

ICT in Primary Care in Brazil : current situation



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Abstract

This article aims to describe the situation of Information and Communication Technologies merger process (ICT) in primary care in Brazil from the National Program for Improving the Access and Quality of Primary Care (PMAQ-AB), in the structure dimensions, deployment of systems and use of information.

Keywords: Information technology; Health Communication; Primary Health Care; Access to Information.

Resumen

TIC en la Atención Primaria en Brasil: situación actual

Este artículo tiene por objeto describir la situación del proceso de incorporación de Tecnologías de Información y Comunicación (TIC) en la atención primaria en Brasil a partir del Programa Nacional de Mejoría del Acceso y de la Calidad de la Atención Básica (PMAQ-AB, en su sigla en portugués), en las dimensiones de estructura, implementación de sistemas y utilización de la información.

Palabras-clave: Tecnología de Información; Comunicación en Salud; Atención Primaria a la Salud; Acceso a la Información.

Resumo

TIC na Atenção Primária no Brasil: situação atual

Este artigo pretende descrever a situação do processo de incorporação de Tecnologias de Informação e Comunicação (TIC) na atenção primária no Brasil a partir do Programa Nacional de Melhoria do Acesso e da Qualidade da Atenção Básica (PMAQ-AB), nas dimensões de estrutura, implantação de sistemas e utilização da informação.

Palavras-chave: Tecnologia de Informação; Comunicação em Saúde; Atenção Primária à Saúde; Acesso à Informação.

INTRODUCTION

The relationship between the incorporation of Information and Communication Technologies (ICT) and the quality of caution in primary care has been discussed at length. In a broader perspective, a study¹ conducted in 2014 proposed

a plan for assessing the quality in the Primary Health Care (PHC) European services, correlating the existing resources in the PHC and the scope of system goals to which it belongs. The results of the study point out² that health systems where the PHC has adequate resources to facilitate the access to the wide range of services contribute to health equity.

The use of electronic health records is widely recommended as a means to improve the quality, safety and efficiency of health care. Some studies^{3,4} point to the potential of quality and safety related to the ICT: increase of adherence to care based on guidelines, greater agility care, more extensive documentation, conducting of tests without duplication and fewer medical errors.

Several systematic reviews seek to understand specifically the correlation between incorporation of ICT and the quality of care. In 1997⁵ it was found that the computer use during the consultations led to cost savings and the reduction of unnecessary testing with regard to the request for additional tests. However, it lengthened the time of consultations and the issuance of prescriptions increased. The study concluded that the introduction of computer systems in primary care can improve the work performance.

A systematic review in 2009 on the electronic registration of adoption in primary care in seven countries⁶ concluded that the quality of implementation is as important as the quality of the system and many errors can be corrected during the implementation process with simple measures and states that the usability of the health system, the computer skills and the system adjustment within the organizational culture are significant factors of success in the implementation.

Another systematic review by English authors⁷ covering the period from 1997 to 2010, concluded that exist in the literature a lack of evidence of the impact of these technologies in relation to improvements in patients' outcomes, as well as the lack of evidences on cost-effectiveness.

In 2012, a Canadian study in another systematic review⁸ showed that there were little evidences about the specific benefits: the records were not robust enough to anchor the clinical use; it did not occur a good adjustment between the electronic medical record and clinical workflows and it was still precarious the demonstrable value to the clinicians.

A study conducted in Latin America in 2016⁹ in relation to the implementation of electronic medical records, recommended attention to some aspects: to stimulate the formation of human resources for this area; introduce strategic planning, involving people who will be potential users of the system; to formulate regulatory frameworks to facilitate its adoption, involving security, confidentiality and usage of patterns. Despite these considerations, the implementation of ICT in APS is in expansion.

