Implementation of Telemedicine in Cape Verde: Influencing Factors

A Implementação da Telemedicina em Cabo Verde: Fatores Influenciadores

Artur CORREIA1,2,3, Vanda AZEVEDO4,5, Luís Velez LAPÃO1

ABSTRACT

Introduction: Telemedicine is the provision of health services, where distance is a critical factor, using information and communication technologies. Cape Verde has bet on using this tool to increase access of the population of its islands to specialized care.

Material and Methods: Qualitative study, covering the period between 2013 and 2014. It uses document analysis, semi-structured interviews and focus groups to collect data and analysis of content for their analysis. The participant population includes doctors, nurses and professionals from some institutions related to telemedicine.

Results: The priorities of the National Telemedicine Program are set, the cores and reference centers are operational, with trained personnel and equipment installed. Several other policy instruments and conditioning factors and facilitators of the program have been identified.

Discussion: Telemedicine is contributing to the reduction of inequalities in access to health, in Cape Verde. However, the full adoption of a service based on a new technology depends on conditioning factors and facilitators, and several success factors of telemedicine, identified in the literature, are not observed and in conjunction with other existing weaknesses affect the overall development of the National Telemedicine Program. However the strengths and capabilities are highlighted opportunities to act.

Conclusion: Despite the progress, some telemedicine success factors highlighted on the literature are not seen in the country.

Keywords: Cape Verde; Global Health; Health Services Accessibility; Telemedicine

RESUMO

Introdução: A telemedicina é a prestação de serviços de saúde, onde a distância é um factor crítico, utilizando tecnologias de informação e comunicação. Cabo Verde tem apostado na utilização desta ferramenta para aumentar o acesso das populações das suas ilhas a cuidados especializados. O objectivo deste artigo é estudar os factores influenciadores da implementação do Programa Nacional de Telemedicina no país, na vertente teleconsultas.

Material e Métodos: Estudo qualitativo, abrangendo o período entre 2013 e 2014. Utiliza a análise documental, entrevistas semiestruturadas e grupos focais, para a recolha de dados e a análise de conteúdo, para a respectiva análise. A população participante inclui médicos, enfermeiros e profissionais de algumas instituições ligadas à telemedicina.

Resultados: Os eixos prioritários do Programa Nacional de Telemedicina estão definidos, os núcleos e centros de referência estão operacionais, com pessoal formado e equipamentos instalados. Vários outros instrumentos de política e factores condicionantes e facilitadores do programa foram identificados.

Discussão: A telemedicina está a contribuir para a diminuição das desigualdades no acesso à saúde, em Cabo Verde. Todavia, a adoção completa de um serviço com base numa nova tecnologia depende de factores condicionantes e facilitadores, e vários factores de sucesso da telemedicina, identificados na literatura, não são observados e conjuntamente com outras fraquezas constatadas, afectam o desenvolvimento integral do Programa Nacional de Telemedicina. Contudo os pontos fortes e as potencialidades apontados são oportunidades para agir.

Conclusão: Apesar dos avanços, alguns factores de sucesso da telemedicina apontados na literatura não se observam no país.

Palavras-chave: Acesso aos Serviços de Saúde; Cabo Verde; Saúde Global; Telemedicina

INTRODUCTION

According with the World Health Organization, telemedicine involves “health-related activity deployment, wherever distance is a critical factor, using information and communication technologies for the purposes of sharing information for diagnosis, treatment and prevention of diseases and injuries, for research and assessment for health, as well as for continuing education of healthcare professionals, aimed at health promotion for individuals and their communities”.

Telemedicine was introduced as an instrument aimed at a more effective use of resources, at bringing healthcare closer to the population as well as promoting modern procedures, working methods and an organisational change in health units. It has still not reached its full potential for a widespread use, mainly due to the fact that a mainly technological perspective has been followed.

The archipelagic nature of Cape Verde has always imposed disparities regarding the access to healthcare; internal and external medical evacuations as well as specialists sent to the islands corresponded to a crucial contribution to minimizing these disparities under a global access perspective, even though the number of available specialist physicians is still not enough in order to fully...
respond to demand (six physicians per 10,000 people, including specialists). It should be mentioned that around two thousand requests for internal medical evacuations have been recorded in 2012. The Government, through the Ministry of Health, has decided to implement a telemedicine (eHealth) program, linking primary, secondary and tertiary-level healthcare structures in 2012 with a strategy aimed at improving response efficacy. Case reports are also discussed and patients are sent abroad (e.g. to Portugal) using the telemedicine platform. This article aimed at the analysis of influencing factors for deployment of the National Program of Telemedicine - Programa Nacional de Telemedicina (PNT) in public healthcare services of Cape Verde as well as implemented measures, infra-structures, procedures and systems, in addition to the results obtained.

