

Implementation of Telemedicine in Cape Verde: Influencing Factors

A Implementação da Telemedicina em Cabo Verde: Fatores Influenciadores



Artur CORREIA^{1,2,3}, Vanda AZEVEDO^{3,4}, Luís Velez LAPÃO¹
Acta Med Port 2017 Apr;30(4):255-262 • <https://doi.org/10.20344/amp.7578>

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 objetivo 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”.¹

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.^{2,3} 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.^{4,5}

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

1. Global Health and Tropical Medicine. Instituto de Higiene e Medicina Tropical. Universidade NOVA. Lisboa. Portugal.

2. Comité de Coordenação do Combate à SIDA. Praia. Cabo Verde.

3. Ministério da Saúde de Cabo Verde. Praia. Cabo Verde.

4. Colégio de Cardiologia. Ordem dos Médicos de Cabo Verde. Praia. Cabo Verde.

✉ Autor correspondente: Artur Correia. arturcorreia51@hotmail.com

Recebido: 02 de março de 2016 - Aceite: 18 de novembro de 2016 | Copyright © Ordem dos Médicos 2017



respond to demand (six physicians per 10,000 people, including specialists).⁶

It should be mentioned that around two thousand requests for internal medical evacuations have been recorded in 2012.⁷

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.⁸

Case reports are also discussed and patients are sent abroad (e.g. to Portugal) using the telemedicine platform.⁹

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.¹⁰ 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.¹⁰

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.¹¹ This was followed by the connection with the second central hospital of Mindelo, in 2012.¹² 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.¹³ 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).¹⁴ 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.¹⁵ 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 approved⁶ 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 appointed¹⁷ and a range of organizational and functional norms have also been approved.¹⁸

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.¹⁹

Teleconsultations can be requested by GPs to the specialist physicians from their healthcare centre either live or pre-recorded.¹⁸ 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,²⁰ 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,¹⁹ the *Hospital Central da Praia* supported 74% of the teleconsultations in 2014 mostly 'in teal-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

Data collection methodology	Sexo	Age group										Total
		20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	≥ 65	
Interview	M	0	0	2	0	0	1	0	0	1	1	5
	F	0	0	2	0	0	0	2	1	0	0	5
Focus groups	M	0	0	2	0	0	3	0	1	1	1	8
	F	0	1	1	0	1	1	2	0	0	0	6
Total		0	1	7	0	1	5	4	2	2	2	24

M: Male; F: Female

Table 2 – SWOT analysis of interviews and focus groups

Strengths	Weaknesses
<ul style="list-style-type: none"> - New telemedicine infra-structure (equipment and network). - Improvements in the approach to patients who attend teleconsultations, with the possibility of an earlier diagnosis. - Improvements in the communication between professionals at central and regional hospitals. - National and international tele-training, clinical sessions and meetings. - Potential cost reduction (medical evacuations, specialist travel, training, etc.). - Innovative working procedures. - Access to better practices in the approach to patients. - Potential for internationalisation (telehealth training, clinical sessions, meetings, etc.) using videoconferencing. 	<ul style="list-style-type: none"> - Low involvement of some specialist physicians in hospitals and GPs in healthcare centres. - Few telemedicine information, education and communication campaigns involving the population and professionals. - Suboptimal link between services regarding teleconsultation registration system. - Shortcomings regarding teleconsultation registration system. - Suboptimal training of new technicians in using the equipment. - Resistance to change, to telemedicine introduction by some professionals (physicians, nurses). - Demotivation of healthcare professionals due to workload. - Perceived limitations leading to privacy breakdown in teleconsultations, due to the presence of other professionals in the room, apart from physicians.

Opportunities	Threats
<ul style="list-style-type: none"> - Opening up of telemedicine to the private sector, connecting institutions out of the public network. - Development of telemedicine partnerships between Cape Verde and friendly countries. - Potential for providing teleconsultation to friendly countries and supporting our migrant communities, namely in S. Tomé e Príncipe. 	<ul style="list-style-type: none"> - Occasional failure (three days maximum) in communication systems. - Issues related to financial sustainability (equipment update). - Suboptimal link with the <i>Núcleo Operacional para a Governação Eletrónica do Estado (NOSI)</i>.