Brazil, in the last period, managed a skip in relation to know the situation of ICT incorporation in primary care. In 2011, it started in the country a new step in the process of institutionalization of the evaluation of Primary Care, with the

formulation of the National Programme for Improving the Access and Primary Care Quality (PMAQ-AB),¹⁰ established by the Ordinance GM / MS 1654 of 19 July 2011. Through the establishment of continuous and progressive processes, the PMAQ-AB aims to increase the capacity of the three spheres of government to offer services to guarantee a comparable quality standard in national, regional and local scopes. The PMAQ-AB is starting its third cycle, also collecting data on ICT incorporation process.

Few studies in Brazil have been conducted on the incorporation of ICT in all primary care. In a study using the first cycle data of 2012 PMAQ on typology¹¹ of the basic health units, it was found that the best structured units - type 4 and 5, which correspond to 51.0% and 4.8% of the units - incorporated more ICT. The units of type 5 have in their offices 100% of computers with internet connection while the units of type 4 have 61%. In the units having the worst structure (type 1 and 2) there are computers only in 3.7% and 16.8% respectively. In this study, with data related to 2012, it was observed that, generally, 51.2% of the units reported to have a computer and 35.4% of the units had access to Internet.

Another study,¹² using PMAQ data, also from 2012, showed that approximately 22% of all Family Health Teams (FHT) from Brazil have Internet and 8% use the telehealth as a resource. The results reaffirm the great challenge that is to achieve the objectives of access and use of information technologies in the SUS primary care.

This article aims to describe the situation of ICT incorporation process in primary care in Brazil from PMAQ, in the dimensions of structure, systems implementation and use of information.

METHOD

This is a descriptive study. It was used the external evaluation of the PMAQ database of the second cycle organized by the Ministry of Health, whose collection was carried out between the years 2013 and 2014. The external evaluation instrument of PMAQ is divided into six modules. The module I is related to issues of infrastructure, materials and supplies of the basic health units (UBS). The module II raises issues related to access and quality of care, the organization of the team work process and the joint of the health care network (interview with professional of health teams, at a higher level that would add more knowledge about the work process, designated by the staff to respond to external evaluation). The module III is related to the user's satisfaction (interview

with four members of the primary care team) and module IV collected information regarding the teams of the Center of Support for Family Health. The modules V and VI relate to dentistry, the first evaluates the physical structure of dentistry health in the health unit and the second is an assessment based on the responses of dentistry health professionals (dentist, dentistry technician and dentistry assistant).

In this study, the variables of the modules I and II from PMAQ arranged from three dimensions are used. It was selected variables from PMAQ questionnaire that could indicate issues related to the following ICT dimensions: infrastructure, systems and use of information.

In the first dimension on the ICT infrastructure of the basic health units, it was used the variables related to: connectivity - the existence of internet, the status of connectivity (operation and number of connected environments) - computers and peripherals conditions of use, the presence of computers and internet in doctors, nursing and dentistry's offices, besides pharmacy. These variables are present in the module I.

The second dimension concerns the deployment and use of the systems by the Primary Care Teams and it was used the following variables of the modules I and II: existence of electronic medical record deployed on the team and its integration with the other points of care network, existence of telehealth in the unity and use of centres of regulation and telehealth resources.

The third analytical dimension refers to the use of information and the variables were also from module II: availability of information by the management and support for the teams of health situation analysis and implementation by monitoring teams and analysis of the indicators and health information.

As for the universe researched, the second PMAQ cycle certified 30,523 teams with 713 declassified and other 353 considered unsatisfactory, according to criteria set by the program. For this study, it was analysed the interviews of all certified teams (excluding the disqualified and unsatisfactory ones), totalling 29,778 teams in all Brazilian states in UBS who joined the PMAQ in 2014. These interviews were conducted with the professionals who answered the questionnaire module I and the coordinators of ESF who responded to the questionnaire module II of the PMAQ. For the data of module I, the universe analyzed was 24,055 basic health units. For the variables of module II, the universe analyzed was 29,778 primary care teams. The variables were organized by size, to allow an overview of ICT incorporation process in primary care in Brazil.

