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COMMENTARY

Challenges in the uptake of telemedicine in dentistry

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ABSTRACT

With the availability of oral care services very unevenly distributed in rural or remote areas, underserved people seek oral care from non-dental care providers. Against this backdrop, and coupled with the decreasing cost of and innovations in technology, there is a growing interest in the adoption of telemedicine services. Regardless of the lack of good-quality evidence supporting the cost-effectiveness of telemedicine, evidence already indicates that telemedicine, even with extra costs, helps in reducing the inequalities in the provision of primary health care. Telemedicine has the potential to overcome geographical barriers and contribute to closing the rural–urban healthcare gap in Australia and many other regions. Although research examining different teledentistry applications has found that this technology can be successfully integrated into different settings, there is little active teledentistry practice in Australia. The integration of telemedicine into the mainstream oral health system is a complex and collaborative process in which numerous factors at individual, infrastructure and organisational levels are involved. Addressing the barriers that delay the implementation of a teledentistry service can provide valuable insights into its lack of acceptance and establish an evidence base that can help to inform future decisions about the benefits of teledentistry.

Key words: acceptance, Australia, barriers, evidence, oral health, teledentistry.

Context

Although the average dentist-to-population ratio has increased over recent decades, a significant discrepancy between the ratio in urban and rural regions still exists[1]. With the availability of oral care services very unevenly distributed in regional and remote/very remote areas, underserved people seek oral care from non-dental care providers, most commonly physicians, hospital emergency departments or pharmacies[2-4]. Non-dental

care providers often help to provide symptomatic relief and/or issue a referral to a dentist rather than providing effective dental care[2,3].

Short-term measures such as relying on visiting services or volunteerism to overcome the lack of dental services in underserved areas can help but are often only temporary solutions. We need to look for long-term and systematic approaches for an ongoing solution. Against this backdrop and coupled with the decreasing cost of and innovations in information and communication technology (ICT), there is growing interest in the adoption of telemedicine services[5]. Teledentistry is a form of telemedicine that is specifically dedicated to dentistry that uses electronic medical records, ICT and the internet to provide consultation at a distance[6]. It is an innovative method of health service delivery that has the potential to facilitate timely distribution of information to locally based practitioners for better decision making, effectively triage patients who require referrals and support locally based treatment[7,8]. This strategy allows the underserved population to seek treatment earlier, provide access to specialist care and minimise the burdens of patients/parents who would have to travel long distances to receive consultations. The potential advantages of teledentistry are summarised in Table 1.

The history of teledentistry can be traced back to the 1990s, when the US Army established the first teledentistry project, Total Dental Access, within the Department of Defense, which enabled the referring general dentists located in a dental clinic at a military base to consult with dental specialists at a distance[9]. Ever since, the number of teledentistry projects has rapidly increased, particularly in the USA, Europe, Australia and Brazil[10]. Despite growing interest in this technology, there has been a relatively slow integration of telemedicine into the mainstream oral health system. This can be attributed to the fact that many teledentistry projects are still ongoing or in proof-of-concept stages[10]. In the past decade, the Alaskan Native Tribal Health Consortium in partnership with the University of Washington established a telemedicine-based workforce model with a long-term strategy that centres on developing and training dental health aide therapists in Alaska to provide essential dental care, utilising telemedicine, to Alaskan residents under indirect supervision by dental experts[11,12].

Two different technological approaches are used in telemedicine applications: real-time and store-and-forward technology. Although teledentistry services are still largely utilised in real time[10], store-and-forward teledentistry has proven to be more cost-saving and efficient compared to real-time and in-person care approaches[4,13,14]. Previous studies have not provided any evidence that telemedicine interventions are cost-effective when compared with non-telemedicine care approaches[15,16]. Most research reports have indicated that the absence of evidence supporting the cost-effectiveness and effectiveness of telemedicine creates a barrier to its implementation within routine healthcare services. Cost-analysis studies of telemedicine are often pragmatic and mainly concerned with costs and their minimisation while ignoring equity issues of access to health care. Regardless of head-to-head economic benefits, evidence already indicates that telemedicine, even with its potential extra costs, can help in reducing inequalities in oral health[17].

Issues

Despite its enormous potential, several constraints for the growth and acceptance of teledentistry do exist (Table 2). The successful implementation of a sustainable telemedicine model is a complex and collaborative process involving numerous factors at individual, infrastructure and organisational levels[18]. Although perceived usefulness and ease of use are essential factors in the acceptance of any technology[19], there is very little published evidence regarding patient readiness and acceptance of teledentistry services[20]. The body of literature on the acceptance of teledentistry is limited to care providers'[21-25] or end-users'[26] perceptions of this technology. Further research is needed to examine in depth the patient's acceptance of teledentistry. Other considerations such as non-technological, political or organisational barriers (planning, bureaucratic difficulties, lack of reimbursement guidelines, and medico-legal and copyright issues) have not been well investigated in the literature[27,28]. Such issues may become more evident when the practice of teledentistry becomes more widespread, highlighting the need for creating new laws to regulate the practice of teledentistry.

Table 1: Benefits of teledentistry

Level	Benefits
Patient	• Provides access to primary and specialised dental care • Allows reception of a timely diagnosis and follow-up appointment • Improves communication between the care team and patients • Facilitates patient education • Avoids costs and risks associated with travelling and overnight accommodation
Care provider	• Increases dental workforce capacity • Allows effective triaging of patients • Reduces waiting lists • Reduces inappropriate referrals • Improves communication amongst care providers • Connects local dental practitioners with dental consultant at hub site • Reduces isolation of health professionals practising in isolated regions
Quality of care	• Increases efficiency of care delivery • Improves clinical outcomes • Reduces pain and co-morbidities associated with delayed diagnosis and treatment • Facilitates monitoring patient's condition
Societal	• Minimises burdens of parents or caregivers missing work • Reduces frequency of missed school days • Reduces inequity and inequalities in oral health in the community • Addresses specific needs of underserved populations

Table 2: Barriers to the uptake of teledentistry

Level	Barriers
Individual	• Lack of research on patient's acceptance of teledentistry services • Poor levels of IT literacy • Resistance to new technologies • Lack of direct patient contact • Concerns about data security and inappropriate access of health records • Concerns with decline in the accuracy and quality of health information • Increased clinical workload and consultation time • Increased costs and practice expense
Infrastructural	• Lack of internet access and poor connectivity availability in rural and remote regions • Hardware and software incompatibility • Complexity of the technology • Funding sustainability • Unavailability of technical expertise • Lack of training in the use of technology associated with telemedicine • Lack of ongoing technical support
Organisational	• Incompatibility of telemedicine with current healthcare system • Lack of reimbursement structure • Lack of copyright, licensure and taxation guidelines • Malpractice and medico-legal issues • Bureaucratic difficulties • Difficulty in coordination between remote and hub sites

Lessons learned

The shortcomings in existing policy and practice may indicate that the use of teledentistry does not receive support by healthcare policy-makers due to lack of evidence related to the cost-effectiveness of teledentistry in head-to-head comparisons[29]. Addressing the barriers that delay the implementation of teledentistry services can provide a valuable insight into its acceptance and establish an evidence base that can help to inform future decisions about the benefits of teledentistry. Both strong political support and adoption of new legislations are essential to bring the underserved population up to an acceptable level of oral health and reduce the inequalities in oral health status between those who live in rural areas and in general populations.

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