A large scale Brazilian public Telehealth service improving population access to specialized healthcare

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www.telessaude hc.ufmg.br
Brazilian Unified Health System
Sistema Único de Saúde (SUS)

Introduced by the 1988 Constitution
Universal access to health care in Brazil

Cover all cities in all 26 states
Exclusive for 150 million individuals

Source: Ministry of Health
Family Health Strategy in Brazil

Composition of Family Health Care teams

- 1 Nurse
- 1 Dentist
- 1 or 2 Auxiliary Nurses
- 6 Community Health Agents
- 1 Physician

Family health teams are located at FHC clinics, and are assigned to specific geographical areas and defined populations of 600-1000 families.

Expansion of PHC teams in Brazil

- Difficult access to health services
- Poor PHC resoluteness
- Deficit of human resources
- High turnover of PHC professionals

Source: Ministry of Health
The State of Minas Gerais, Brazil

- 586,528 km² (> Spain)
- 19,597,330 inhabitants
- 853 cities
- 93% cities < 50k persons

High variability of the Human Development Index (HDI)

Low access to ECG in most cities, specially in small/poorest
TeleHealth Network of Minas Gerais

Partnership between seven public universities of Minas Gerais, coordinated by the Hospital das Clínicas da Universidade Federal de Minas Gerais, in order to develop multiple telehealth activities covering assistance, research and education to support remote health professionals, to generate knowledge and to train health professionals.

<table>
<thead>
<tr>
<th>Year</th>
<th>Phase</th>
<th># Municipalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005/2006</td>
<td>I</td>
<td>82</td>
</tr>
<tr>
<td>2006/2007</td>
<td>II</td>
<td>100</td>
</tr>
<tr>
<td>2008/2009</td>
<td>III</td>
<td>97</td>
</tr>
<tr>
<td>2009/2010</td>
<td>IV</td>
<td>328</td>
</tr>
<tr>
<td>2011</td>
<td>V</td>
<td>50</td>
</tr>
<tr>
<td>2012</td>
<td>VI</td>
<td>3</td>
</tr>
<tr>
<td>2013</td>
<td>VII</td>
<td>11</td>
</tr>
<tr>
<td>2014</td>
<td>VIII</td>
<td>50</td>
</tr>
<tr>
<td>2015</td>
<td>IX</td>
<td>59*</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>780</strong></td>
</tr>
</tbody>
</table>


2016
780 municipalities
1,000 telehealth sites, 48 ambulances
The Minas Telecardio project (2005-2009)

- Implanted in 2006
- 82 cities from Minas Gerais
- 400,942 inhabitants
- 5 Universities (leader UFMG)
- Telecardiology assistance
- Low-cost technology
Funding - TeleHealth Network of Minas Gerais

Governmental ministries and departments

![Minas Gerais Government](image1)
![Brasilia Government](image2)
![Belo Horizonte Prefecture](image3)
![RNP](image4)

Research and Innovation agencies

![FAPEMIG](image5)
![CNPq](image6)
![Finep](image7)
![NIH](image8)
![Verizon Foundation](image9)

Private clinics
Clinical services

- Teleconsultations online and off-line
- Telediagnosis (ECG, Holter, ABPM, fundus photography)
- Decision support systems
- Quality office and periodic audit

Tele-education

- Online courses and lectures
- E-books and web-based content

Technical assistance

- Implementation
- Maintenance and monitoring
- Technical support
Numbers - TeleHealth Network of Minas Gerais

- 2.8 million electrocardiograms (2006 to 2016)
- 1,788 Holter and ABMP (2013-2016)
- 1,750 fundus photographs
- 87,108 teleconsultations (2016)

2,500 ECG per day (2016)
TeleOphthalmology
**Impact** - TeleHealth Network of Minas Gerais

- **97% of user satisfaction**
- **80% of reduced referrals** (Teleconsultation)
- **Savings of US$ 43 million** (R$ 167 million)
- **Saving of US$ 5.8 for each US$ 1 invested**
<table>
<thead>
<tr>
<th>Quality Control - TeleHealth Network of Minas Gerais</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audit system for diagnostic reports (ECG, Holter, FF)</td>
</tr>
<tr>
<td>Audit of teleconsultations</td>
</tr>
<tr>
<td>Patterns / routines for clinical services</td>
</tr>
<tr>
<td>Protocols</td>
</tr>
<tr>
<td>User line / contact for queries and claims</td>
</tr>
<tr>
<td>Analysis of clinical data</td>
</tr>
<tr>
<td>Involvement of undergraduate / postgraduate students</td>
</tr>
</tbody>
</table>
Innovation – Novel ECG management system

• Web-based ECG data management
• Direct signal acquisition at remote points
• Enhanced specialist interface for measuring and reporting
• Quality assurance (compatibility of codes and measurements)
• Report easy to download and print at the remote point
Innovation – Decision support systems

Decision support system for hypertension - PCP

Tested in primary care centers (10 MD, 535 patients, 662 consultations)

- Applicability to PHC: 100%
- Easy to use: 80%
- Useful (information): 90%
- Useful (management of patients): 80%

TeleHealth Network of Minas Gerais
Rede de Teleassistência de Minas Gerais

Attenuation of geographical barriers
Improved access to specialized care
Qualification of referrals to upper levels
Better quality of care
Lower cost
Thank you

Daniel Vítor Vasconcelos Santos
Milena Soriano Marcolino
Maria Beatriz Alkmim
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