necessary" healthcare services that a population requires. This article uses the quadruple aim to present a thematic analysis regarding patient experience, the health of populations, provider experience, and the cost per capita of telehealth into rural indigenous communities.*

Ever since the Canada Health Act was passed as legislation in 1984 with the objective of protecting, promoting, and restoring the physical and mental well-being of Canadians, as well as facilitating reasonable access to health services without barriers, all provinces and governments have been obligated to meet the five key principles.[1] These principles are: public administration, accessibility, comprehensiveness, universality, and portability.[1] While arguments can be made regarding how well these principles have been followed throughout the last three decades, there is a consensus among policy experts about the utter denial and failure of the federal government in being consistent with the principles of accessibility and comprehensiveness when delivering care to first nations on reserves in rural communities.[2] As per the Canada Health Act, accessibility and comprehensiveness represent the concept that healthcare must be equally accessible for all groups without significant accessibility costs, and that healthcare must incorporate all

"medically necessary" healthcare services that a population requires.[2] In fact, over 50% of first nations community members report not having access to relevant medical services.[3]

Through telehealth, patients and providers can see each other virtually to conduct remote medical consultations, and with the implementations of robotic diagnostic devices, the provider can maneuver this technology to adequately assess a patient at their local community/testing center.[4] This technology has enabled a diversity of providers to consult with rural patients, increasing the accessibility to care for many of these populations.[4]

Despite the implementation of telehealth, many concerns remain, and new one's continued to arise.[4] Issues such as clinical care quality, sustainable implementation, provider ease, and costs continue to rise to the forefront in clinical practice and literature.[4] These issues are consistent with the themes of the Quadruple Aim.[4] The quadruple aim is an extension of the Triple Aim developed by the Institute for Healthcare Improvement which comprises four key principles[4]:

1. Patient Experience
2. Health of Populations
3. Per Capita Cost
4. Provider Experience

As such, this paper seeks to conduct a quadruple aim thematic analysis in a review format to decipher concerns regarding patient experience, the health of populations, provider experience, and the cost per capita of telehealth delivery in rural first nations communities.

METHODS

The research for this paper was conducted through the Medline database. All searches were conducted in September 2021.

To conduct a review-based search of the literature on the four concepts embedded within the quadruple aim, the following terms were used in variation: "telemedicine," "telehealth," "first nations," "aboriginals," "indigenous," "patient," "population," "population health," "cost," "finance," "economics," "healthcare providers," and "providers."

A detailed breakdown of the terms and extracted papers can be observed in Table 1.

An inclusion and exclusion criteria were also developed as presented in Table 2.

Papers were short-listed based on the relevance of their title and abstract to the contents of this paper. Selected papers were then categorized into the respective domains of the quadruple aim they would fall into (i.e., patient experience, population health, per capita cost, and provider experience). Often, one paper would fall into more than one domain; duplicate citations were managed through a sequential order. A summary and key data were then extracted from the papers and can be observed in Table 3.

DISCUSSION & RECOMMENDATIONS

Patient experience

Access to care

There has been a consistent presence of the increased accessibility components that telehealth offers to remote populations, particularly the ease of access presented through the avoidance of long travel times.[5,6,7] Generally, patients mentioned travelling into

Table 1. Variations of the search terms used to identify relevant research articles as part of this study

Search Terms	Article(s) Yielded	Month/Year of Search
telehealth OR telemedicine AND aboriginal AND patient	Outcomes of using telehealth for the provision of healthcare to Aboriginal and Torres Strait Islander people: a systematic review	Sep-21
	A cost-consequence analysis comparing patient travel, outreach, and telehealth clinic models for a specialist diabetes service to Indigenous people in Queensland	Sep-21
	Enablers and barriers in providing telediabetes services for Indigenous communities: A systematic review	Sep-21
	An evaluation of the telehealth facilitation of diabetes and cardiovascular care in remote Australian Indigenous communities: - protocol for the telehealth eye and associated medical services network [TEAMSnet] project, a pre-post study design	Sep-21
	Validation of the Kimberley Indigenous Cognitive Assessment short form (KICA-screen) for telehealth	Sep-21
	Uptake of telehealth services funded by Medicare in Australia	Sep-21
	Barriers to Telehealth Uptake in Rural, Regional, Remote Australia: What Can Be Done to Expand Telehealth Access in Remote Areas?	Sep-21
	A mobile telemedicine-enabled ear screening service for Indigenous children in Queensland: activity and outcomes in the first three years	Sep-21
	The Cedar Project - Mobile Phone Use and Acceptability of Mobile Health Among Young Indigenous People Who Have Used Drugs in British Columbia, Canada: Mixed Methods Exploratory Study	Sep-21
	The use of remote presence for health care delivery in a northern Inuit community: a feasibility study	Sep-21
	The use of remote presence for health care delivery in a northern Inuit community: a feasibility study	Sep-21
	Positive Clinical Outcomes Are Synergistic With Positive Educational Outcomes When Using Telehealth Consulting in General Practice: A Mixed-Methods Study	Sep-21
	Increasing the impact of teleophthalmology in Australia: Analysis of structural and economic drivers in a state service	Sep-21
	Videoconferencing could reduce the number of mental health patients transferred from outlying facilities to a regional mental health unit	Sep-21

Continued

Table 1. (Continued) Variations of the search terms used to identify relevant research articles as part of this study

Search Terms	Article(s) Yielded	Month/Year of Search
telehealth OR telemedicine AND first nation AND population health telehealth OR telemedicine AND indigenous AND population health	Telehealth and indigenous populations around the world: a systematic review on current modalities for physical and mental health	Sep-21
	Specialist cancer care through telehealth models	Sep-21
	An economic cost analysis of an expanding, multi-state behavioural telehealth intervention	Sep-21
	Patient and practitioner satisfaction with tele-dermatology including Australia's indigenous population: A systematic review of the literature	Sep-21
	Mental health professionals' perspectives of telemental health with remote and rural First Nations communities	Sep-21
	A cost comparison of travel models and behavioural telemedicine for rural, Native American populations in New Mexico	Sep-21
telemedicine AND cost AND aboriginal		Sep-21
telemedicine OR telehealth AND cost AND indigenous	The socio-economic impact of telehealth: a systematic review	Sep-21
telemedicine OR telehealth AND finance AND indigenous		-
telemedicine OR telehealth AND economics AND indigenous		-
telemedicine OR telehealth AND healthcare providers OR providers AND indigenous		-

large regional facilities to receive basic healthcare screening, diagnosis, and care.[5,6,7] Travelling to these facilities was accompanied with long road-trip times, averaging more than 2 to 3 hours.[5,6,7] In fact, when it came to specialist care, patients mentioned that often

Table 2. The inclusion and exclusion for literature as part of this study.