The project was approved by the Ethics Committee in Research of UFMG under the number 28,804 in 2014.

RESULTS

The status of connectivity in the basic health units, using internet, reaches 50.1% of the units, with good quality - 78.1% of the teams claim that it is sufficient to carry out the activities according to Table 1. However, the number of connected environments (reception, pharmacy, management, reception room, observation room, immunization, procedure room) is still limited: most units have between 1 and 2 connected environments - 33.6% and 17.6 % respectively.

Table 1 - Status of internet access in the basic health units - Brazil 2014

Internet access			Broadband is sufficient for the activities			Number of environments connected to the Internet		
	Frequency	%		Frequency	%	0	179	1.5
Yes	12055	50,1	It operates continuously	9,411	78.1	1	4,046	33.6
No	12,000	49,9				It operates regularly	2,556	21.2
			It never operates	88	0.7			
						4	1,024	8.5
						5	750	6.2
						6 or more	2,453	20.3
Total	24,055	100		24,055	100		12,055	100.0

Table 2 - Number of computers, microphones, webcam, printers and smartphones in use conditions - Brazil 2014

N°	Computers in use conditions		Microphones in use conditions		Webcam in use conditions		Printers in use conditions		Smartphones		
	N° Abs	%	N° Abs	%	N° Abs	%	N° Abs	%		N° Abs	%
0	7,314	30.4	21,570	89.7	20,482	85.1	11,669	48.5	Yes	280	1.2
1	6,454	26.8	1,836	7.6	2,564	10.7	7,353	30.6			
2	3,229	13.4	321	1.3	511	2.1	2,246	9.3	No	6,382	26.5
3	1,794	7.5	109	0.5	184	0.8	1,009	4.2			
4	1,186	4.9	57	0.2	98	0.4	526	2.2	Not applicable	17,393	72.3
5	739	3.1	28	0.1	49	0.2	319	1.3			
6 or more	3,339	13.9	134	0.6	167	0,7	933	3.9			
Total	24,055	100	24,055	100	24,055	100	24,055	100,0	Total	24,055	100

As it is detailed the infrastructure of ICT in the primary care units in relation to offices, it is observed from Table 3 that there is still a small incorporation of ICT: 86.2%, 80.6% and 70.6 % of dental, doctors and nurses' offices do not have computer respectively, as well as in 78.3% of pharmacies located in

the primary health care units. These percentages increase when it comes to the Internet: 88.2%, 84.1% and 77.45% do not have computers connected to the internet in dental doctors and nurses' offices. With regard to pharmacies, 83.8% of the units are not connected to the Internet.

Table 3 – Existence of computers in doctors', nursing, dentist offices and pharmacy in primary care - Brazil 2014

	Medical offices with computer		Medical offices with computer connected to the internet		Dental offices with computer		Dental offices with computer connected to the internet		Nursing offices with computer		Nursing offices with computer connected to the internet		Pharmacy with computer		Number of computers in the pharmacy connected to the internet	
	N°	%	N°	%	N°	%	N°	%	N°	%	N°	%	N°	%	N°	%
0	18,619	80.6	19,435	84.1	15,670	86.2	16,034	88.2	15,181	70.6	16,633	77.4	18,828	78.3	0	0
1	2,658	11.5	2,091	9.1	2,232	12.3	1,892	10.4	5,356	24.9	4,070	18.9	5,227	21.7	4,379	83.8
2	733	3.2	637	2.8	218	1.2	201	1.1	582	2.7	469	2.2			612	11.7
3	380	1.6	329	1.4	53	0.3	46	0.3	197	.9	163	.8			134	2.6
4	229	1	179	0.8	5	0	5	0	68	.3	56	0.3			35	0.7
5	141	0.6	117	0.5	4	0	4	0	28	.1	25	0.1			12	0.2
6 or more	340	1.5	312	1.4	0	0	0	0	81	.4	77	0.4			55	1.1
	23,100	100	23,100	100	18,182	100	18,182	100	21,493	100.0	21,493	100.0	24,055	100	5,227	100

In Table 4, starting for the systems analysis, it is observed that only 13.9% of the Primary Care Teams have electronic medical records - 4,133 teams in a total of 29,778, and in places where the electronic medical record is implemented,

most are already integrated with other network points of attention (80.7%). Also 90.1% of the teams have reported to have their own medical record.