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.”

Procedures and systems

- **Available technicians and specialists**

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

- **Innovative procedures and working methods**

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.²¹ However, the adoption of a new technology

or service depends on different factors and stages.²² On a first stage, professionals must get familiarized with the technology; in a second stage, an opinion regarding the new technology is needed, followed by the stage of adopting or rejecting the technology.

The crucial factors for success regarding telemedicine deployment, described by Kodukula and Nazvia²³ 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.

Lange²⁴ 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^{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 Lange²⁴ 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 Henderson²⁵ 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.²⁶

According with Mair *et al.*,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.²⁸ Process mining instruments may also be used for monitoring these procedures and for correct deployment.²⁹

Zanaboni and Lettieri³⁰ 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.²²

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.

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.

DATA CONFIDENTIALITY

The authors declare that they have followed the

Table 3 – 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- 36.²³

Critical success factors	Compliance in Cape Verde
a) Supported by Government Regulations and Politics;	Yes
b) Adopting a standardized management project;	Yes
c) Public acceptance;	Yes
d) Political support;	Yes
e) Available technological infra-structure, including hardware, software and adequate bandwidth;	Yes
f) Financial sustainability;	No
g) Clearly defined legislation;	No
h) Clearly defined mechanisms for referral and telemedicine protocols;	Yes
i) Adequate and skilled human resources;	Yes / No
j) Ensuring the communication and articulation between parts.	Yes / No

Table 4 – 18 factors that are critical to deploying telemedicine successfully and their presence in Cape Verde. Adapted from Lange M. *The secret of telehealth*. Ehtel: Momentum; 2014.²⁴

Factors related to strategy and management	Compliance in Cape Verde
1. Check that there is cultural readiness towards telemedicine.	Yes
2. Ensure leadership through a 'champion'.	Yes
3. Identify a 'compelling' need.	Yes
4. Put together the resources needed for deployment.	Yes
Factors related to organization and management	Compliance in Cape Verde
5. Address the needs of the primary client.	Yes
6. Involvement of healthcare professionals and decision makers.	Yes
7. Business plan (development and implementation).	No
8. Change management plan (development and implementation).	No
9. Put the patient at the centre of the service.	Yes
Factors related to legal, regulatory and security procedures	Compliance in Cape Verde
10. Establish that the service is legal.	No
11. Apply relevant legal and security guidelines.	No
12. Ask advice from legal and security experts.	No
13. Ensuring that telemedicine doers and users have 'privacy awareness'.	Yes
Factors related to decisions on technology and purchase	Compliance in Cape Verde
14. Ensuring that the IT and eHealth infrastructures need are in place.	Yes
15. Ensuring that the technology is user-friendly.	Yes
16. Monitor the service.	Yes
17. Maintain good practices in vendor relations.	Yes
18. Guarantee that technology has the potential for scale-up.	Yes