Inclusion Criteria	Exclusion Criteria
Country of study, or health system of study must be a part of an Organisation for Economic Co-operation and Development (OECD) country	Country of study or health system in study is not part of an OECD country
Literature must be in English	Literature is not in English
Literature must be published in 2010 or be published later	Literature is published before 2010
Literature must be in line with one of the themes of the quadruple aim: 1. Patient Experience 2. Health of Populations 3. Per Capita Cost 4. Provider Experience	Literature does not fit atleast one of the themes of the quadruple aim

they would travel to the point where they would have to spend the night at another facility.[5,6,7] As a result, patients would often avoid accessing specialist care, leading to a significant increase in chronic disease.[7] For example, in a remote Australian community, the implementation of an ear-screening service with a specialist improved screening rates in children in Australia from 35% to 80%.[8] Consequently, specialist waiting time was reduced to an average of 29 days from 64 days.[8] Problems, however, did arise for many other specialties where consultations would be taking place from home.[7,8] As a result of poor telecommunications network in aboriginal care, many patients cited that appointments would be re-scheduled, or video quality would be poor when conducting diagnostic assessments and consultations.[6,8] It's recommended to policy makers, therefore, based on the national survey for the Broadband for the Bush Alliance (B4BA) to make significant investments into telecommunications technology to be implemented in rural regions.[8] When providers and patients can use this technology at an affordable subscription-based price, it can offer telecommunications providers the opportunity to make staunch revenues.[8,9]

Patient perceptions

Throughout literature, the response that indigenous groups have had towards telehealth has been positive and effective.[9] In fact, in a cognitive assessment telehealth clinic, patients rated telehealth services higher than in-person services; 4.86 out of 5.0 versus 4.5 out of 5.0, respectively.[9] Patient perceptions, however, were hindered in the realms of diagnosis, quite significantly, where 20% of patients found telehealth to be ineffective and inaccurate as compared to in-person testing.[7] In the instance of tele-dermatology, patients feared that telehealth technology would miss critical diagnostic data that a doctor would not.[7] Many of these concerns are motivated by a strong fear linked to physical presentability in dermatology, but similar results were observed in cardiology, endocrinology, and mental health diagnosis.[7,8,9] In particular, diagnosis that require a physical examination from the provider are regularly questioned by rural and indigenous patients, many of whom are not familiar with clinical technology and do not trust it.[7,8,9] To add to that, patients who regularly require diagnosis that requires physical touching, are far more likely to pursue conventional treatment over telemedicine.[5] As garnered by a systematic review, changing patient

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Table 3: A summary of extracted data from the articles as well as their relevant categorizations in the framework of the quadruple aim.

Article Name	Extracted Data	APA Citation	Outcome Categorization
Outcomes of using telehealth for the provision of healthcare to Aboriginal and Torres Strait Islander people: a systematic review	- Telehealth was utilized to address the poor accessibility that rural patients have in health services - Positive social and emotional implications of telehealth services as they were being utilized in the community as opposed to travelling to a "foreign" area - Family was present during care - Avoided the mental distress and feelings of alienation typically present when indigenous people transfer from community-settings to regional ones - Reduction in patient travel resulted in a greater access to care facilities - Greater access to secondary care services such as specialists was also noted - 75% preference for teleconsultations over face-to-face; some researchers even said upto 100% said they preferred telehealth consultations over face-to-face ones - Positive clinical outcomes	Caffery, L. J., Bradford, N. K., Wickramasinghe, S. I., Hayman, N., & Smith, A. C. (2017). Outcomes of using telehealth for the provision of healthcare to Aboriginal and Torres Strait Islander people: a systematic review. Australian and New Zealand journal of public health, 41(1), 48–53. https://doi.org.proxy.lib.uwaterloo.ca/10.1111/1753-6405.12600	Patient Experience
Outcomes of using telehealth for the provision of healthcare to Aboriginal and Torres Strait Islander people: a systematic review	- Increased health literacy across populations as family members and other caregivers were all present together - Patients had to attend regional hospitals for video conferencing - accessibility and monitoring concerns	Caffery, L. J., Bradford, N. K., Wickramasinghe, S. I., Hayman, N., & Smith, A. C. (2017). Outcomes of using telehealth for the provision of healthcare to Aboriginal and Torres Strait Islander people: a systematic review. Australian and New Zealand journal of public health, 41(1), 48–53. https://doi.org.proxy.lib.uwaterloo.ca/10.1111/1753-6405.12600	Health of Populations

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Table 3 (Continued). A summary of extracted data from the articles as well as their relevant categorizations in the framework of the quadruple aim.

Article Name	Extracted Data	APA Citation	Outcome Categorization
Outcomes of using telehealth for the provision of healthcare to Aboriginal and Torres Strait Islander people: a systematic review	- Per Capita Costs became significantly lower as opposed to in-person visits from the provider end	Caffery, L. J., Bradford, N. K., Wickramasinghe, S. I., Hayman, N., & Smith, A. C. (2017). Outcomes of using telehealth for the provision of healthcare to Aboriginal and Torres Strait Islander people: a systematic review. Australian and New Zealand journal of public health, 41(1), 48–53. https://doi.org.proxy.lib.uwaterloo.ca/10.1111/1753-6405.12601	Per Capita Cost
Outcomes of using telehealth for the provision of healthcare to Aboriginal and Torres Strait Islander people: a systematic review	- "Failed to Attend" rates also decreased - Significant increase in screening rates as tools and methodical frameworks became more feasible in implementation - Video consultations believed to be as crucial to face-to-face consultations from the provider's POV - Good technical quality for videos was imperative to this experience - As patients attended regional hospitals for video conferencing (for retinal exams, diabetes, cardiovascular examinations etc.), there was a significant patient load burdened on those hospitals - Propose a greater integration with satellite aboriginal clinics as well as regional hospitals to share data more seamlessly, and reduce costs further. This will also help incorporate greater organizational and patient management allowing to better manage patient load in these facilities	Caffery, L. J., Bradford, N. K., Wickramasinghe, S. I., Hayman, N., & Smith, A. C. (2017). Outcomes of using telehealth for the provision of healthcare to Aboriginal and Torres Strait Islander people: a systematic review. Australian and New Zealand journal of public health, 41(1), 48–53. https://doi.org.proxy.lib.uwaterloo.ca/10.1111/1753-6405.12602	Provider Experience

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Table 3 (Continued). A summary of extracted data from the articles as well as their relevant categorizations in the framework of the quadruple aim.