Table 4 - The existence and type of implanted electronic medical record in primary care units - Brazil 2014

Existence of Medical Report		Frequency	%	Type of Medical Report	Frequency	%
Yes	Integrated	3,337	80.7	Own Record	3,724	90.1
	Not integrated	733	17.7			
	Don't know- Didn't answer	63	1.5			
	Sub-Total	4,133	13.9			
No		25,645	86.1	E-SUS Record	409	9.9
Total		29,778	100.0	Total	4,133	100.0

Continuing the analysis of the systems deployed in the primary care, it is observed in Table 5 that the 29,778 primary care teams analyzed, 30.8% have reported using telehealth resources. It is observed that 12.7% of the units had

telehealth resources in 2012 passing to 27.7 in 2014. As for the central regulation, 86.3% of the teams have reported using them.

Table 5 - Number of Teams that have access to central regulation and telehealth -2012-2014

Type of implanted systems	Central use of regulation by the team - 2014		The unit has telehealth - 2012		The unit has telehealth - 2014		Use of telehealth by the team - 2014	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Yes	25,703	86.3	4,931	12.7	6,662	27.7	9,181	30.8
No	4,075	13.7	33,875	87.3	17,393	72.3	20,597	69.2
Total	29,778	100.0	38,812	100.0	24,055	100.0	29,778	100.0

In the dimension relating to the use of information by the primary care teams, it was observed in the three dimensions analysed that this block has the highest number of positive responses: over 80%. As for carrying out monitoring and analysis of health indicators and health information, 88.5% of the teams

respond positively; when asked about the management to make available information that assist in the analysis of health status, 89.0% answered that these activities are carried out as well as 81.1% of the teams report that receive support from the management to discuss the data of the information system.

Table 6 - Number of teams that have access to central regulation and telehealth -2012-2014

Does the management team provide for the team information to help in the health situation analysis?	Frequency	%
Yes	26,505	89.0
No	3,273	11.0
Total	29,778	100.0
Does the primary care team carries out monitoring and analysis of indicators and health information?	Frequency	%
Yes	26,363	8.5
No	3,415	11.5
Total	29,778	100.0
Does the team receive support for the discussion of monitoring data of the Information System?	Frequency	%
Yes	24,149	81.1
No	5,629	18.9
Total	29,778	100.0

Among the three dimensions analyzed – infrastructure, systems and information – it is in the dimension related to the information that a better structuring is found.

DISCUSSION

In relation to the items related to the infrastructure, it can be observed that the access to Internet in this study covers 50.1% of the units, with almost 80% of the units stating that it works properly. This result is a skip in relation to the data of 2012, in which 35.4% reported having access.¹¹ Despite the significant skip, although most of the units have only one or two environments connected to the Internet - 66.2%.

When analyzing the presence of computers in the units, it was noted that the current study revealed that 69.4% of the units have computers in use conditions, while a study conducted in 2012 shows that only 51.2% of the units had computers.¹¹ In other words, the country has advanced in recent years to face this situation, focusing on ICT incorporation processes. For other peripherals, important to the process of interaction and to better structure the units, however, there is also a significant absence: 89.7%, 85.1 and 48.5% of the units do not have microphones, webcam

and printers respectively. There are still very few smartphones available in the units - 1.2%.