The example of Cape Verde is very relevant in terms of global health, due to its archipelagic nature, small population and low financial resources.

**Telemedicine in Cape Verde**

Different initiatives have been implemented by central hospitals with some foreign hospital centres, using different eHealth platforms, providing for teleconsultation and telediagnosis. According with this author, a telemedicine intervention has been organized at the island of Brava in 2000, with the support of the Embassy of the United States of America, using a ISDN 128Ks line and Net Meeting software for the transmission of X-ray imaging. The two central hospitals were connected with each other and with a Spanish hospital in 2007, with the support of the Spanish cooperation. The first connection was deployed in 2009 between the Department of Cardiology of the Hospital Dr. Agostinho Neto in Praia and the Department of Cardiology of the Portuguese Centro Hospitalar de Coimbra, with the financial support of CVTelecom and PT Multimedia. This was followed by the connection with the second central hospital of Mindelo, in 2012. This initiative in the area of paediatric cardiology still remains providing periodical teleconsultations, case reports and medical evacuation programme from Cape Verde to Portugal.

The integration of Cape Verde within the African and Indian Medical Community through the Pan African and Network project has been obtained in 2010, with the support of the Indian cooperation. This project allowed for the presentation and discussion of case reports (store-and-forward telemedicine), including an e-learning platform. A crucial strategical breakthrough in telemedicine in Cape Verde occurred in 2012 with the deployment of an infra-structure project of telemedicine services with the financial support of the Slovenian cooperation, in association with the International Telemedicine Foundation (ITF). This two-stage project allowed for the link between central and regional hospitals with healthcare centres in every island by the end of 2013; central hospitals are the referral centres. Within this project, different healthcare professionals working in different structures were trained on site and abroad in order to use telemedicine resources.

Therefore, by order of the Minister of State and Health of 25 Nov 2013, the list of members of telemedicine centres was approved in every island. A Facebook page (Cardiocenter) has been developed at the same time aimed at sharing information and documents between healthcare professionals using the telemedicine facilities.

By no. 2 order of 17 Jan 2014 of the Minister of State and Health, the National Program of Telemedicine (PNT) has been approved and the objectives of the program were established. By order of 31 Jan 2014 of the Minister of State and Health, the coordinator of the PNT has been appointed and a range of organizational and functional norms have also been approved. One director physician and the secretariat including one administrative officer and one IT engineer providing logistic and technical support are involved in the PNT team. Different telemedicine centres were installed at the different municipalities and islands, including one general practitioner (GP) (coordinator), one nurse and one IT technician. At the central hospitals, the management of teleconsultation requests was ensured by one coordinator physician and one administrative officer.

All the eight centres in the islands and the two referral centres at the two central hospitals were already operative in 2014, with all the equipment installed and the professionals trained on the use of the equipment and teleconsultation procedures. Teleconsultations can be requested by GPs to the specialist physicians from their healthcare centre either live or pre-recorded. X-ray images as well as electrocardiogram tracing records and ultrasound images can also be sent. A daily appointment system for teleconsultation has been implemented with a schedule for the different specialties, at the two referral centres. Teleconsultations are free of charge.

The commercial software platform, supported by a partnership agreement between the Hospital Central da Praia/Centro Nacional de Telemedicina and the NOSI (Núcleo Operacional para a Sociedade da Informação) CVTelecom has been used by the telemedicine eHealth network.

**Teleconsultations**

According with the 2013 PNT report, internal telemedicine activities only started from May 2013. Neurology and Cardiology were the most requested specialties, followed by Surgery, Dermatology and Orthopaedics, corresponding to around 65% of all teleconsultations. According with the PNT, the Hospital Central da Praia supported 74% of the teleconsultations in 2014 mostly ‘in real-time’ with each island’s healthcare centre.

The number of internal medical evacuations has been significantly reduced upon deployment of teleconsultation...
service in 2014, as a previous teleconsultation became the rule in order to assess whether a medical evacuation was required. In fact, only 18% of the patients who underwent a teleconsultation were evacuated, reflecting a high rate of diagnoses directly obtained through teleconsultations.19

MATERIAL AND METHODS
This was a qualitative study of the implementation of the Programa Nacional de Telemedicina in Cape Verde regarding 2013-2014, using the document analysis, semi-structured interviews and focus groups for data collection. Document analysis aimed at searching for the relevant documents on telemedicine produced between 2009 and 2014, including reports carried out by central departments of the Ministry of Health, by central hospitals and by the PNT, different documentation, orders, norms and procedures regarding the implementation of telemedicine in Cape Verde.

