

Evaluation of the use of videoconferencing for distance training of doctors in the family health teams within the national telehealth project

Avaliação do emprego de videoconferências para a capacitação à distância dos médicos das equipes de saúde da família dentro do projeto nacional telessaúde

Gustavo Cancela e Penna¹, Henrique Gomes Mendes², Maria Angélica de Salles Dias³, Maria do Carmo Barros de Melo⁴, Alaneir de Fátima dos Santos⁵, Marcos Cunha Resende⁶, Aline Costa Pereira⁷, Daniele Cardoso Nunes Souza⁸, Luciana Wildhagen de Carvalho⁸, Cláudio de Souza⁹

DOI: 10.5935/2238-3182.20150018

ABSTRACT

Introduction: the National Telehealth Program aims at updating and training doctors in the Family Health Teams by means of videoconferencing (VCs), with potential impact on improving the health care in remote locations and reducing the displacement of patients. In addition, it proposes increased primary care interaction with specialized centers. **Objectives:** presentation and evaluation of the use of the videoconferencing system allowing for better planning of action in the project. **Methods:** 916 evaluation /feedback questionnaires were analyzed, completed by participants at the end of 84 VCs in Medicine, between 2009 and 2013. The VCs are a branch of the National Telehealth Project and reach 50 municipalities in Minas Gerais under the coordination of the FM-UFGM. They are held via web, requiring minimal equipment in diffuser and receiver centers. **Results:** in the study period, an average of 12.64 municipalities and 19.42 speakers were identified. Of these, the average number of doctors was 12.97. The quality parameters achieved positive assessment (“great” or “good”) in just 62% for the sound, and 84% for the image. The theme was considered “interesting” or “very interesting” by 98%. **Conclusions:** the VCs have been strengthened as an alternative to educational institutions. However, the participation of speakers and municipalities in this project was less than desired. The comparative analysis of VCs from other areas also reveals a reduced adhesion of doctors. Among the problems detected, especially regarding the sound quality, the low quality of internet connection in the municipalities may have contributed to this result.

Key words: Videoconferencing; Telemedicine; Continuing Medical Education.

RESUMO

Introdução: o Programa Nacional de Telessaúde visa à atualização e capacitação dos médicos das Equipes de Saúde da Família por meio de videoconferências (VCs), com potencial impacto na melhoria da atenção à saúde em locais remotos e redução do deslocamento dos pacientes. Ainda, propõe mais interação da atenção primária com centros especializados. **Objetivos:** apresentação e avaliação do emprego desse sistema de videoconferências, possibilitando melhor planejamento das ações do projeto. **Métodos:** analisados 916 questionários de avaliação/retroalimentação preenchidos pelos participantes ao término de 84 VCs de Medicina, no período de 2009 até 2013. As VCs são um braço do Projeto Nacional de Telessaúde e alcançam 50 municípios em Minas Gerais, sob a coordenação da FM-UFGM. Elas realizam-se via web, exigindo aparelhagem mínima no centro difusor e receptor. **Resultados:** no período do estudo, obteve-se média de 12,64 municípios e 19,42 conferencistas por VC. Destes, a média de médicos foi 12,97. Quanto aos parâmetros de qualidade das VC, alcançaram avaliação positiva

Submitted: 2014/02/13
Approved: 2014/12/05

Institution:
Health Technology Center (CETES) – Center of
Telehealth (Nutel) of the Medical School at UFGM
Belo Horizonte, MG – Brazil

Corresponding Author:
Gustavo Cancela e Penna
E-mail: gustavocenna@gmail.com

(“ótimo” ou “bom”) o som em apenas 62% delas e a qualidade de imagem em 84%. O tema foi considerado “interessante” ou “muito interessante” em 98%. Conclusões: as VCs têm se fortalecido como alternativa para instituições educacionais. Porém, a participação de conferencistas e municípios nesse projeto foi aquém da almejada. Análises comparativas com VCs de outras áreas revelam, ainda, reduzida adesão dos médicos. Entre os problemas detectados, especialmente quanto à qualidade do som, a baixa qualidade de internet nos municípios pode ter contribuído para esse resultado.

Palavras-chave: Videoconferencing; Telemedicine; Continuing Medical Education.

INTRODUCTION

The advent of new technologies and their constant incorporation into daily life and economic activities impacted notable transformations in society over the recent years. The medical practice followed this process and has also gone through considerable changes in its various fields. One of the innovations that have drawn attention is the application of information and communication technology to the medical practice is generally titled telemedicine or telehealth.¹ Norris² defined² telemedicine as the use of these referred technologies to transfer information related to clinical, educational, and administrative services.