As regards the situation in the offices concerning computerization, it was observed a very precarious situation: less than 20% of the teams have access to computers and internet in the offices. Even in the pharmacy, which has numerous processes that could provide better control and agility with the presence of computers, the situation is worrying - only 21.7%. In other words, there is still a long way to go to the computing infrastructure is adequate in order to take advantage of all the potential of ICT in the different areas and activities conducted in the basic units.

With regard to electronic medical record, it was observed that only 13.9% of the teams in Brazil have access to electronic medical records. In the United States, a study¹³ conducted in 2011, pointed out that 35% of primary care doctors of APS already had electronic medical record while in Canadá¹⁴ this percentage in 2010 reached 49%. The implementation of electronic medical record systems in primary care is complex, involving many aspects. A recent review identified more than 48 different factors that can influence in the success of the implementation of electronic records.¹⁵

The deployment of telehealth resources and the access of the teams to these resources draw attention in the general framework of ICT assessed: more than 30.8% report using telehealth program for various activities, including remote diagnostics, continuing education activities and teleconsultations. According to a study conducted in 2012¹². This percentage was only 8%. In addition to the growth process of using telehealth resources in Brazil, it was also noted a skip in relation to the implementation of the project in the basic units. In 2012, this percentage was 12.7% passing to 27.7% in 2014.

Brazil has since 2007¹⁶ a national project of structured telehealth, which allowed the provision of telehealth resources to about 14,000 teams since their implantation¹⁷. In this study, 9,121 primary care teams reported using the telehealth resources, denoting the effective implementation of the national telehealth project. However, there is still a significant gap between the possibility of the teams to have access – by the national project and the concrete account of its use. There is also still a significant number of teams that do not have telehealth resources because the national project does not have 100% coverage.

The most significant results are found in relative dimension to the use of information, in which more than 80% of the teams refer significant processes with regard to the in-

involvement of managing the provision and supporting the use information as well as the use of information by the teams to perform monitoring. Although this last dimension offer ample scope for interpretation, the scope of the questions, the finding goes against the efforts made in the country for family health teams use the data generated by the systems of information.^{18,19}

In order to act on the problems found on the ICTs incorporation process, it is underway in the country, the Requalification Programme of UBS's Ministry of Health,²⁰ which has invested in the installation of computers, internet and in the implementation of Electronic Medical Records in UBS. In particular, the e-SUS project's implementation proposal²¹, that advances towards improving the information production process on the activities of primary care, individualizing care, has been a significant initiative that has driven the computerization process of primary care in the country. Another important initiative relates to the National Broadband Plan in UBS, the result of a partnership between the Ministry of Health and the Ministry of Communications, aiming to install broadband in twelve thousand UBS²². But there is still a long way to be followed until all the primary care teams have an available ICT structure.

It is emphasized that this framework of relative precariousness of ICT incorporation process in primary care in Brazil is conditioned by concrete limits. There are limits as regards the implementation and evaluation of innovative policies in the health area in complex institutional settings, such as the ICT incorporation process. Some topics are well described in the literature^{23,24} such as a useful list of innovation attributes that predict (but do not guarantee) the successful adoption, the importance of social influence and the networks through which operates the complex and contingent nature of adoption process, the characteristics (both hardware and software) of the organizations that encourage and inhibit innovation, initiated and discontinued actions, beyond assimilation and routinization process of difficult investigation.

Although this process of still relatively precariousness ICT incorporation into primary health care in Brazil, it is important to emphasize the progresses made in recent years about the existence of computers and connectivity, the incorporation of telehealth resources and especially the use of information by primary care teams.

CONCLUSION

This study observed that in Brazil the ICT incorporation process in primary care is relatively poor, with problems in the infrastructure, with less than 20% of the teams having computers in their offices and internet access. The electronic medical record implementation is still very limited and the process of using telehealth resources has advanced in recent years reaching more than a third of the teams. In the three analyzed dimensions - infrastructure, systems implementation and use of information - it is in this last aspect that we observe significant advances: more than 80% of the teams report using information for monitoring their activities. There is still a long way to go in Brazil in relation to the incorporation of ICT in primary care.