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

- World Health Organization. A health telematics policy in support of WHO's Health-For-All strategy for global health development: report of the WHO group consultation on health telematics, 11–16 December, 1997. Geneva: WHO; 1998.
- Álvares S. Telemedicina: avaliação económica. NASCER E CRESCER - Rev Hospital de Crianças Maria Pia. 2004;2.
- Lapão, LV. Lean na gestão da saúde: uma oportunidade para fomentar a centralidade do doente, o respeito pelos profissionais e a qualidade nos serviços de saúde. Acta Med Port. 2016;29:237-9.
- Armstrong AW, Dorer DJ, Lugin NE, Kvedar JC. Economic evaluation of interactive teledermatology compared with conventional care. *Telem J E Health*. 2007;13:91-9.
- Bergmo TS. Can economic evaluation in telemedicine be trusted? A systematic review of the literature. *Cost Eff Resour Alloc*. 2009;24:7-18.
- Ministério de Saúde. Relatório Estatístico de 2013. Praia: DGPOG; 2014.
- Correia A. As evacuações médicas internas em Cabo Verde. Praia: Ministério da Saúde; 2013.
- Ministério da Saúde. Relatório Anual do Programa Nacional de Telemedicina de 2014. Programa Nacional de Telemedicina. Praia: Ministério da Saúde; 2015.
- Lapão LV, Correia A. Improving access to pediatric cardiology in Cape Verde via a collaborative international telemedicine service. *Stud Health Technol Inform*. 2015;51-7.
- Lopes M. Potencial da telemedicina em Cabo Verde: evacuações sanitárias. Tese de Mestrado em Saúde e Desenvolvimento. Lisboa: IHMT; 2012.
- Ministério da Saúde. Hospital Agostinho Neto. Relatório Anual. Praia: Ministério da Saúde; 2010.
- Ministério da Saúde. Hospital Baptista de Sousa. Relatório Anual. Praia: Ministério da Saúde; 2012.
- Ministério da Saúde. Hospital Agostinho Neto. Relatório Anual. Praia: Ministério da Saúde; 2011.
- Ministério da Saúde. Relatório Anual do Programa Nacional de Telemedicina de 2013. Programa Nacional de Telemedicina. Praia: Ministério da Saúde; 2014.
- Ministério da Saúde. Despacho da Ministra Adjunta e da Saúde, designando os membros dos Núcleos de Telemedicina, de 25 de Março de 2013. Praia: Ministério da Saúde; 2013.
- Ministério da Saúde. Despacho nº2, da Ministra Adjunta e da Saúde, de 17 de Janeiro de 2014, criando o Programa Nacional de Telemedicina e definindo os eixos estratégicos e os objectivos do Programa. Praia: Ministério da Saúde; 2014.
- Ministério da Saúde. Despacho nº3, de 31 de Janeiro de 2014, nomeando o coordenador do Programa Nacional de Telemedicina. Praia: Ministério da Saúde; 2014.
- Programa Nacional de Telemedicina. Procedimento Base de Operação. Programa Nacional de Telemedicina. Praia: PNT; 2014.
- Programa Nacional de Telemedicina. Relatório Anual de 2013. Programa Nacional de Telemedicina. Praia: PNT; 2015.
- Programa Nacional de Telemedicina. Relatório Anual de 2013. Programa Nacional de Telemedicina. Praia: PNT; 2014.
- Cáceres-Méndez EA, Castro-Díaz SM, Gómez-Restrepo C, Puyana JC. Telemedicina: historia, aplicaciones y nuevas herramientas en el aprendizaje. *Univ Med Bogotá*. 2011;52:11-35.
- Zanaboni P, Wootton R. Adoption of telemedicine: from pilot stage to routine delivery. *BMC Med Inform Decis Mak*. 2012;12:1.
- Kodukula S, Nazvia M. Evaluation of critical success factors for telemedicine implementation. *Int J Computer Applications*. 2011;12:29-36.
- Lange M. *The secret of telehealth*. Ehtel: Momentum; 2014.
- Lipson LR, Henderson TM. State initiatives to promote telemedicine.

- Telemed J. 1996;2:109-21.
26. van Gemert-Pijnen JE, Nijland N, van Limburg M, Ossebaard HC, Kelders SM, Eysenbach G, et al. A holistic framework to improve the uptake and impact of eHealth technologies. *J Med Internet Res.* 2011;13:e111.
 27. Mair FS, May C, O'Donnell C, Finch T, Sullivan F, Murray E. Factors that promote or inhibit the implementation of e-health systems: an explanatory systematic review. *Bull World Health Organ.* 2012;90:357-64.
 28. Walker J, Whetton S. The diffusion of innovation: factors influencing the uptake of telehealth. *J Telemed Telecare.* 2002;8:S73-5.
 29. Cruz-Correia R, Boldt I, Lapão L, Santos-Pereira C, Rodrigues PP, Ferreira AM, et al. Analysis of the quality of hospital information systems audit trails. *BMC Med Inform Decis Mak.* 2013;13:1.
 30. Zanaboni P, Lettieri E. Institutionalizing telemedicine applications: the challenge of legitimizing decision-making. *J Med Internet Res.* 2011;13:e72.