

► E-health and the Universitas 21 organization: 2. Telemedicine and underserved populations

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Summary

Telemedicine activities in underserved communities were reviewed as part of the Universitas 21 (U21) e-health project. A SWOT analysis (strengths, weaknesses, opportunities, threats) was conducted on 12 articles identified in a literature review, supplemented by expertise from U21 members. The analysis showed that threats include the reluctance of populations to use telemedicine services, and a general absence of infrastructure and resources to sustain them. Opportunities centre around potential research, including cost-effectiveness analyses and quantitative assessments of existing telemedicine services. The great strength of telemedicine is that it can improve access to health services among those most in need. However, its greatest weakness is the lack of evidence supporting its clinical and cost advantages relative to traditional services. This represents an important opportunity for research on telemedicine initiatives among underserved populations.

Introduction

Telemedicine – here used as an umbrella term to encompass all health-related activities involving distance – is a method of improving health-care delivery among underserved populations, both nationally and internationally. Telemedicine projects have been carried out in developing countries such as India,^{1,2} Bangladesh,³ South Africa,⁴ the South Pacific^{3,5} and Nepal.³ Telemedicine has also been used in underserved regions of industrialized countries such as the United States⁶ and the United Kingdom.^{7,8} Services include teleradiology to improve neurosurgical consultations,⁴ email consultations,^{3,9} Internet and email distribution lists,⁵ remote mental health assessments,⁷ and the use of personal digital assistants (PDAs) to improve access to information.¹

The majority of telemedicine initiatives have been successful in improving certain aspects of health service delivery. For example, one international project has been operating since 1999, and has been successful

in providing diagnoses and management advice for doctors in developing countries, and in sparing patients the cost of unnecessary international travel.^{3,10} It has expanded from serving a single hospital in Bangladesh to offering specialist second opinions to doctors in 45 participating hospitals in 18 developing countries. Although the majority of telemedicine projects are not as ambitious in scope, they all appear to increase access to better health services. However, little is known about the cost-effectiveness and sustainability of these services.

The aim of the present study – which was part of the Universitas 21 (U21) consortium's work in global e-health¹¹ – was to summarize recent telemedicine activities in underserved communities, and to examine their potential for long-term health service delivery.

Methods

A SWOT (strengths, weaknesses, opportunities, threats) analysis focuses on the subject's internal (strengths and weaknesses) and external environment (opportunities and threats) in order to identify its strengths, weaknesses, opportunities and threats.¹² It was chosen to examine the application of telemedicine in

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underserved populations because it is a well known form of analysis that is easy to use and understand.¹² SWOT analysis has been used in health-related fields in the past with success,^{13,14} although not in the area of telemedicine specifically.

A review of the literature on telemedicine and underserved populations was conducted by searching PubMed using the MeSH term 'telemedicine' paired with 'vulnerable populations', 'medically underserved area' and 'developing countries'. A total of 70 articles was found. The search was not intended to be an exhaustive literature review, but simply to provide a background for the SWOT analysis. Articles chosen from the search results were those that reported on findings from specific telemedicine initiatives among underserved populations (rather than opinion articles) in the last five years. A total of 12 articles were included in the SWOT analysis (see Table 1). Analysis was conducted by creating a worksheet with the four relevant categories (strengths, weaknesses, opportunities, threats) into which information related to each category was entered. Content from the articles was supplemented by the expert opinion of one of the authors who has several years of direct experience in the area of telemedicine and underserved populations.

Results

The following threats, opportunities, weaknesses and strengths summarize the potential of telemedicine applications for underserved populations.

Threats to the success of telemedicine among underserved populations

There are a number of outside threats to telemedicine services among underserved populations. One of the most immediate threats is the possible reluctance of

the population to use telemedicine services. Many of the world's most marginalized populations lack access to technologies, and even among those that have such access, there may be a lack of ability to use technologies.¹ Furthermore, new technologies tend to change rapidly, requiring populations to constantly try to keep up with new knowledge. At a more basic level, communities with low levels of literacy will automatically be excluded from text-based communication technologies such as email.