The applications of telemedicine are several, including tele-education with courses conducted via the web for medical updating; teleconsulting in which it is possible to obtain a second medical opinion remotely; telemonitoring when the patient is monitored by a doctor in a different location; and teleconferencing through which it is possible to hold meetings between remote sites for the discussion of various subjects related to Medicine.³

Review studies⁴ have attested advantages linked to telemedicine such as reduced need to transport patients to specialized centers, data transmission at high speed and quality, and reduced time between diagnosis and guidance for conduct in various diseases through teleconsultations. In addition, it allows professional updating through distance learning, improving health care in places of difficult access, and interaction between specialized centers with the recording and storing of exchanged information. It allows medical updating and potentially cost reduction impact in the assistance.

In Brazil, due to its extensive territory and inefficient distribution of resources, telemedicine could

be of great assistance to facilitate access to available protocols, distance education, collaborative research between educational centers, second opinion consultations, and improved assistance to the population, especially in remote or deficient areas where access to medical services is precarious. The lag between time of diagnosis and treatment decreases, which increases the efficiency of medical services, justifying the investment in technology.¹

Possible disadvantages are the high cost of the equipment required for its implementation, the need for specialized technicians for the installation and maintenance of equipment and dependence on the quality of internet connection where telemedicine tools will be implemented.⁵

The National Telehealth Program is a governmental action developed in conjunction with several Brazilian universities. It proposes the use of these tools available for telemedicine to better empower family health teams and raise the quality of basic care provided by the Unified Health System. Still, it aims to encourage primary care interaction with specialized centers from universities.

The Medical School at the Federal University of Minas Gerais is one of the core sites in the project since the beginning of 2008 providing assistance and educational support through teleconsultations (online and offline) and videoconferences for 50 municipalities in the State. The focus of this study is the use web conferencing aiming to upgrade and train family health teams (ESF) on various medical topics, in all cities covered by the project.

Therefore, doctors and teachers are invited; experts in their area of operation, to minister videoconferences on subjects previously selected by doctors in the family health teams.

The International Telecommunication Union defines⁶ videoconferencing as an audiovisual interactive chat service that provides a bi-directional and real-time exchange of audio and video signals among user groups in two or more locations.

In other words, it is an audio-visual communication system between geographically distant sites that is gaining space in the medical practice in the context of telemedicine. It is useful in the implementation of consulting for second opinions, remote professional training, non-face-to-face meetings, and participation in health activities¹. This remote professional training, or more specifically continuing medical education, is the most widespread use of teleconferencing.⁷

Due to the rapid evolution of medical knowledge, studying and continuous updating are indispensable for all medical professionals. Continuing medical education represents a growing need to improve the quality of health care and is a central element in the organization of health systems.⁸

In several areas of medical education, non-traditional teaching strategies, such as teleconferences, proved to be at least as effective as traditional strategies.⁹ They should, however, be seen as a complement and not substitute strategy.

OBJECTIVES

The present study aims to evaluate the use of video conferencing by the National Telehealth Project between 2009 and 2013 tracing the encountered results and difficulties. Permission is granted to a reflection about the initiative coordinated by the Center for Telehealth (NUTEL) of the Health Technology Center of the Medical School at UFMG.

MATERIALS AND METHODS

The Center for Telehealth at UFMG holds videoconferences with professionals in the areas of Dentistry and Nursing. In the present study, only the telemedicine videoconferences coordinated by Dr. Gustavo Cancela e Penna, an endocrinologist and employee at UFMG and NUTEL member, will be addressed.

Between 2009 and 2013, a total of 84 medical videoconferences occurred. They happened every two weeks, on Thursdays afternoon. They were accompanied by the video conference coordinator from NUTEL and a technical manager responsible for the initialization, fixing potential problems that occur during transmission, and VC recording.

The equipment used by participants in the target municipalities are multimedia sound, webcam, and a conventional desktop computer. These inputs were provided by the National Telehealth Project and implemented by the NUTEL technical team, which aids in the assembly and training for the use of telemedicine tools offered by UFMG.