Article Name	Extracted Data	APA Citation	Outcome Categorization
A cost-consequence analysis comparing patient travel, outreach, and telehealth clinic models for a specialist diabetes service to Indigenous people in Queensland	- High-upfront telehealth costs due to the development of infrastructure, staff training, and procedures such as referrals, documentation and billing need development - Changing management structures and processes also involve large up-front costs - Approximately $30,000 USD was required for installing the necessary hardware, training and other technological/incidental costs to develop this satellite network - Reduction in patient travel costs (reimbursement programs) - Approximately savings of $517 USD from both patient and provider transportation were saved - Lowering outreach costs and increasing continuity of care through telemedicine saved approximately 25% per patient cohort - Overall cost savings of $4000 USD per patient cohort - Issues arise in developing infrastructure as well as establishing a methodology to conduct outreach via telemedicine - Management changes and implementing new processes also require significant investment and appear to be among the main burdens of telemedicine costs	Snoswell, C. L., Caffery, L. J., Haydon, H. M., Wickramasinghe, S. I., Crumblin, K., & Smith, A. C. (2019). A cost-consequence analysis comparing patient travel, outreach, and telehealth clinic models for a specialist diabetes service to Indigenous people in Queensland. Journal of telemedicine and telecare, 25(9), 537–544. https://doi.org.proxy.lib.uwaterloo.ca/10.1177/1357633X19873239	Per Capita Cost

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Table 3 (Continued). A summary of extracted data from the articles as well as their relevant categorizations in the framework of the quadruple aim.

Article Name	Extracted Data	APA Citation	Outcome Categorization
Enablers and barriers in providing telediabetes services for Indigenous communities: A systematic review	- Incorporation of cultural and spiritual beliefs through acknowledgements of traditions and relevant community engagement has had the effect of increasing in-patient attendance and follow-ups from 20% to 85% after the inclusion of spiritual ceremonies - High fail-to-attend rates due to a lack of awareness and knowledge about chronic disease in communities largely attributed to the lack of continous care	Wickramasinghe, S. I., Caffery, L. J., Bradford, N. K., & Smith, A. C. (2016). Enablers and barriers in providing telediabetes services for Indigenous communities: A systematic review. Journal of telemedicine and telecare, 22(8), 465–471. https://doi.org.proxy.lib.uwaterloo.ca/10.1177/1357633X16673267	Health of Populations
Enablers and barriers in providing telediabetes services for Indigenous communities: A systematic review	- Indigenous healthcare worker participation is also a significant supporter of increasing telemedicine and healthcare usage uptake - They helped enhanced communication through the local language(s), helped clinicians better understand their community of patients, and even transported patients to regional facilities - Technological training of local staff remains an issue particularly in operating and maintaining diagnostic equipment such as retinal cameras, and collecting clinical information over EHR software(s) - Investments in automation and increased staff credentialling have sought to improve the quality of diagnostics and accuracy of clinical information	Wickramasinghe, S. I., Caffery, L. J., Bradford, N. K., & Smith, A. C. (2016). Enablers and barriers in providing telediabetes services for Indigenous communities: A systematic review. Journal of telemedicine and telecare, 22(8), 465–471. https://doi.org.proxy.lib.uwaterloo.ca/10.1177/1357633X16673267	Provider Experience

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Table 3 (Continued). A summary of extracted data from the articles as well as their relevant categorizations in the framework of the quadruple aim.

Article Name	Extracted Data	APA Citation	Outcome Categorization
An evaluation of the telehealth facilitation of diabetes and cardiovascular care in remote Australian Indigenous communities: - protocol for the telehealth eye and associated medical services network [TEAMSnet] project, a pre-post study design	- Ambigious conclusions from teleheath uptake in diabetes care - particularly in primary care environments - Seek to expand the positive outcomes of retinal screening, lifestyle modifications and electronic decision support from this study via telemedicine to other complications of diabetes and even other common co-morbidities	Brazionis, L., Jenkins, A., Keech, A., Ryan, C., Bursell, S. E., & TEAMSnet Study Group (2017). An evaluation of the telehealth facilitation of diabetes and cardiovascular care in remote Australian Indigenous communities: - protocol for the telehealth eye and associated medical services network [TEAMSnet] project, a pre-post study design. BMC health services research, 17(1), 13. https://doi.org.proxy.lib.uwaterloo.ca/10.1186/s12913-016-1967-4	Health of Populations
Validation of the Kimberley Indigenous Cognitive Assessment short form (KICA-screen) for telehealth	- Similar cognitive testing administration results (KICA) as in face-to-face delivery - Patients rated 4.86 out of 5 on average - Barriers did come up; - Many patients required in-person support during telehealth administration to ensure hearing and vision aids are appropriately used - Patients with cognitive degradation such as MCI or dementia patients often struggle to get accustomed to this new format	Russell, S., Quigley, R., Strivens, E., Miller, G., Norrie, J., Craig, D., Jordan, J., & Muller, R. (2021). Validation of the Kimberley Indigenous Cognitive Assessment short form (KICA-screen) for telehealth. Journal of telemedicine and telecare, 27(1), 54–58. https://doi.org.proxy.lib.uwaterloo.ca/10.1177/1357633X19860309	Patient Experience

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Table 3 (Continued). A summary of extracted data from the articles as well as their relevant categorizations in the framework of the quadruple aim.