REFERENCES

1. Kringos DS, Boerma WGW, Bourgueil Y, Cartier T, Hasvold T, Hutchinson A, et al. The european primary care monitor: structure, process and outcome indicators. *BMC Family Practice*. 2010[citado em 2015 jul. 04]. Disponível em: <http://www.biomedcentral.com/1471-2296/11/81>. DOI: 10.1186/1471-2296-11-81
2. Kringos DS, Boerma WGW, Hutchinson A, Van Der Zee J, Groenewegen PP. The breadth of primary care: a systematic literature review of its core dimensions. *BMC Health Services Research*. 2010[citado em 2015 jul. 04]; 10:65. Disponível em: <http://www.biomedcentral.com/content/pdf/1472-6963-10-65.pdf>. DOI: 10.1186/1472-6963-10-65
3. McGuire MJ, Noronha G, Samal L, Yeh H-C, Crocetti S, Kravet S. Patient safety perceptions of primary care providers after implementation of an electronic medical record system. *J Gen Inter Med*. 2013[citado em 2015 jul. 04]; 28(2):184-92. Disponível em: <http://www.ncbi.nlm.nih.gov/pubmed/22887020> DOI: 10.1007/s11606-012-2153-y.
4. Price M, Singer A, Kim J. Adopting electronic medical records: are they just electronic paper records? *Can Fam Physician*. 2013[citado em 2015 jul. 04]; 59:e322-9. Disponível em: <http://www.ncbi.nlm.nih.gov/pubmed/23851560>
5. Mitchell E, Sullivan FA. Descriptive feast but an evaluative famine: systematic review of published articles on primary care computing during 1980-97. *BMJ*. 2001[citado em 2015 jul. 04]; 322(3):279-82. Disponível em: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC26582/>