Conversely, the municipalities must encourage the participation of doctors from the basic attention and support and provide an internet bandwidth with a suggested minimum speed of 128 Kbps and unre-

stricted access to the web. The doctors then connect by means of a browser to the address <http://www.telessaude.ufmg.br>, where the link to access the Adobe Connect® Server is available, which hosts the meeting. No additional settings are required in the equipment such as adding codecs or installation of software; it presents only one technical requirement that is the use of a browser with the Flash Player® plugin, already native in the vast majority of them.

VC speakers use a room dedicated to the project in the FM-UFMG and connect via the web as well as users. To send audio, video, and speaker presentation, Adobe Connect® takes care of receiving and distributing the data to other participants, automatically managing technical aspects of connectivity such as video submission rate (standard as 30 FPS), audio distribution via VoIP, resolution, compression rate, frames per second, and codec.

The technical aspects used for the implementation of Adobe Connect Server® followed parameters suggested by the manufacturer: Microsoft Windows Server® 2008 operating system and physical server Intel Xeon® dual-core 3 GHz; these were physically installed in a Data Processing Center at the FM – UFMG also at the expense of National Project.

A semi-annual selection of topics to be presented is performed for the video conferencing planning considering prevalence of diseases in the basic attention, demand of professionals in each region, and emergency public health issues such as outbreaks and epidemics. This selection occurred in one VC when doctors from health teams voted and defined themes.

From the selection of themes, a schedule with date and time for video conferences, guest speaker, and title are set. Some actions were reinforced and recalled during the sessions' event to intensify the participation of health professionals: sending posters with the half-yearly schedules to the Municipal Secretary of Health, notifications via e-mail, phone calls, or messages by cell phones; charge on stimulation roles towards the project on responsible individuals for primary health care in the municipalities.

The videoconference lectures last for 30 minutes and are taught by specialists in their area of work who are invited by the project coordination. At the end of this time, participants can ask questions to the speaker via chat available in the same virtual environment. The questions are read and discussed allowing other participants to follow.

With the purpose of feedbacking the project, participants are asked to answer an online survey at the end of VCs. The survey asks questions about the perception of audio and video quality, interest in the issue, areas of expertise of professionals who attended the lecture, and the number of participants per municipality because it there is usually to more than one professional attending the VCs in the same access site.

A total of 916 evaluation questionnaires/feedback were obtained throughout this study. These data were archived in Excel spreadsheets and analyzed. The results of these questionnaires are presented in the following graphs.

RESULTS

Based on the analysis of 916 VC questionnaires, some data enable the assessment of the coverage achieved by the project. Considering the quota of 50 municipalities included in this core of the National Telehealth Project, the average of 12.64 municipalities per session represents the percentage of 25.28% attendance.

The number of professional participants averaged in 19.42 professionals per session. The training of these participants was distributed as 12.97 doctors representing 66.78% of the quota. Thus, the participation of several other non-doctor health professionals in the videoconferences, during the study period and in the covered cities, was represented by nurses, nursing assistants, dentists, and community workers. The massive participation of nurses stood out among these.

However, a progressive decline in the number of VC participants between 2010 and 2013 was observed, with maintenance in the doctors' average and reduced participation by other professionals. The relationship between professional participants in total and the total number of doctors is shown in the graph in Figure 1.

The technical aspects evaluated by participants were the perception of sound and image quality. The questionnaire assessed this perception of quality with the following options: great, good, regular, bad, and terrible. Positive assessment ("great" or "good") was achieved for sound in only 62% (569), and image quality for 84% (769). The t-test reveals $p < 0.05$ for these variables, and may, therefore, indicate that there was a significant difference between the perception of the quality of sound and image. The following graphs show the percentage values obtained for each concept in the evaluations of sound (Figure

2) and image (Figure 3) during the studied period. There were no major variations in the distribution of concepts in the five years of study.

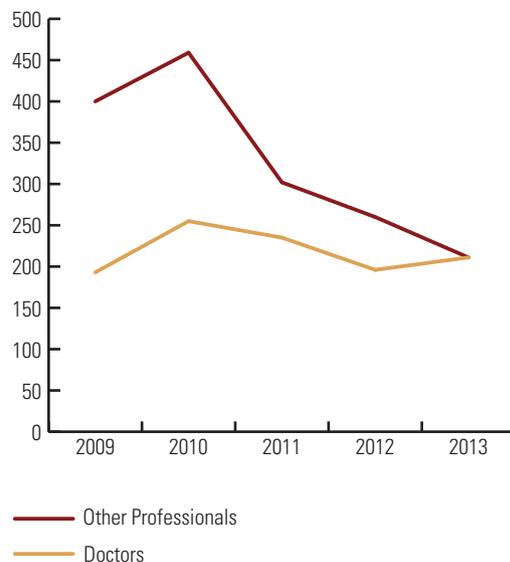


Figure 1 - Relationship between total number of professionals in general and number of participating doctors in the period from 2009 to 2013.

