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Cell Phone Short Messaging Service (SMS) for HIV/AIDS in South Africa: A literature review

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Abstract

The HIV/AIDS pandemic is one of the most serious threats to global health. HIV/AIDS is a chronic illness, requiring patient empowerment to enhance adherence to treatment regimes if it is to be managed effectively. While healthcare costs are rising, people still have expectations of high-quality care. This literature review-based study explored the use of cell phone (mobile phone) short messaging services (SMS) in health care, in particular for HIV/AIDS in South Africa.

From an initial corpus of 212 papers, 28 were reviewed. The main findings include that SMS can improve service delivery through appointment reminders and improve communication between healthcare workers. It improves diagnosis, prevention, treatment and rehabilitation by supporting adherence to medication, and monitoring illness and medical interventions. SMS is useful in public health programmes, such as contact tracing and partner notification, therefore playing an important role in control of HIV/AIDS. As South Africa has one of the highest uptakes and demographic distributions of cellular technology in the world, SMS is feasible as a tool to deliver quality health care with low cost.

Keywords:

Enabling technologies, Mobile technologies, Cell phone, Mobile phone, Health care, HIV/AIDS, South Africa, SMS.

Introduction

South Africa has a population of 48.7 million, with 46% living in rural areas. Many South Africans are struggling with HIV/AIDS infection [1]. The data suggest that, in the decade to 2010, up to 7 million South Africans will die from AIDS [2], with life expectancy in South Africa falling to 43 years. With approximately 5.7 million people living with HIV in South Africa, including 280,000 children under 15 years old, young people are increasingly at the centre of the HIV/AIDS epidemic [3], [4]. Many social factors drive the HIV/AIDS epidemic in South Africa [5].

It is acknowledged that only anti-retroviral (ARV) medication can prolong the lives of people with AIDS, and the successful roll-out of the country's ARV program is therefore crucial. ARV drug treatment can maintain health and help people lead relatively normal lives, but few people in South Africa have access to this treatment [6]. By mid-2006, while some 711,000 people in South Africa were in need of anti-retroviral treatment (ART), only 225,000 were actually receiving it. [7]

Cell Phone and SMS Use in mHealth Services

ICTs (information and communications technologies) can have an important role to play in the HIV/AIDS crisis [8]. They are integral to mHealth (mobile health), defined as the 'emerging mobile communications and network technologies for healthcare systems' [9]. mHealth is a recent term that encompasses the use of mobile telecommunications devices and mobile computing, such as mobile (cell) phones, patient monitoring devices and medical sensors, PDAs, and other wireless devices, to support medical and health care, and public health practice [10, 11].

There were over 4 billion mobile devices in use around the world in 2009, with 64% of them in the hands of people living in developing and emerging economies [10, 12]. 80% of the world's population lives in areas with mobile phone coverage making mobile technology probably the most viable type of technology to reach the largest part of the world's population [13]. The National Department of Health (NDOH) has adopted a National Telemedicine Strategy for South Africa (NTSSA) which was established in 1998 [14]. However, the national telemedicine system is not working and has not solved the initially anticipated health problems [15, 16].

Cell Phone and SMS Use in South Africa

South Africa has one of the highest uptakes and demographic distributions of cellular technology in the world. There are around 30 million active cell phone users in the country, almost two-thirds of the South African population [17]. 60% of households in South Africa own a cellular telephone and 41% of adults have access to a cell phone.

People use cell phones daily for communication. They are an inexpensive and rapid way to be connected to the internet in areas where the fixed telecommunications infrastructure is poor or there is a lack of resources [8]. Low start-up costs, text messaging, and flexible payment plans, all make them

attractive to use as a healthcare intervention [18].

Since rural youth are at the front line of combating HIV/AIDS in their communities, cell phones and other ICTs might play a contributing role to linking these future leaders [19]. One of the benefits of mobile technology is that it is used as an agent for social change worldwide today [20].

Healthcare services are facing pressure to improve efficiency and meet expectations for high-quality care and customer service [21] and SMS is a well established technology and widely used around the world. SMS (short message service) is a method of communication that sends short (160 character) text messages over the mobile networks. However, it is not without limitations. There is no scope for graphics or audio, the messages are limited by size, speedy message delivery is not guaranteed and the issues of confidentiality and privacy are a matter of great concern.