In total, 10 semi-structured interviews and two focus groups (involving six and eight elements, respectively) have been carried out aimed at a better perception of constraints, strengths and weaknesses and threats to PNT deployment.

The participants in interviews (50% male) were mostly aged 30-40 (Table 1) and involved different experts in telemedicine, including general practitioners and specialist physicians (public health delegates, the PNT general coordinator, hospital’s clinical directors and the National Director of Health). The group of participants in focus groups (57% male) were mostly aged 30-34 and 45-49 (Table 1) and involved, apart from physicians and nurses, representatives of the Instituto Nacional de Previdência Social, the Núcleo Operacional para Governação Electrónica, the Universities and the Agência Nacional de Telecomunicações.

Interviews and focus groups were analysed using the technique of content analysis. In addition, a SWOT analysis has been carried out (Table 2).

The research protocol has been submitted for approval by the National Ethics Committee.

RESULTS
The results were presented in three areas: politics, infra-structure and procedures and systems.

Politics
Document analysis showed that, apart from equipment purchase and installation, a team for equipment operation and telemedicine has been implemented at the different centres, in healthcare centres and regional hospitals, as well as in central hospitals. Additionally, a PNT management team has also been deployed.

According with the order of 25 Mar 2013 of the Minister of State and Health, the members of the different centres were appointed. That same year, a Facebook page has been developed by the PNT management aimed at sharing information and documentation, as well as to motivate healthcare professionals. With no.2 order of 17 Jan 2014 of the Minister of State and Health, the PNT has been made official and its objectives have been defined. The coordinator of the PNT has been appointed and a range of organizational and functional norms has been approved.16,17

Teleconsultations were started in 2013 involving a few centres and specialties and these were increased in 2014 covering all the centres and involving almost all the specialties present at the two central hospitals of the country.

Infra-structures
The following aspects of telemedicine deployment in Cape Verde should be mentioned, as well as the transcription of some approaches by the participants in the study, based on the analysis of the interviews and focus groups:

• New telemedicine infra-structure (equipment and network)
P1: “... all the islands are connected to the telemedicine network ... 3rd stage of the program, in which we will have all healthcare centres connected to the telemedicine network ...”
P2: “…the system is often unavailable for a moment, sometimes we can visualize the people, others not so…”

• Fibre optic network linking the different islands
P3: “…in my opinion, as regards the telecommunication infra-structures, we are well equipped, with a fibre optic network spread by all municipalities, by land and all the islands connected.”

“Prioritisation of the telemedicine network is another part of the problem, which must be carefully analysed, so that traffic coming from an equipment connected to the telemedicine network can be prioritised.”

Table 1 – Distribution of the participants in the study by gender, age group and data collection methodology

<table>
<thead>
<tr>
<th>Data collection methodology</th>
<th>Sexo</th>
<th>20 - 24</th>
<th>25 - 29</th>
<th>30 - 34</th>
<th>35 - 39</th>
<th>40 - 44</th>
<th>45 - 49</th>
<th>50 - 54</th>
<th>55 - 59</th>
<th>60 - 64</th>
<th>≥ 65</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview</td>
<td>M</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Focus groups</td>
<td>M</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>0</td>
<td>1</td>
<td>7</td>
<td>0</td>
<td>1</td>
<td>5</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>24</td>
</tr>
</tbody>
</table>

M: Male; F: Female
P4: "Other advantages present in the country make this easier: good telecommunication networks allowing for this connection and the electrical network spread throughout the country, also allowing for the installation and equipment operation, already well decentralised and therefore allowing for widespread deployment of this benefit."

• High rate of internet and mobile network coverage

• Failures in communication systems
P5: "...we have some communication failures in transmission."

P6: "The mostly described constraints regard the system. We are in the middle of something and suddenly the system is down."

• Issues regarding the financial sustainability related to equipment renovation
P4: "... a system like this one demands for financing, heavy investments, as the purchase of the equipment and the installation of centres is very expensive, even though, in my opinion, this is not an impediment ... its development is certainly not in risk."

P1: "...The lack of IT technicians at the different centres will sometimes make things more difficult ...

Procedures and systems
• Available technicians and specialists

P7: "... this technology is here to stay, within a wider institutional framework of healthcare proximity to the population. Therefore, as on-site deployment of technology and specialists is not feasible, telemedicine allowed for this link between users and these resources..."