Article Name	Extracted Data	APA Citation	Outcome Categorization
Uptake of telehealth services funded by Medicare in Australia	- Year-long Incentivized payments for healthcare providers to focus more so on rural and indigenous populations resulted in a year-long spike in telehealth activity in said regions - General practitioners are the vast majority of telehealth service providers (86%) - Due to a lack of local support when administering telehealth services, those that required clinical intervention(s) such as diabetes, or CVD management were less used - Geriatric and psychiatry services (primarily run through solely consultations) were used most frequently - Anaesthetics have great potential if local administration is to be present - On-site physician provision for telehealth delivery is crucial to increasing uptake and satisfaction	Wade, V., Soar, J., & Gray, L. (2014). Uptake of telehealth services funded by Medicare in Australia. Australian health review : a publication of the Australian Hospital Association, 38(5), 528–532. https://doi.org.proxy.lib.uwaterloo.ca/10.1071/AH14090	Health of Populations
Barriers to Telehealth Uptake in Rural, Regional, Remote Australia: What Can Be Done to Expand Telehealth Access in Remote Areas?	- Lack of emergency services using video-conferencing to improve triage and management - Phone apps for health monitoring with immediate consultation request features - Improving internet connectivity - Educating public about availability - Increasing data allowances (connect with private sector to not meter telehealth usage) - Increasing telehealth availability	St Clair, M., & Murtagh, D. (2019). Barriers to Telehealth Uptake in Rural, Regional, Remote Australia: What Can Be Done to Expand Telehealth Access in Remote Areas?. Studies in health technology and informatics, 266, 174–182. https://doi.org.proxy.lib.uwaterloo.ca/10.3233/SHTI190791	Health of Populations

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Table 3 (Continued). A summary of extracted data from the articles as well as their relevant categorizations in the framework of the quadruple aim.

Article Name	Extracted Data	APA Citation	Outcome Categorization
	- Develop clinical skillset to deliver telehealth without long hours of training and overcoming staunch regulatory requirements - Increasing billing codes particularly for specialities - Increase patient-end resources - Significant less likely to have internet (76%) - Most plans are pre-paid - Investments in telecommunication infrastructure are critical		
A mobile telemedicine-enabled ear screening service for Indigenous children in Queensland: activity and outcomes in the first three years	- Improved screening rates in children from about 35% to 80% in remote communities across Australia - Bookings for specialist care (if needed) were done easily and seamlessly through priority cases due to a high regard of information available through effective screening practices - Specialist waiting time was reduced to an average of 29 days from 64 days - Reduction in specialist travel time	Smith, A. C., Armfield, N. R., Wu, W. I., Brown, C. A., & Perry, C. (2012). A mobile telemedicine-enabled ear screening service for Indigenous children in Queensland: activity and outcomes in the first three years. Journal of telemedicine and telecare, 18(8), 485–489. https://doi.org.proxy.lib.uwaterloo.ca/10.1258/jtt.2012.gth114	Patient Experience
A mobile telemedicine-enabled ear screening service for Indigenous children in Queensland: activity and outcomes in the first three years	- Primary care costs decreased as children had been cared for since they were young, and children who were screened earlier, were about 70% less likely to present an ear problem to their GP during their teenage ears	Smith, A. C., Armfield, N. R., Wu, W. I., Brown, C. A., & Perry, C. (2012). A mobile telemedicine-enabled ear screening service for Indigenous children in Queensland: activity and outcomes in the first three years. Journal of telemedicine and telecare, 18(8), 485–489. https://doi.org.proxy.lib.uwaterloo.ca/10.1258/jtt.2012.gth114	Per Capita Cost

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Table 3 (Continued). A summary of extracted data from the articles as well as their relevant categorizations in the framework of the quadruple aim.

Article Name	Extracted Data	APA Citation	Outcome Categorization
A mobile telemedicine-enabled ear screening service for Indigenous children in Queensland: activity and outcomes in the first three years	- Community level involvement and satellite clinics were helpful in increasing accessibility - Also improved awareness and screening-related education practices within the community	Smith, A. C., Armfield, N. R., Wu, W. I., Brown, C. A., & Perry, C. (2012). A mobile telemedicine-enabled ear screening service for Indigenous children in Queensland: activity and outcomes in the first three years. Journal of telemedicine and telecare, 18(8), 485–489. https://doi.org.proxy.lib.uwaterloo.ca/10.1258/jtt.2012.gth114	Health of Populations
The Cedar Project - Mobile Phone Use and Acceptability of Mobile Health Among Young Indigenous People Who Have Used Drugs in British Columbia, Canada: Mixed Methods Exploratory Study	- Less than half of participants own a mobile phone - Folks living with HIV, substance abuse problems and addiction troubles had significant openness and were open to using telehealth to receive care - Mobile connectivity challenges remain an issue with most people not having a cellular plan, and most with a basic internet limit - SMS and Phone calling remain to be better options as most youth utilize pre-paid phone plans	Jongbloed, K., Pearce, M. E., Thomas, V., Sharma, R., Pooyak, S., Demerais, L., Lester, R. T., Schechter, M. T., Spittal, P. M., & Cedar Project Partnership (2020). The Cedar Project - Mobile Phone Use and Acceptability of Mobile Health Among Young Indigenous People Who Have Used Drugs in British Columbia, Canada: Mixed Methods Exploratory Study. JMIR mHealth and uHealth, 8(7), e16783. https://doi.org.proxy.lib.uwaterloo.ca/10.2196/16783	Health of Populations

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Table 3 (Continued). A summary of extracted data from the articles as well as their relevant categorizations in the framework of the quadruple aim.

Article Name	Extracted Data	APA Citation	Outcome Categorization
The use of remote presence for health care delivery in a northern Inuit community: a feasibility study	- Learning curve for telemedicine robots is simple as the controls and operability are rather simple - 1 hour of training for physicians is sufficient - Physicians reported robots being more simple and easy to use than basic simple teleconferencing procedures where a general physician is performing the assessments - Robot is highly effective in making real-time clinical decisions, determining patient follow-up, and increasing interaction and workflow between nurses and other allied health staff - 84% of nurses found telemedicine robots to more effectively facilitate diagnosis and patient management, with 80% of nurses reporting increased physician-patient interaction	Mendez, I., Jong, M., Keays-White, D., & Turner, G. (2013). The use of remote presence for health care delivery in a northern Inuit community: a feasibility study. International journal of circumpolar health, 72, 10.3402/ijch.v72i0.21112. https://doi.org.proxy.lib.uwaterloo.ca/10.3402/ijch.v72i0.21112	Provider Experience
The use of remote presence for health care delivery in a northern Inuit community: a feasibility study	- High degree of patient satisfaction in the clinic by physicians in the referral center - 95% of physicians reported using the robot again for evaluations, with 84% reporting they're very comfortable in their interactions - Only 53% of the remote presence sessions required an interpreter or family member to accompany the patient	Mendez, I., Jong, M., Keays-White, D., & Turner, G. (2013). The use of remote presence for health care delivery in a northern Inuit community: a feasibility study. International journal of circumpolar health, 72, 10.3402/ijch.v72i0.21112. https://doi.org.proxy.lib.uwaterloo.ca/10.3402/ijch.v72i0.21112	Patient Experience