Another potential threat is a lack of infrastructure suitable for telemedicine and resources to sustain telemedicine services. Inappropriate use of existing resources could potentially deter future investment in telemedicine. Other threats to telemedicine include the possible reluctance of health professionals to deliver telemedicine services, a lack of medicolegal protocols for these services,^{8,15} and a lack of consistent patient follow-up in resource-poor countries, making it difficult to assess the clinical effectiveness of telemedicine services.¹⁵

Opportunities for telemedicine among underserved populations

Most of the opportunities for telemedicine among underserved populations centre around potential research.⁸ There is a particular need for cost-effectiveness analyses of existing telemedicine services. It must be made clear that these services offer significant improvement in delivery costs over traditional medical services if they are to be implemented widely. The majority of research on telemedicine has been at the level of the individual case study and the small-scale qualitative assessment. It is not known how many potential patients at referring hospitals have been missed, or what the long-term outcomes are for patients who have been treated. Without sound research providing evidence of telemedicine's sustainability, clinical and cost-

Table 1 Details of the 12 studies used in the SWOT analysis

Study	Country/countries	Project
Chandresekhar and Ghosh, 2001 ¹	India	Various
Freir <i>et al.</i> , 1999 ⁷	Scotland	Videoconference psychology consultations
Ganapathy, 2002 ²	India	Videoconference/email neurosurgery consultations
Marcin <i>et al.</i> , 2004 ⁶	United States	Videoconference paediatric consultations
Nakajima and Chida, 2000 ⁵	Various South Pacific nations	Distance learning for health professionals
Patterson <i>et al.</i> , 2001 ¹⁶	Bangladesh	Email referrals to specialists
Swinfen and Swinfen, 2002 ¹⁵	Various	Email referrals to specialists
Swinfen <i>et al.</i> , 2003 ³	Various	Email referrals to specialists
Vassallo <i>et al.</i> , 2001 ⁹	Bangladesh	Email referrals to specialists
Vassallo <i>et al.</i> , 2001 ¹⁰	Bangladesh	Email referrals to specialists
Wootton, 1999 ⁸	UK	Various
Wootton, 2003 ¹⁷	Various	Email referrals to specialists

effectiveness, underserved populations will be reluctant to invest in the set-up and maintenance of telemedicine services.

Weaknesses of telemedicine among underserved populations

As mentioned in the previous section, one of the central weaknesses is that the literature contains rather limited evidence of successful and sustainable use of telemedicine in underserved areas. Other weaknesses include potentially cumbersome and difficult to use equipment,⁶ a potential increase in physician workload, and limited resources for set-up and ongoing operation of telemedicine services.⁹

Strengths of telemedicine among underserved populations

An obvious strength of telemedicine is the improved quality of treatment in underserved populations. Enhanced treatment quality is most apparent in increased access to specialist services.^{8,16} Specialist access is arguably one of the biggest problems facing underserved populations. Telemedicine enables physicians in underserved areas to consult with specialists both nationally and internationally, without leaving their physical location. More rapid diagnosis and fewer missed diagnoses are other important improvements in treatment quality due to telemedicine.³ Other strengths of telemedicine include the decrease in patient travel for health services^{2,10,16} and the mutual exchange of knowledge among practitioners connected by telemedicine.^{5,8,10}

Discussion

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Telemedicine in underserved populations has great potential to improve access to health services among those who need those services most. However, telemedicine's greatest weakness is the lack of evidence supporting its clinical and cost advantages relative to traditional services. Obviously, this represents an opportunity for research to be conducted on new and existing telemedicine initiatives among underserved populations. Due to the lack of follow-up common with patients in many countries, it will be particularly challenging to determine the clinical efficacy of telemedicine services; however, it is of critical importance that researchers work to overcome this and other challenges in order to produce sound research on telemedicine and underserved populations.¹⁷

It is important to remember that although telemedicine may increase access to health services among underserved populations, equity of access is not the ultimate goal of a health-care system. Rather, improving and maintaining the health of all citizens should be the primary goal. Furthermore, access to health services should be understood as one component of a number of interactive health determinants, including systemic poverty, education, socioeconomic status and geography.¹⁸ Telemedicine alone is unlikely to have a significant effect on the health status of underserved populations without corresponding and substantial investments of resources in other determinants of health. Finally, it should be kept in mind that many underserved populations lack access to the technical resources needed for telemedicine. As a result, the technologies commonly used in telemedicine risk further alienating the most marginalized members of underserved populations. For telemedicine applications to provide optimum assistance to underserved populations, it is important that the fundamentals such as education, literacy and community capacity development are not neglected in favour of telemedicine. In addition, more investment is needed in basic communication technologies within underserved areas to ensure that telemedicine applications are available to the widest number of communities possible.

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