"Telemedicine may also bring some virtual technological density to healthcare centres and deployment of multidisciplinary teams within this virtual background is provided by telemedicine."

P1: "This is also an interesting situation: the colleagues in Boavista work well with the colleagues in the Island of Sal and as they have Internal Medicine, Gynaecology..."
and Paediatrics, they provide a teleconsultation between each other, without having to pass through the central hospital. This is a different dynamics and this is also the future.

- Resistance to change shown by some professionals (physicians, nurses) at different levels regarding the introduction of telemedicine

P7: “… some colleagues, with more affinity to technological issues use it more often, even though we sometimes feel some resistance and we understand that this resistance is more related to whether you feel more comfortable using the technology or not.”

“… resistance relates to the “awkward” feeling expressed by a patient that does not know you and, suddenly, the technician says ‘it’s ok, you will attend the cardiologist, even though you will not feel the doctor touching you.”

P8: “… we really do not know that we are all resistant to change … This is a new aspect, we have to work harder until this technique enters your own routine. Therefore, I think that we must insist more on the empowerment of healthcare professionals … only from there will we make it…”

- Low involvement or demotivation by some specialists in the hospitals and by GPs at the health centres

P8: “In my opinion, first we must work on the empowerment of telemedicine by healthcare professionals; therefore, I often feel that many colleagues still consider telemedicine more than an obligation, a bureaucracy and they do not realise how important telemedicine is …”

P9: “There is still no involvement by all physicians in teleconsultations; we need to raise physician’s awareness and I also believe that disclosure of telemedicine has been not enough.”

- Few telemedicine information, education and communication campaigns for the population and the professionals

P10: “In my opinion, raising physician’s awareness is a great challenge, not only regarding neurologists as also the other specialists.”

P11: “…it is the appropriation of telemedicine by its doers, as this relates to training, empowerment and awareness; telemedicine is still regarded with a certain reluctance.”

- Communication between professionals using telemedicine

P9: “… In my opinion, the isolation of the physician in our islands has come to an end.”

P4: “… and in terms of the presence of colleagues at the other end and, apart from that, it breaks up the isolation in which we have lived in the islands, alone or almost alone; isolation is bad for professionals and also for the people.”

- Suboptimal link between services regarding teleconsultation registration

P12: “…sometimes a colleague waits for a long time to have a successful telemedicine connection with another colleague and, in addition, there is no report of some teleconsultations aimed at defining whether the patient has to go to Praia …”

P1: “… sometimes the physician with the patient has to wait for the specialist and sometimes the other way around, with a relevant impact on patient’s satisfaction.”

- Suboptimal training on the use of the equipment

P8: “… the second issue regards training; in my opinion, some colleagues at the hospital should have a more comprehensive training on the correct use of the equipment and the technology; you feel more comfortable with what you know better, do not you agree?”

P7: “… in the near future, training must continue as we already have people skilled in the area who are able to provide annual training programs for newcomers …”

- National and international tele-health training actions, including clinical sessions and meetings, with subsequent technical update and satisfaction of the professionals

P9: “… telemedicine will allow for continuous training, distance education of healthcare professionals …”

P4: “… will certainly benefit from these new technologies, allowing for distance, as well as on-site education, with obvious gains in terms of time, travelling …”

- The approach to patients who underwent teleconsultations, with the possibility of reaching an earlier diagnosis

P12: “… helps doctors think and obtain good diagnoses and that will benefit patients, physicians and the entire health system …”

P1: “Electrocardiograms can be sent to one of the centres and may be interpreted by an expert… and therefore obtain earlier diagnoses and results are timely sent.”

- Access to better practices in the approach to patients

P9: “Doctors have access to an opinion on diagnosis, can get clinical orientation on treatment and support in case a medical evacuation is needed, as technologies and more comprehensive care are only available in hospitals … upon returning to the island, the patient can be followed up …”

“… The patient… regarding the teleconsultation may even attend a multidisciplinary teleconsultation.”

**DISCUSSION**

The use of telemedicine is quickly increasing and may correspond to a complementary alternative to different health programs. However, the adoption of a new technology
The crucial factors for success regarding telemedicine deployment, described by Kodukula and Nazvia\textsuperscript{23} are shown in Table 3.