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Article Name	Extracted Data	APA Citation	Outcome Categorization
The use of remote presence for health care delivery in a northern Inuit community: a feasibility study	- Improved assessment and diagnostic procedures by the telehealth robot can be as effective as reducing referrals to an external diagnostic centre by upto 60%	Mendez, I., Jong, M., Keays-White, D., & Turner, G. (2013). The use of remote presence for health care delivery in a northern Inuit community: a feasibility study. International journal of circumpolar health, 72, 10.3402/ijch.v72i0.21112. https://doi.org.proxy.lib.uwaterloo.ca/10.3402/ijch.v72i0.21112	Per Capita Cost
Positive Clinical Outcomes Are Synergistic With Positive Educational Outcomes When Using Telehealth Consulting in General Practice: A Mixed-Methods Study	- Medical students thoroughly enjoyed the opportunity to lead clinical education sections, becoming more accustomed to traditional modes of healthcare delivery in these communities	Knight, P., Bonney, A., Teuss, G., Guppy, M., Lafferre, D., Mullan, J., & Barnett, S. (2016). Positive Clinical Outcomes Are Synergistic With Positive Educational Outcomes When Using Telehealth Consulting in General Practice: A Mixed-Methods Study. Journal of medical Internet research, 18(2), e31. https://doi.org.proxy.lib.uwaterloo.ca/10.2196/jmir.4510	Provider Experience
Positive Clinical Outcomes Are Synergistic With Positive Educational Outcomes When Using Telehealth Consulting in General Practice: A Mixed-Methods Study	- Patients enjoyed the learnings of medical education from medical specialists - Psychiatric consultations were perceieved by both providers and patients to be highly effective in teaching populations new skillsets and experiences to improve mental health	Knight, P., Bonney, A., Teuss, G., Guppy, M., Lafferre, D., Mullan, J., & Barnett, S. (2016). Positive Clinical Outcomes Are Synergistic With Positive Educational Outcomes When Using Telehealth Consulting in General Practice: A Mixed-Methods Study. Journal of medical Internet research, 18(2), e31. https://doi.org.proxy.lib.uwaterloo.ca/10.2196/jmir.4510	Health of Populations

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Table 3 (Continued). A summary of extracted data from the articles as well as their relevant categorizations in the framework of the quadruple aim.

Article Name	Extracted Data	APA Citation	Outcome Categorization
Positive Clinical Outcomes Are Synergistic With Positive Educational Outcomes When Using Telehealth Consulting in General Practice: A Mixed-Methods Study	- Enhanced continuity of care because telehealth practitioners improved liasons and relationships with other community providers - Improved access to medical specialists and timely care delivery was effective in reducing the aggressions of emergency cases	Knight, P., Bonney, A., Teuss, G., Guppy, M., Lafferre, D., Mullan, J., & Barnett, S. (2016). Positive Clinical Outcomes Are Synergistic With Positive Educational Outcomes When Using Telehealth Consulting in General Practice: A Mixed-Methods Study. Journal of medical Internet research, 18(2), e31. https://doi.org.proxy.lib.uwaterloo.ca/10.2196/jmir.4510	Patient Experience
Increasing the impact of teleophthalmology in Australia: Analysis of structural and economic drivers in a state service	- Effective utilization of existing telehealth facilities can save over $1.1 USD per year - GP practitioners clinical practices do not necessarily require the capability to have tele-specialist services because it would end up being more costly to initially incorporate that infrastructure on their end - Increasing coordination between these specialists, however, is critical to ensuring patient load distribution is managed effectively within remote communities	Razavi, H., Copeland, S. P., & Turner, A. W. (2017). Increasing the impact of teleophthalmology in Australia: Analysis of structural and economic drivers in a state service. The Australian journal of rural health, 25(1), 45–52. https://doi.org.proxy.lib.uwaterloo.ca/10.1111/ajr.12277	Per Capita Cost

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Table 3 (Continued). A summary of extracted data from the articles as well as their relevant categorizations in the framework of the quadruple aim.

Article Name	Extracted Data	APA Citation	Outcome Categorization
Videoconferencing could reduce the number of mental health patients transferred from outlying facilities to a regional mental health unit	- Higher patient satisfaction, reduced travels and transfers - Lowered frequency of missed appointments, improved continuity of care and a faster receipt of consultant findings - Reduced patient transfer to regional and more provincial healthcare facilities	Buckley, D., & Weisser, S. (2012). Videoconferencing could reduce the number of mental health patients transferred from outlying facilities to a regional mental health unit. Australian and New Zealand journal of public health, 36(5), 478–482. https://doi.org.proxy.lib.uwaterloo.ca/10.1111/j.1753-6405.2012.00915.x	Health of Populations
Videoconferencing could reduce the number of mental health patients transferred from outlying facilities to a regional mental health unit	- In First Nation communities, video conferencing has resulted in net savings of $420,000 in patient travel costs, and savings of upto $70,000 for visiting the psychiatrist	Buckley, D., & Weisser, S. (2012). Videoconferencing could reduce the number of mental health patients transferred from outlying facilities to a regional mental health unit. Australian and New Zealand journal of public health, 36(5), 478–482. https://doi.org.proxy.lib.uwaterloo.ca/10.1111/j.1753-6405.2012.00915.x	Per Capita Cost

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Table 3 (Continued). A summary of extracted data from the articles as well as their relevant categorizations in the framework of the quadruple aim.