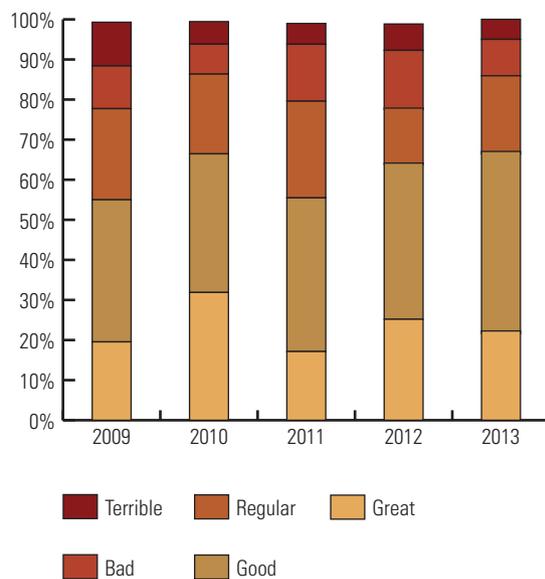


Figure 2 - Evaluation of sound quality in videoconferences showing the percentage obtained in each concept in the years from 2009 to 2013.

The evaluation of personal interest in the topics addressed in VCs, in turn, relied on the response options in the questionnaire: very interesting, interesting, of little interest, and not interesting. The theme

was considered “interesting” (372) or “very interesting” (528) in 98% of 916 questionnaires. Similarly, there are no major variations in the concept obtained over the years of study.

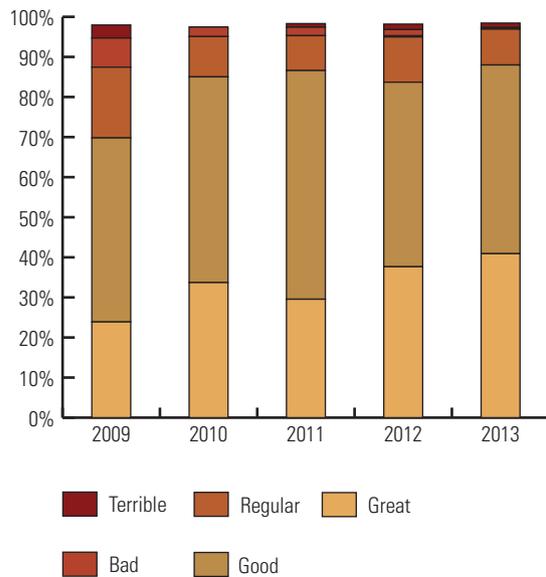


Figure 3 - Evaluation of image quality in videoconferences showing the percentage obtained in each concept in the years from 2009 to 2013.

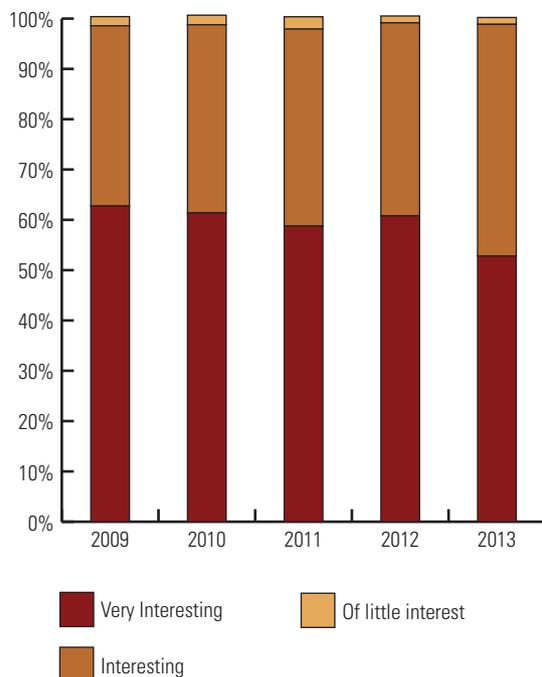


Figure 4 - Evaluation of the interest in the topic addressed in the conferences showing the percentage obtained in each concept in the years from 2009 to 2013.