In Cape Verde, the presence of three out of these ten factors seems troublesome, namely those regarding ‘financial sustainability’, ‘adequate and skilled human resources’ and ‘ensuring the communication and articulation between parts’. In fact, the SWOT analysis of PNT, based on the analysis of contents of the interviews and focus groups allowed for the identification of the following constraints: telemedicine deployment depends on financial support from the international community; the mobility of the human resources is an obstacle to the implementation of this intervention as training must be repeated and, finally, there are still communication gaps between the parts.

Lange\textsuperscript{24} described the results of studies carried out in different European countries within the MOMENTUM Project on the critical success factors to be considered for telemedicine deployment. These studies allowed for the identification of 18 critical success factors related to deployment strategy, organizational changes, legal, regulatory and security procedures as well as decisions on technology and purchase (Table 3 and 4).

The following common issues should be mentioned from the critical success factors described by Kodukula and Nazvia and by Lange\textsuperscript{23,24}:

- Fundraising for telemedicine deployment;
- Involvement of healthcare professionals and decision-makers in deployment;
- Factors related to legal procedures;
- Available infra-structures.

Almost all these critical factors described by Lange\textsuperscript{24} are met in Cape Verde, except those related to business plan deployment, a change management plan and to legal, regulatory and security procedures, which have not yet been fully met.

In addition, the analysis of the interviews and the content of focus groups allowed for the identification of the following issues regarding telemedicine deployment in terms of strengths, weaknesses, opportunities and threats:

Lipson and Henderson\textsuperscript{25} have described different political measures aimed at supporting the development of telemedicine in the USA, including planning and coordination, network development, development of specific programs, financing, building of a telecommunication infra-structure and regulatory support and clarifications. However, interdependencies between technology, human characteristics and socio-economic environment are frequently ignored, leading to interventions with low impact on health practices.\textsuperscript{26}

According with Mair \textit{et al},\textsuperscript{27} apart from the organizational issues, social issues must be considered in telemedicine deployment. In addition, healthcare professional perception, organizational and cultural structures with an impact on health, legal issues, technical constraints, timing, costs, training and familiarisation with the equipment are elements for an easier telemedicine deployment.\textsuperscript{28} Process mining instruments may also be used for monitoring these procedures and for correct deployment.\textsuperscript{29}

Zanaboni and Lettieri\textsuperscript{30} mentioned the fact that healthcare professionals are frequently reluctant or indifferent to telemedicine applications. In fact, if an optimal cost-efficacy relationship can be considered as an advantage for society, this may not happen for the individual user.\textsuperscript{22}

\section*{CONCLUSION}

Despite the improvements found in telemedicine deployment in Cape Verde, some success factors described in literature have not been met and, in addition, different weaknesses, strengths and opportunities found by the participants in this study have had an influence on the development of this intervention in the country.

\section*{HUMAN AND ANIMAL PROTECTION}

The authors declare that the followed procedures were according to regulations established by the Ethics and Clinical Research Committee and according to the Helsinki Declaration of the World Medical Association.

\section*{DATA CONFIDENTIALITY}

The authors declare that they have followed the

\begin{table}[h]
\centering
\begin{tabular}{|l|c|}
\hline
\textbf{Critical success factors} & \textbf{Compliance in Cape Verde} \\
\hline
\textit{a)} Supported by Government Regulations and Politics; & Yes \\
\textit{b)} Adopting a standardized management project; & Yes \\
\textit{c)} Public acceptance; & Yes \\
\textit{d)} Political support; & Yes \\
\textit{e)} Available technological infra-structure, including hardware, software and adequate bandwidth; & Yes \\
\textit{f)} Financial sustainability; & No \\
\textit{g)} Clearly defined legislation; & No \\
\textit{h)} Clearly defined mechanisms for referral and telemedicine protocols; & Yes \\
\textit{i)} Adequate and skilled human resources; & Yes / No \\
\textit{j)} Ensuring the communication and articulation between parts. & Yes / No \\
\hline
\end{tabular}
\caption{Factors that are critical to deploying telemedicine successfully. Adapted from Kodukula S, Nazvia M. Evaluation of critical success factors for telemedicine implementation. Int J Computer Applications. 2011;12:29- 36.\textsuperscript{23}}
\end{table}
protocols of their work centre on the publication of patient data.

CONFLICTS OF INTEREST
The authors declare that there were no conflicts of interest in writing this manuscript.

FINANCIAL SUPPORT
The authors declare that there was no financial support in writing this manuscript.

REFERENCES


25. Lipson LR, Henderson TM. State initiatives to promote telemedicine.


29. Lipson LR, Henderson TM. State initiatives to promote telemedicine.


33. Lipson LR, Henderson TM. State initiatives to promote telemedicine.