Article Name	Extracted Data	APA Citation	Outcome Categorization
Telehealth and indigenous populations around the world: a systematic review on current modalities for physical and mental health	- Evidence-Based Interventions (EBT's) with respect to the integration of cultural and community values into care delivery were only found in 40% of telehealth studies worldwide (systematic review & meta-analysis) - Critical to help improving treatment relevance (health belief-model), treatment engagement, and health outcomes with respect to mental health outcomes (anxiety, depression scales) and physical wellbeing (Hlc, hypertension, glucose levels, mortality rates etc.) - Telephone delivery highly preferred over computer or systems based delivery due to increased accessibility of smartphones as well as lower transportation barriers - Issues arise when service providers fail to reimburse healthcare providers (policy re-arrangements to be made) - Increasing the duration of telehealth delivery is also important as a minimum timespan of 8-12 weeks is imperative to for interventions to be effective, particularly due to behvarioual and lifestyle factors - Community based HR investments need to be made for clinicians and local staff to be trained to further incorporate social and cultural factors into care delivery	Dawson, A. Z., Walker, R. J., Campbell, J. A., Davidson, T. M., & Egede, L. E. (2020). Telehealth and indigenous populations around the world: a systematic review on current modalities for physical and mental health. mHealth, 6, 30. https://doi.org.proxy.lib.uwaterloo.ca/10.21037/mhealth.2019.12.03	Patient Experience

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Table 3 (Continued). A summary of extracted data from the articles as well as their relevant categorizations in the framework of the quadruple aim.

Article Name	Extracted Data	APA Citation	Outcome Categorization
Specialist cancer care through telehealth models	- Enhanced patient safety through telehealth oncological consultations - Safe administration of chemotherapy has been observed - High levels of continuity of care as mainstream health centres in rural areas have a wide acceptability for telehealth care, increasing patient access throughout the continuum - Incorporation of telehealth usage in smaller rural centres is imperative to increasing this continuum of care and enhancing coordination across rural health networks - Allowing teleoncology models to be incorporated into clinical trials is more effective because it allows for geographically and socially sensitive data and patients to be incorporated into cancer research	Sabesan S. (2015). Specialist cancer care through telehealth models. The Australian journal of rural health, 23(1), 19–23. https://doi.org.proxy.lib.uwaterloo.ca/10.1111/ajr.12170	Health of Populations
An economic cost analysis of an expanding, multi-state behavioural telehealth intervention	- Provider travel found to be roughly $85 more expensive that alloting a telehealth option, and patient-travel found to be $174 more expensive that alloting a telehealth option on average per patient - Increasing telehealth facilities is more likely to decrease these average costs - Building an integrative health network in rural communities with centralized hubs at larger regional facilities for analysis was found to be highly effective in reducing costs through the patient-cost volume models	Yilmaz, S. K., Horn, B. P., Fore, C., & Bonham, C. A. (2019). An economic cost analysis of an expanding, multi-state behavioural telehealth intervention. Journal of telemedicine and telecare, 25(6), 353–364. https://doi.org.proxy.lib.uwaterloo.ca/10.1177/1357633X18774181	Per Capita Cost

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Table 3 (Continued). A summary of extracted data from the articles as well as their relevant categorizations in the framework of the quadruple aim.

Article Name	Extracted Data	APA Citation	Outcome Categorization
Patient and practitioner satisfaction with tele-dermatology including Australia's indigenous population: A systematic review of the literature	- Patient satisfaction measured at 80% - Efficacy of diagnostic accuracy in telecare delivery found be approximately 80% accurate as in-person - Many patients still feel that teledermatology doesn't accurately measure they're conditions and all their complaints weren't adequately addressed - Patients who regularly required dermatogical care were more likely to pursue conventional treatment methodologies	Kozera, E. K., Yang, A., & Murrell, D. F. (2016). Patient and practitioner satisfaction with tele-dermatology including Australia's indigenous population: A systematic review of the literature. International journal of women's dermatology, 2(3), 70–73. https://doi.org.proxy.lib.uwaterloo.ca/10.1016/j.ijwd.2016.06.004	Patient Experience
Patient and practitioner satisfaction with tele-dermatology including Australia's indigenous population: A systematic review of the literature	- Practitioner satisfation found to be greater than patient satisfaction - 85% of GP's reported increasing knowledge on dermatology through telecare referrals - Factors that promote provider satisfaction include the effective pre-selection of patients for tele-dermatology, high photo sensitivity, dermoscopy for pigmented lesions, appropriate infrastructure, and access to continued educational courses	Kozera, E. K., Yang, A., & Murrell, D. F. (2016). Patient and practitioner satisfaction with tele-dermatology including Australia's indigenous population: A systematic review of the literature. International journal of women's dermatology, 2(3), 70–73. https://doi.org.proxy.lib.uwaterloo.ca/10.1016/j.ijwd.2016.06.004	Provider Experience
Patient and practitioner satisfaction with tele-dermatology including Australia's indigenous population: A systematic review of the literature	- Reduction in referrals to specialists reduced burden and empowered GP's to care for mild concerns - Staunch reduction in waiting times (an average of 4 hours to 3 days for telecare vs. 90 days for face-to-face)	Kozera, E. K., Yang, A., & Murrell, D. F. (2016). Patient and practitioner satisfaction with tele-dermatology including Australia's indigenous population: A systematic review of the literature. International journal of women's dermatology, 2(3), 70–73. https://doi.org.proxy.lib.uwaterloo.ca/10.1016/j.ijwd.2016.06.004	Health of Populations

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Table 3 (Continued). A summary of extracted data from the articles as well as their relevant categorizations in the framework of the quadruple aim.

Article Name	Extracted Data	APA Citation	Outcome Categorization
Patient and practitioner satisfaction with tele-dermatology including Australia's indigenous population: A systematic review of the literature	- Initial expenses are high such as purchasing and installing new equipment (computers, cameras, monitors, telecams etc.), training staff, and using the equipment for various technological requirements - Telehealth costs were found to reduce costs after an average of 2 years - Savings of $82 USD per patient were observed after a 3 year intervention in rural communities - In some cases, teledermatology can become over-expensive if it's dealing with complicated cases where a margin of misdiagnosis can be costly. It's important to ensure that tele-dermatology is avoided for complicated cases and conventional care is used instead to limit ER admissions	Kozera, E. K., Yang, A., & Murrell, D. F. (2016). Patient and practitioner satisfaction with tele-dermatology including Australia's indigenous population: A systematic review of the literature. International journal of women's dermatology, 2(3), 70–73. https://doi.org.proxy.lib.uwaterloo.ca/10.1016/j.ijwd.2016.06.004	Per Capita Cost
Mental health professionals' perspectives of telemental health with remote and rural First Nations communities	- Perceptions of telemental health usage remained usefull and positive for those with experience using it but those who were unaware of the operation, found it confusing and ineffective (perception wise)	Gibson, K., O'Donnell, S., Coulson, H., & Kakepetum- Schultz, T. (2011). Mental health professionals' perspectives of telemental health with remote and rural First Nations communities. Journal of telemedicine and telecare, 17(5), 263–267. https://doi.org.proxy.lib.uwaterloo.ca/10.1258/jtt.2011.101011	Provider Experience

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Table 3 (Continued). A summary of extracted data from the articles as well as their relevant categorizations in the framework of the quadruple aim.