7. Black AD, Car J, Pagliari C, Anandan C, Cresswell K, Bokun T, et al. The impact of ehealth on the quality and safety of health care: a systematic overview. *PLoS Med.* 2011[citado em 2015 jul. 04]; 8(1):e1000387.
8. Greiver M, Williamson T, Bennett TL, Drummond N, Savage C, Aliarzadeh B, et al. Developing a method to estimate practice denominators for a national Canadian electronic medical record database. *FamPract.* 2013[citado em 2015 jul. 04]; 30(3):347-54. Disponível em: <http://www.ncbi.nlm.nih.gov/pubmed/23307818> DOI: 10.1093/fampra/cms083back.
9. Organización Pan-Americana da Saúde. Registros médicos electrónicos en América Latina y el Caribe: análisis sobre la situación actual y recomendaciones para la Región. Washington, DC: OPS; 2016. [Citado em 2016 abr. 12]. Disponível em: <http://iris.paho.org/xmlui/handle/123456789/28209>
10. Ministério da Saúde (BR). DAB. PMAQ. [Citado em 2016 abr. 12]. Disponível em: http://dab.saude.gov.br/portaldab/cidadao_pmaq2.php?conteudo=resultado_avaliacaoFORM
11. Giovanella L, Bousquat A, Fausto MCCR, Fusaro RE, Mendonça MHM, Gagno J. Novos caminhos: tipologia das unidades básicas de saúde brasileiras. Nota Técnica 5/2015. 63 pg. [Citado em 2016 abr. 12]. Disponível em: http://www.resbr.net.br/wp-content/uploads/2015/09/NovosCaminhos05_ValeEste.pdf
12. Lima AMLD, Costa AA, Santos AF, Abreu DMX, Sobrinho DF, Lobato L, et al. Acesso e uso de ferramentas informacionais na atenção básica à saúde no Brasil. Anais do 11º Congresso Brasileiro de Saúde Coletiva. [Citado em 2016 abr. 12]. Disponível em: <http://www.saudecoletiva.org.br/anais/index.php>
13. McGuire MJ, Noronha G, Samal L, Yeh H-C, Crocetti S, Kravet S. Patient safety perceptions of primary care providers after implementation of an electronic medical record system. *J Gen Inter Med.* 2013[citado em 2015 jul. 04]; 28(2):184-92. Disponível em: <http://www.ncbi.nlm.nih.gov/pubmed/22887020> DOI: 10.1007/s11606-012-2153-y.
14. Ryan AM, Bishop TF, Shih S, Casalino LP. Small physician practices in New York needed sustained help to realize gains in quality from use of electronic health records. *Health Aff (Millwood).* 2013[citado em 2015 jul. 04]; 32(1):53-62. Disponível em: <http://www.ncbi.nlm.nih.gov/pubmed/23297271> DOI: 10.1377/hlthaff.2012.0742.
15. Mars M, Scott R, Fahim A. Scope of policy issues in eHealth: results of a literature review structured. *J Med Internet Res.* 2012[citado em 2015 jul. 04]; 14 (1):34-42. Disponível em: <http://www.jmir.org/2012/1/e34/> DOI: 10.2196/jmir.1633
16. Campos FE, Haddad AE, Wen CL, Alkmin MBM. The National Telehealth Program in Brazil: an instrument of support for primary health care. *Latin-Am J Telehealth.* 2009[citado em 2015 jul. 04]; 1(1):39-66. Disponível em: <http://telessaude.hc.ufmg.br/publicacoes/the-national-telehealth-program-in-brazil-an-instrument-of-support-for-primary-health-care/>
17. Ministério da Saúde (BR). Secretaria de Gestão do Trabalho e da Educação na Saúde. Nota técnica 50 - Diretrizes para oferta de atividades do Programa Nacional Telessaúde Brasil Redes. Brasília: MS; 2015.
18. Moraes IHS. Sistemas de Informações em Saúde: patrimônio da sociedade brasileira. In: Paim J, Almeida-Filho N, organizadores. *Saúde Coletiva: teoria e prática.* Rio de Janeiro: MedBook; 2014. p. 649-65.
19. Nogueira C, Santos SAS, Cavagna VM, Braga ALS, Andrade M. Sistema de informação da atenção básica: revisão integrativa de literatura. *J Res Fundam Care Online.* 2014[citado em 2015 jul. 04]; 6(1):27-37. Disponível em: http://www.seer.unirio.br/index.php/cuidadofundamental/article/viewFile/1599/pdf_1042
20. Ministério da Saúde (BR). Portal da Saúde. Programa de requalificação de unidades básicas de saúde. [Citado em 2015 jul. 04]. Disponível em: http://dab.saude.gov.br/portaldab/ape_requalifica_ubs.php
21. Ministério da Saúde (BR). Portal da Saúde. E-sus. [Citado em 2015 jul. 04]. Disponível em: http://dab.saude.gov.br/portaldab/o_que_e_esus_ab.php
22. Ministério da Saúde (BR). Portal da Saúde. Projeto Nacional de Banda Larga Saúde.
23. Shcherbatykh I, Holbrook A, Thabane L, Dolovich L, COMPETE III investigators. Methodologic issues in health informatics trials: the complexities of complex interventions. *J Am Med Inform Assoc.* 2008[citado em 2015 jul. 04]; 15(5):575-80. Disponível em: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2528041/> DOI: 10.1197/jamia.M2518
24. Finch TL, Mair FS, O'Donnell C, Murray E, May CR. From theory to 'measurement' in complex interventions: methodological lessons from the development of an e-health normalisation instrument. *BMC Med Res Methodol.* 2012[citado em 2015 jul. 04]; 12:69. Disponível em: <http://bmcmedresmethodol.biomedcentral.com/articles/10.1186/1471-2288-12-69> DOI: 10.1186/1471-2288-12-69