1.000.000 electrocardiograms by distance: an outstanding milestone for telehealth in Minas Gerais, Brazil


Telehealth Network of Minas Gerais
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- 586,528 km² (~ France)
- 19 million inhabitants
- 853 cities
- 70% cities < 14,000 inhab.
- Great economic, cultural and geographical contrasts
- Difficulty to set physicians in remote and poor areas
Introduction

In Brazil and specially in Minas Gerais, telehealth is mainly applied to primary care to support health professionals in remote and poor areas.
Telehealth Network of Minas Gerais (TNMG)

A partnership of six public universities in Minas Gerais state since 2005, coordinated by University Hospital of Federal University of Minas Gerais to provide telehealth services.

Alkmim MB et al. Improving patient access to specialized healthcare: The Telehealth Network of Minas Gerais, Brazil. Bull World Health Organ. 2012; May 1;90(5):373-8
Telehealth Network of Minas Gerais

Activities:

Teleassistance, teleducation and research in telehealth

Telehealth Network of Minas Gerais

Who finances?

- Ministry of Health
- Ministry of Science Technology and Innovation
- State Health Department
- City Hall of Belo Horizonte
- Brazilian Research Promotion Agencies
Objective

To describe the evolution of the telecardiology service provided by the TNMG.
Telecardiology

Started in 2006

- ✅ 82 municipalities
- ✅ Research project

2013

- ✅ 660 municipalities
- ✅ 821 sites

Telecardiology: how does it work?

Activities
Analysis of electrocardiograms and discussion of clinical cases of critically ill patients
Telecardiology: how does it works?

- 3 cardiologists on duty/day
- Urgencies answered in less than 10 minutes
- Routine exams answered in the same day

Monday to Friday, from 7:30 am to 8:00 pm.

- Compatible with different types of equipments
- Automatic data transfer
- International standards
- Self-made system
Clinical Quality Control Office

Audit system

- To assess agreement between different cardiologists’ EKG readings
- First study: 900 EKG randomly and blindly selected were analyzed from all cardiologists

Cardio 1

Cardio 2

Cardio 3

9.4% rate of disagreement with respect to EKG abnormalities that were substantial enough to potentially alter case management
Myocardial Infarction Network

- Connects emergency units of Belo Horizonte to Coronary Care Unit and Telehealth Center to improve treatment for patients with myocardial infarction

2,576 EKG in 2011/2012

Hospital Mortality in MI in Belo Horizonte, 2009 to 2011
## Teleconsultation off line

**Gatekeeper**

- Family and Community Medicine
- Pediatrics
- Gynecology/Obstetrics
- Dermatology
- Nursing
- Dentistry
- Nutrition
- Physiotherapy
- Pharmacy
- Psychology
- Audiology

**Specialists**

- Angiology
- Cardiology
- Gastroenterology
- Infectology
- Pulmonology
- Rheumatology
- Hematology
- Geriatrics
- Mastology
- Neurology
- Orthopedics
- Surgery
- Psychiatry
- ...
Main Results

1,1 million Electrocardiograms

From June/2006 to December/2012
From April/2007 to December/2012

48,000

TELECONSULTATIONS
Number of Activities

Total of ECG: 1.165.410
Total of teleconsultation online /offline: 48.680
Number of Activities

**Weekly average per municipality**

Mars y Scott (2012): average of 1,8 activ./mun./week
TNMG (2009): average of 3,4 activ./mun./week
TNMG (2012): average of 6,1 activ./mun./week

**Daily average**

Electrocardiogram: 1,500 ekg/day
Teleconsultation: 77 teleconsultation/day

**Utilization rate (percentual of active municipalities)**

Electrocardiogram: > 90%
Teleconsultation: ~ 60%

Other indicators

• 80% of the telehealth activities avoid the patient referral to specialists
• ~ 95% of the users are satisfied with the system
• ~ 50% of the EKG are normal
• The most frequent teleconsultation question is about pharmacological treatment
More than 5,000 health professionals trained
Economical Analysis

Variable cost per patient referral in Minas Gerais: US$ 36,00
Telehealth activity cost: US$ 5,40
Efficiency: 80%
Number of activities: 1,214,090 (February/2013)

Savings for public health system:

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0.80 \times 1,214,090 \times (36.00 - 5.40) = \text{US$ 29,720,923}
\]

Investment (2005/2012) = US$ 8,615,495 Million

ROI = US$ 3,45
Success Factors

✓ Collaborative network
✓ Partnership government / academia
✓ To meet real needs of users
✓ To use simple and low cost technology
✓ Virtual / personal process
✓ Economic sustainability
Awards

Award 10 Best Practices in Education/ MEC 2011
1st place

2011 International Health Promotion Awards

Award Health! 2008
1st place in Cardiology

Award Science and Technology
National Health System 2010
1st place MsC category

Award Science and Technology
National Health System 2011
1st place Paper Published category
Awards

Award Citizenship without Borders
2011
1st place Health category

Certified as Best Practices in Telehealth 2012
Project Regional Protocols in Telehealth for Latin America

17º Inovation in Federal Public Management
2013
1st place
Conclusion

The telehealth model developed to support primary healthcare in Minas Gerais, Brazil, has produced good clinical and economical results. As a consequence, it is now a regular health service in the State, covering 660 of the 853 municipalities and integrated to the healthcare system. It has also been expanded to secondary and emergency care. The model and technology characteristics permit the replication in other parts of the world.
Thank You!

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