Article Name	Extracted Data	APA Citation	Outcome Categorization
A cost comparison of travel models and behavioural telemedicine for rural, Native American populations in New Mexico	- Average savings of $31.42 USD per physician travel model and $195.18 per patient travel model per session - Significant drops in technology costs, now personnel costs remain the leading expenditure	Horn, B. P., Barragan, G. N., Fore, C., & Bonham, C. A. (2016). A cost comparison of travel models and behavioural telemedicine for rural, Native American populations in New Mexico. Journal of telemedicine and telecare, 22(1), 47–55. https://doi.org.proxy.lib.uwaterloo.ca/10.1177/1357633X15587171	Per Capita Cost
The socio-economic impact of telehealth: a systematic review	- Providing education and assessing risk before turning into an emergency department admission has saved approximately 23% of emergency department funding ever since the introduction of telemedicine into first nations communities in Canada	Jennett, P. A., Affleck Hall, L., Hailey, D., Ohinmaa, A., Anderson, C., Thomas, R., Young, B., Lorenzetti, D., & Scott, R. E. (2003). The socio-economic impact of telehealth: a systematic review. Journal of telemedicine and telecare, 9(6), 311–320. https://doi.org.proxy.lib.uwaterloo.ca/10.1258/135763303771005207	Per Capita Cost

perceptions on telemedicine and its diagnostic accuracy requires a thorough intervention from local community health centers through community leaders who can explain to populations about the convenience, safety, and accessibility with telehealth diagnosis; past strategies have even increased telehealth acceptance from 30% to 70%.[7]

Care quality

According to clinicians, and even in accordance with patient perceptions, the efficacy of telehealth in delivering safe and quality healthcare was found to be the same as conventional treatment methods.[5] Ironically, in some indigenous groups, telehealth resulted in more desirable outcomes such as lower blood pressure for patients with hypertension and better glucose levels for those with diabetes.[5,9] This is because, patients who didn't have to leave their communities to receive care (i.e., through telehealth) were more likely to feel comfortable and avoid the feelings of alienation, anxiety, and distress associated with a regional center that feels "foreign" to them.[5,7,8] Despite bolstered clinical outcomes, issues did arise.[5] For geriatric care, and in particular, patients with technological accessibility concerns such as older adults and those with hearing difficulties, telehealth utilization could not be performed individually.[7] For many of these medically marginalized groups having difficulty accessing healthcare, literature mentions the growing need to have clinicians delivering home care or community-level care during telehealth administration with specialists at regional facilities to uphold patient equity.[6,7] Furthermore, in the delivery of care itself, evidence-based interventions were seldom followed.[6] In fact, in an international systematic review of telehealth studies worldwide, only 40% of telehealth care services in rural indigenous populations integrated cultural and community values.[6] As a result of this, and as per the health-belief model, patients failed to resonate and engage with providers as well as they could have.[6,7,9] Additionally, this also had the effect of shortening the delivery of care from a recommended 8 to 12 weeks for rural indigenous populations, to an average of 2 weeks.[6,7] Not only are these patterns strong supporters of higher cholesterol levels, higher hypertension rates, and worse mental health, but they also distance providers from rural patients.[6] Literature urges for increased funding and resources to be supplemented into more thoroughly understanding and implementing aboriginal values, training physicians in regional facilities, and embedding community-based care as part of telehealth delivery.[6,7,8,9]

Health of populations

Patient education and awareness

Among the benefits of telehealth are patient education and patient engagement strategies, particularly when patients are keen to bring their families and caregivers with them, further improving the health literacy of a patient's mesosystem.[5,10] This enhanced health awareness has had the effect of increasing in-patient attendance to community-wide health education programs from 20% to over 85%, on average, in indigenous regions around the world.[11] Subsequently, heightened community programming, and patient engagement in telehealth related health promotion endeavors has had the effect of improved screening rates and has bolstered openness about receiving medical treatment.[10,11,12] For instance, with a disease as stigmatized and taboo as HIV, over 60% of rural indigenous folks after receiving care services through telehealth, reported being open to receiving treatment and publicly attending engagement and awareness events.[10] While telehealth was initiated to deliver care, it also delivers education to marginalized communities, empowers them to seek care, and even encourages them to be proud of it.[13]

Lowering emergency department visits, waiting times, and patient transfers

In rural indigenous communities, regional center are often over-burdened with patients in the emergency department (ED), and for specialist appointments.[6,7,8] With the incorporation of telehealth, and the vast growth of preliminary screening, ED visits in regional facilities have been reduced by up to a third.[6,7,8] This has also had the effect of freeing up specialists in the hospital who now have more time to conduct care consultations with patients based off appointments.[6,8,9] In fact, waiting times for specialist consultations following the year-long implementation of telehealth have been reduced from 90 days to a range of 4 hours to 3 days in some states.[8] While this is good for patients in terms of transportation efficiency, it does increase burden upon those sites.[14] Literature encourages investments into software development and EMR (electronic medical record) competency for community members to consult with physicians from their phones through mobile applications.[14] This is believed to reduce the burden and wait times on community health centers for telehealth consultations.[14]

Research opportunities

As research into indigenous healthcare, their needs, their preferences, and community-level care are often neglected, so are the biological underpinnings of many diseases such as cancer.[15] There is a great lack of patient data, clinical data, and even behavioral data for aboriginal patients across a variety of chronic diseases including cardiovascular disease, diabetes, arthritis, etc.[10,12,15] This makes it difficult for practitioners to provide care for many indigenous populations and having this data available could advance much development.[10,12,15] Telehealth has been found to provide this patient data, and with enhanced electronic health record (EHR) communications, it can be shared to conduct more population-specific clinical research and analysis.[15]