DISCUSSION AND CONCLUSIONS

The drop in hardware and telecommunications costs, beside software development in the area, opens a space for new solutions adapted to the “bottlenecks” of health services. The use of technology brings expectation and curiosity in using new ways to acquire knowledge.¹⁰ Thus, video conferencing has been strengthened with a viable alternative to educational institutions offering distance education in Brazil,¹¹ a country with an extensive territory and uneven distribution of basic attention to health. The experiences of distance learning through video conferencing have shown positive results in relation to the connected parts.

Australian studies¹² demonstrated the efficiency and effectiveness of learning using videoconferencing, reported as being appropriate or even an equivalent alternative, in some cases, to the classroom arrangement. A potential expansion of educational coverage with the use of this technology was also noticed because it increases the possibility of reaching doctors without access to the traditional forms. One the restrictions for travel time and costs of accommodation are eliminated teleconferences provide¹³ remote continuing medical education opportunities that are similar to those provided to doctors in large cities.

All these data justify the investments of the National Telehealth Project and our expectation with the implementation of its core coordinated by UFMG in Minas Gerais. The results already presented, frustrate, in part, that initial enthusiasm. It was observed that the number of participating cities was still low in relation to the total number of cities covered by the project.

The comparative analysis with data, not yet published by the authors, between the participation of professionals in videoconferences of telemedicine, telenursing, and teledentistry that have the same effective mechanisms indicates that the participation in telemedicine is inferior to the others, which suggests reduced adherence to this activity on the part of doctors.

It is also interesting to note the substantial participation (33%) of other non-doctor health professionals in telemedicine VCs, with the majority being nurses. Further studies are needed to understand this phenomenon; however, some considerations can be drawn.

The existence of family health teams, at the time, without participating doctors; significant lack of interest from doctors compared to other professionals; hours of work that traditionally load the medical

class and, in counterpoint, VCs occur during business hours on Thursdays; lack of management incentive to participate in the project. These are all elements to be considered on the results obtained in this study.

Thus, it is essential to develop a more effective system of dissemination and effectiveness for this videoconferencing project to have doctors in each city using the opportunity and feeling interested in participating. This is called sensitization. According to Melo and Silva (2006),¹⁴ the inclusion of municipal managers in this awareness is also essential for the viability of services to be offered, as well as for the process of increasing the participation of professionals who will use the resources. This joint responsibility by those in charge for primary health care in the municipalities is already an adopted strategy, however, more efficient mechanisms to propose and charge a policy that encourages and allows doctors to participate in VCs in the UBS are needed. As a comparison, the strand of teleconsultations of the National Telehealth Project, also conducted by FM-UFMG, includes financial incentives and penalties for the participation of municipalities.

Regarding the quality of VCs, the questionnaires showed deviation in the parameters of image and sound. That is, the perception of the quality of the picture was positive while that of sound was negative.

The audio and video quality is critical¹ to the success of participation at a distance to allow participants to feel truly as part of the meeting. In videoconferences, small video “hiccups” (pixelation, freezing, etc.) are for the most part tolerated by users while audio “hiccups” affect them more intensely.

Technical analysis⁷ of similar experiences in telemedicine VCs demonstrated that participants could observe an echo effect on audio or “ghost images” in the case of sudden movements if the bandwidth of the internet is not enough on either side. The result would be a distracting interference to the learning environment.

Consistent problems in the quality of video have not been reported, however, problems of low audio quality on some of our videoconferences was found by the technical staff and it was detected as secondary to the network “bottleneck”, i.e. resulting from the low quality of connectivity due to internet services available in municipalities. As already reported, to offer internet access with a minimum required speed (128 Kbps) is the responsibility of the participating municipalities, however, the possible unavailability of appropriate servers in inner cities, band sharing with other activities, and absence of monitoring mecha-

nisms by the project are elements that may have contributed to this result.

These initial problems may have reduced the expected return of VCs and discouraged the participation of some teams. As a measure to overcome this obstacle, Nutel of UFMG is also investing the improvement of training for computer professionals in the municipalities involved as a way to detect and minimize transmission problems, mainly in relation to sound. The effort and investment in improving the sound quality of videoconferences will be reverted, certainly, to the satisfaction of participants.