Literature Review Method

This desktop literature review, mostly conducted between February and December 2008, explored the potential use of cell phone SMS in health care in South Africa. Several readily available literature sources were electronically explored, including Pub Med, Medline plus, Pub Med Central, AID Search, AIDS related database, Cochrane Library, Electronic Journals Services (EJS), and Google Scholar. Articles in a language other than in English language were excluded. In the beginning, literature was searched using these key words: enabling technologies, wireless technologies, mobile technologies, cell phone, cellular phone, mobile phone, health care, HIV/AIDS, HIV, home care, possibilities, potential, role, monitoring, working groups, volunteer organization, South Africa. Only 72 articles out of 28,703 search engine hits were included in the study.

Table 1--Summary of 28 studies.

	Study Design	**Resources Reference no.**
1	Pilot study (6)	[25-30]
2	Qualitative study (3)	[31-33]
3	Observational study (1)	[34]
4	Randomized control trial (6)	[35-39]
5	Cohort (2)	[40, 41]
6	Mix qualitative and quantitative (2)	[42, 43]
7	Case study (2)	[44, 45]
8	Interview (1)	[46]
9	Meta-analysis (1)	[47]
10	Peer review (1)	[48]
11	Systemic review (3).	[24, 49, 50]

Due to the relative lack of published articles found, the search strategy was modified, and most of the literature was retrieved from Pub Med/ Pub Med Central and Google Scholar. The key words used included: Potential use short messaging service (SMS) cell phone OR mobile phone OR cellular phone, health care, HIV/AIDS, patients, South Africa. Original articles or review articles in English were selected, and only 140 articles out of 1,656 search hits were included.

A total of 212 articles were reviewed for the study, of which, 184 (87%) were excluded from detailed review, as they did not explore the potentials of cell phone or SMS technology in detail. Finally, 28 (13%) of the original corpus of published articles were reviewed (summarized in Table 1). In addition, policy papers, such as the 1997 White Paper by the Ministry of Health for the Transformation of the Health System in South Africa [22], were reviewed.

Results

The main findings of this literature review were that:

1. SMS improves service delivery through: (a) Appointment reminders [23, 25, 34-36, 40, 51]; (b) Improving communication between healthcare workers [32, 52].

2. SMS improves diagnosis, prevention, treatment and rehabilitation of illness by: (a) Improving adherence to medication [23, 33]; (b) Monitoring illness and medical interventions [26, 30, 43]; (c) Prevention and intervention of illness [47].

3. SMS is useful in Public Health Programs via: (a) Contact Tracing and Partner Notification for communicable diseases [24]; (b) Smoking Cessation Programs [37, 51].

Discussion: SMS and Text Messaging for Health

Many of the examples of health applications of mobile phones are in the pilot stage and have yet to be implemented or evaluated on a significant scale [18]. Text messaging has been significantly used in health care, mainly as a means of reminding patients of appointments in the United Kingdom, United States, Norway, and Sweden [18]. SMS was found to have been used widely to improve quality of life in several areas, including health. All the randomized control trial studies available in this study have shown significant results ($p < 0.005$). Randomized controlled trial studies from Malaysia [35] and China [36] showed that text messaging reminders were effective in improving attendance in primary care and cost less than mobile phone call reminders. A systemic review study by Atun *et al* suggested that SMS has the potential to improve tuberculosis control, contributing to reduced non-compliance and better health outcomes with low cost [49].

Some other studies support the use of SMS reminders as an accessible, appropriate and more cost effective tool for patients needing TB medication in South Africa [54]. SMS lowers non-attendance rates, with less labor, in the UK [55] and improves attendance at outpatient clinic appointments in Melbourne, Victoria [23]. It increases patient compliance in taking medication for TB and HIV [57]. Atun and Sittampalam, in another systemic review, found that SMS improves efficiency in the delivery of healthcare. It has public health benefits [24] and is acceptable to patients. However, none of the studies included any formal economic evaluations.

Not all researchers have the same findings and opinion about

SMS technology, with some of them being more skeptical. Kaplan [50] stated that the majority of reports are pilot or feasibility studies, with limited generalization of their findings, and so possibly unreliable. More rigorous evidence is needed for drawing conclusions. Although most of the studies reported that SMS technology is feasible and that there is a good level of patient acceptance, there are methodological problems of either small sample size and lack of representativeness in many, or they were pilot studies done in a relatively short time. However, the studies manage to highlight the important issue of SMS technology and create a positive environment for further study.