Per capita costs

Up-front investments

Unlike in urban regions where the costs of technological implementation have started to become subsidized and more streamlined with existing telecommunications and technological infrastructure, the opposite is the case for rural indigenous communities.[8] An investment into the average rural indigenous community is sought to accompany a capital infrastructure cost of $30,000 USD to care for about 1,000 patients.[8,16] Typically, these investments include the development of telecommunications infrastructure, staff training, procedural management, referral management, documentation, clinical standards implementation, billing, and other forms of structural management.[16] Despite a relatively consistent set of fiscal requirements for telehealth implementation across regions, literature observes that most implementations of telehealth in rural indigenous communities don't follow similar standards of clinical guidelines, financial regulations, or even cost structuring.[16,17,18] Therefore, it's recommended for policy specialists to fund research and devise evidence-based procedures for incorporating telehealth practices into rural indigenous communities in a more systematic, consistent, and cost-effective manner.[8,16,17,18]

Travel costs

Understandably, the most critical cost-savings in telehealth take place in the reduction of travel costs, for both patients and providers.[14,17] On average, travel costs provider into rural communities for consultations or procedure was found to be $85 USD more expensive, per patient, than using telehealth.[14,17] In fact, patient travel was found to be $174 USD more expensive, per patient, than using telehealth.[14,17]

Medical specialties

Surprisingly, while telehealth offers the opportunity of using many medical specialties, geriatric services and psychiatric services are mostly used.[19] Interestingly, chronic diseases—which are mostly prevalent in most of the population—were less used.[19] This includes diseases such as cardiovascular disease, diabetes, kidney disease etc.[12,14,19] As a result, most telehealth services offered, were those of a consultation-based nature, as opposed to a diagnostic or procedural one, even though the technological capabilities are present.[12,14,19] It is also these specialties that require greater clinical resource mobilization such as staff or specific imaging softwares.[19] In consequence, the cost savings with respect to telehealth in literature must be taken with a grain of salt as they do not comprise largely of more costly medical specialties such as cardiology, endocrinology, oncology, neurology, and others.[7,19] In fact, literature has found that patients who had dermatology diagnosis and consultations were more likely to increase costs because they would be transferred to a hospital more frequently because of incorrect clinical analysis.[7,8,9] To account for the cost of these specialties, and to better measure their outcomes, more pilot programs with them must be run to develop a better sense of clinical cost.[7,19]

Preventative care cost reduction

While telehealth houses some complexities in calculating savings, certainly there are elements that can be simply computed.[7,19,20] For instance more thorough and active screening, as well as enhanced monitoring and case management following telehealth implementation have resulted in a 23% reduction in ED admissions at regional facilities from rural indigenous populations.[20] In fact, primary care prevention has been effective to the point where children screened for ear issues from a young age through telehealth, were 70% less likely than their counterparts to repetitively present ear problems to their physician.[8] These populations were also less likely to contract ear disease and infections in communities of poor sanitation, where infections are common.[8,9,20] Furthermore, combining primary and specialist care through integrative rural health models was shown to further improve workflow, enhance patient outcomes, and reduce fiscal barriers.[17] Therefore, the recommendation of rural health integration, fiscal accountability, resource sharing, and clinical-practice standardization is consistently re-emphasized to ensure all facilities in the region are equipped to service the population.[21] With the implementation of Ontario Health Teams, this can definitely be facilitated with strong legislative support.

Provider experience

Perceptions

Overall, when it comes to telemedicine and telehealth delivery into rural populations, literature shows high favorability among clinicians, healthcare practitioners, and most notably, physicians.[5,21] On a rough aggregate, 84% of physicians enjoyed telehealth deployment in rural indigenous communities and found it to be more effective than traditional, in-person care.[22] Because of an increased ease of access, "failed to attend" rates declined, providers noted to use more screening tools which resulted in fewer case complications, and more evidence-based care was being implemented.[22] In fact, administrative work also became simpler for clinicians with the implementation of all-in-one EMR solutions.[21,22]

Championing indigenous clinicians

While certainly the rates of provider experience through telemedicine have been beyond exceptional, literature does indicate that increasing indigenous healthcare worker

participation is essential in facilitating more effective clinical outcomes.[11] In fact, the incorporation of indigenous clinicians was found to increase telehealth uptake in these communities from 46% to 75%.[11] This is because indigenous clinicians better understand local languages and cultures, and hence connect better with patients.[11] More importantly, literature suggests that indigenous clinician-specific training modules be developed by regional hospitals and rural health governing bodies to train indigenous clinicians in delivering healthcare.[21,22] Also, a new role that has emerged would be "clinician liaisons" in community health centers, who facilitate patients in the implementation of telehealth with specialists, through diagnostic examinations, translations, explanations, or technological support.[21,22] Certainly, medical curriculum development for indigenous clinicians in delivering telehealth care to indigenous communities is deemed to be helpful.[11]

Clinician skillset

A barrier that's often perceived by system experts against the implementation of telehealth especially into rural communities is often the component of staff, clinician, and physician training with the technology.[22] This argument becomes more complex depending on the medical specialty and the increasing web of complications in diagnosis and treatment.[22] However, contrary to popular belief, 80% of clinicians found telehealth technology to be easy to learn and understand.[22] In fact, in a Northern indigenous study in Canada, a seemingly complex robot used for general diagnostic procedures by general physicians, dermatologists, cardiologists and others, required an hour worth of training to be clinically operated.[8,9,19] Physicians even found some of this technology to be easier and timelier than conducting in-person examinations, leading 84% of nurses to be content with the technology.[13] Furthermore, with a greater array of information available through teleconferencing on the EMR system, up to 85% of general practitioners acknowledge learning more about other specialties, such as dermatology.[7] In fact, this can be a great resource for medical students or practitioners in residencies, who can learn greatly about using new healthcare technologies for marginalized communities.[13]

CONCLUSIONS

As illustrated in literature, telehealth certainly houses many elements of support, benefit, and care delivery into rural indigenous communities, which are often deprived of access to quality healthcare. While the existing structures of telehealth bode decently well with conforming to the guidelines of the quadruple aim, there is substantial evidence indicating that investments into telecommunications software, clinical skillsets, population monitoring and awareness as well as integration will help it conform better.

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- Drafting the work or revising it critically for important intellectual content; AND
- Final approval of the version to be published; AND
- Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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