Still in the field of actions, the organization, and ongoing implementation of a virtual library in which all videoconferences held within the National Telehealth Project are stored constitute a major breakthrough. This demands formal authorization by lecturers and availability of servers, both conditions have been already overcome. This library will allow the provision of a representative collection of lessons available to other municipalities in the State of Minas Gerais, which are also in need of this training, and enable access to continuing medical education to physicians who, for some reason, cannot participate in videoconferences in real time. The development of an infrastructure to support virtual learning goes through the implementation of these virtual libraries.⁹

A study¹⁵ on the conditions for the success of telehealth strategies such as this project indicated that there is a need also to take into consideration the needs of doctors and their expectations, making them active in decision-making. The largely positive evaluation of the VCs themes reflects a choosing process centered on participants. Therefore, it is still necessary to adapt the project to facilitate its suitability to the routine of doctors and clinical practices motivating and sensitizing the participation of these professionals with a solid disseminating strategy.

Finally, the benefits of telemedicine are only visible after a period of time while its implementation and development require immediate investments. As for the benefits that are less “tangible” such as improvement in the clinical practice through continuing medical education in our project, the difficulties are even greater. This implies the difficulty and needs to strengthen the adoption of these strategies with public health managers. Hence, finding more effective mechanisms to obtain this necessary involvement for the success of video conferences of the National Telehealth Project is needed.

REFERENCES

1. Lima CMAO, Monteiro AMV, Ribeiro EB, Portugal SM, Silva LSX, João Junior M. Videoconferências: sistematização e experiências em Telemedicina. *Radiol Bras.* 2007; 40(5): 341-7.
2. Norris AC. *Essentials of telemedicine and telecare*. Baffins Lane: John Wiley & Sons, Ltd, England; 2002.
3. Alves J. Telemedicina. [Cited 2014 Sep 18]. Available from: <http://www.webartigos.com/articles/1013/1/telemedicinaum-futurosustentadofinanceiramenteeporboaspraticasreflexoes/pagina1.html>
4. Ekeland AG, Bowes A, Flottorp S. Effectiveness of telemedicine: a systematic review of reviews. *Int J Med Informatics.* 2010; 79(11):736-71.
5. Ribeiro RA, Sierra MJ, Arantes LF, Caramori CA, Zornoff DCM. Videoconferência como ferramenta de comunicação nas escolas médicas estaduais e federais do estado de São Paulo. [Cited 2014 Sep 18]. Available from: <http://www.sbis.org.br/cbis/arquivos/959.pdf>
6. Wright D. The International Telecommunication Union's report on telemedicine and developing countries. *J Telemed Telecare.* 1998; 4(1):75-9.
7. Pankaj L. Teleconferencing in medical education: a useful tool. *Australas Med J.* 2011; 4(8): 442-7.
8. Norman JN, Alsajir MB. Tele-education – postgraduate education. *Med Principles Pract.* 2001; 10:115-22.
9. Ruiz JG, Mintzer MJ, Leipzig RM. The impact of e-learning in medical education. *Acad Med.* 2006; 81(3): 207-12.
10. Cruz D, Barcia R. Educação a distância por videoconferência. *Tecnol Educ.* 2010; 28(150-151):310.
11. Campos FE, Haddad AE, Wen CL, Alkmin MBM. Telessaúde em apoio à atenção primária à saúde no Brasil. In: Santos AFS, Souza C, Alves HJ, Santos SF. Telessaúde: um instrumento de suporte assistencial e educação permanente. Belo Horizonte: Editora UFMG; 2006. p.5974.
12. Gray K, Krogh K, Newsome D, Smith V, Lancaster D, Nestel D. Tele-Presence in rural medical education: a mixed methods evaluation. *J Biomed Educ.* 2014; Article ID 823639, 8 pages. <http://dx.doi.org/10.1155/2014/823639>. [Cited 2014 Sep 18]. Available from: <http://www.hindawi.com/journals/jbe/2014/823639/>
13. King FBB, Smith C, Mathews MB. Health professions' education and practice: a commentary on transformation through the internet. *J Allied Health.* 2006; 35(3):174-8.
14. Melo MCB, Silva SEM. Aspectos conceituais em telessaúde. In: Santos AFS, Souza C, Alves HJ, Santos SF. Telessaúde: Um instrumento de suporte assistencial e educação permanente. Belo Horizonte: Editora UFMG; 2006. p.1731.
15. Gagnon MP, Duplantie J, Fortin JP, Landry R. Implementing telehealth to support medical practice in rural/remote regions: what are the conditions for success. *Implement Sci.* 2006; 1(1):18.