Two in-depth studies claim that SMS technology is acceptable to most of the patients. One is a qualitative (in-depth interview) study done in Cape Town by Cell-Life [56], with another qualitative study (based on in-depth interviews) done in Lima, Peru [57]. However, the sample size of the studies was small, and they were conducted in limited areas and, as such, lack a holistic representation of the population such that the results cannot be generalized. There is a need for further studies despite the fact that this method gives more satisfaction to patient parties. Curioso *et al* found that most of their study participants were concerned about privacy and confidentiality as well as the wording of the messages [58]. They did not want "sensitive" words (e.g. 'HIV', anti-retroviral) related to HIV included in the system, and preferred using code words or phrases; something simple such as 'It is time for your candy/life,' but which was understood). Some participants also suggested erasing the reminder after receiving it. This study clearly indicated that the issues of confidentiality, privacy and security are serious considerations when using SMS technology.

Cell phones are widely used in health care in low and middle income countries. In addition to SMS or texting, multi-media messaging service (MMS) can be used [59]. In Brazil and Zambia, health workers consult dermatologists using newly available camera phones [18]. While only 18 percent of clinics in South Africa have Internet-connected computers, 96 percent have a least one cell phone [60]. A system created by Voxiva uses cell phones to boost HIV/AIDS care [61]. The system tracks people living with HIV/AIDS and now connects 75% of the country's 340 clinics and covers 32,000 people in Rwanda.

There are three types of benefit from SMS:

1. It has, improved efficiency in the delivery of healthcare by appointment reminders [24, 62-64],

2. SMS has provided direct benefits to patients in terms of better health outcomes and quality of service by improving the patients adherence to their medications and treatment; monitoring patients' conditions; providing psychological support to patients; communicating test results; queue management in health care facilities [64],

3. It has public health benefits as it has been used in contact tracing and partner notification for communicable diseases such as sexually transmitted infection (STI), tuberculosis (TB), HIV/AIDS and severe acute respiratory syndrome (SARS) as well as communicating health information to the public for the rapid communication of health information to the general public in public health emergencies such as an outbreak of a communicable disease [64]. SMS is also a convenient for deaf and hearing-impaired people to communicate. SMS can be used to send a message to a large number of people at a time, either from a list of contacts or to all the users within a particular area. SMS doesn't overload the network as much as phone calls, it is frequently used by TV shows to let viewers vote on a poll topic or for a contestant.

In Mali, cell phone has become a new tool to help to control the spread of HIV/AIDS [69]. However the hot application of SMS is mobile chatting. The San Francisco Department of Public Health sends safer sex recommendations to young people who request it via text messages on cell phones [66] the automated program is modeled after a similar campaign in London, aimed at youths ages 12 to 24. Mobile technology particularly SMS is used in education as a method of raising HIV and AIDS awareness [67]. In South Africa, the Dokoza system use SMS in HIV/AIDS and TB treatment for information management, transactional exchange & personal communication [68-69].

Conclusion

This study helps in understanding the present context surrounding HIV/AIDS globally and locally in South Africa. It has explored what has been done in this field both nationally and internationally. It has elaborated the encouraging finding that SMS technology could be a cost effective tool to fight against the HIV/AIDS and other chronic health conditions, such as diabetes mellitus and asthma.

HIV/AIDS is a chronic illness. It requires patient empowerment to enhance adherence to manage it effectively. SMS plays a role in adherence and therefore can play an important role in control of HIV/AIDS. It can be especially effective where other forms of communication between patients and health clinics are difficult and access to services is poor due to a weak infrastructure and geographical barriers. SMS offers further opportunities to deploy the benefits of mobile phone technology and improve access to healthcare and information [21].

This study can provide the basis for further research by the Department of Health and the Medical Research Council in South Africa, the private sector, and national and international non-government organizations to explore the potential of this technology. While the focus of this study has been on the technologies, their use for delivering effective services will also need to consider the human and socio-technical resources involved. Overall, SMS technology is feasible; it could be used as a potential tool to deliver quality health care with low cost in this beautiful rainbow nation.

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