



REDE DE
TELEASSISTÊNCIA
DE MINAS GERAIS

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

Prof. Daniel Vítor Vasconcelos Santos

Clinical Coordinator, Centro de Telessaúde
Hospital das Clínicas da Universidade Federal de Minas Gerais,
Belo Horizonte, Brazil



**Milena Soriano Marcolino, Maria Beatriz Alkmim,
Renato Minelli Figueira, Antonio Luiz Pinho Ribeiro**



Conference for Global e-Health Grand Rounds
October, 2016

www.telessaude.hc.ufmg.br

Brazilian Unified Health System

Sistema Único de Saúde (SUS)



26 states
8.5 million km²
200 million people



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

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

Family Health Strategy in Brazil

Composition of Family Health Care teams

Expansion of PHC teams in Brazil



1
Physi

Communit
y Health
Agents

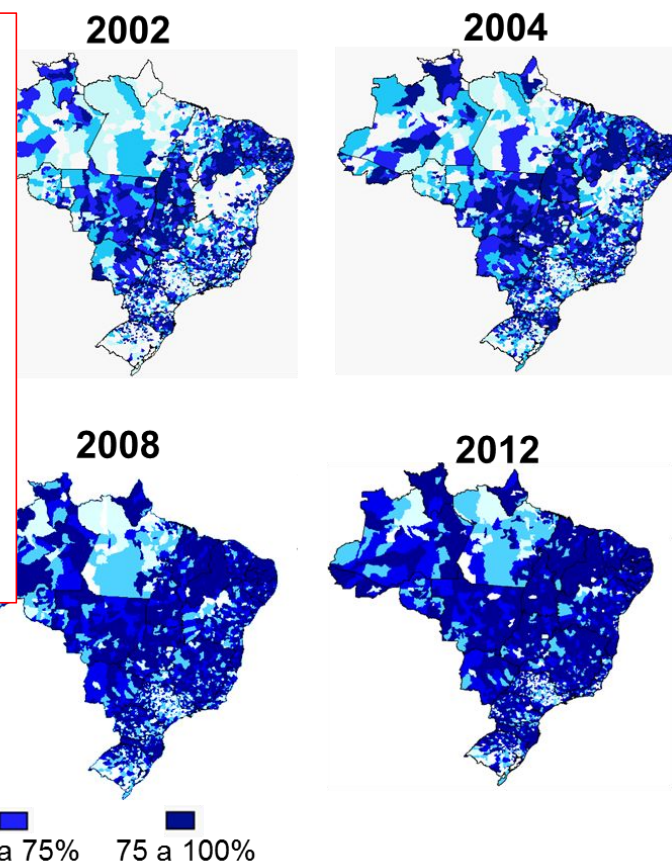
Auxiliary
Nurses

Difficult access to health services

Poor PHC resoluteness

Deficit of human resources

High turnover of PHC professionals



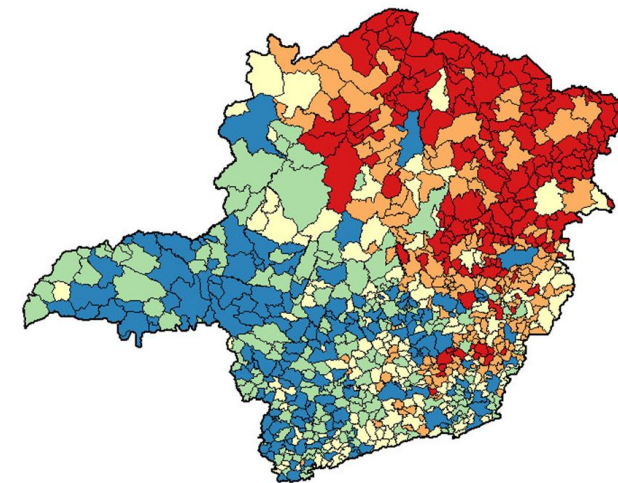
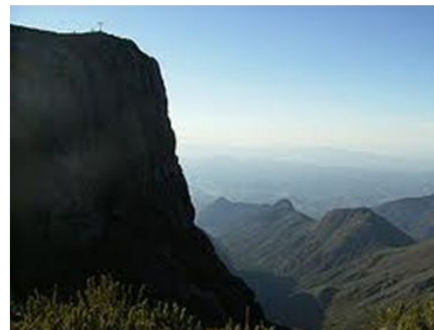
Source: Ministry of Health

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

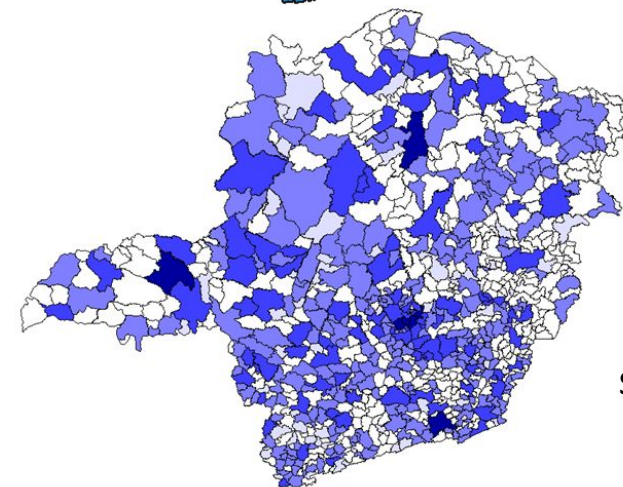
The State of Minas Gerais, Brazil



- 586.528 km² (> Spain)
- 19.597.330 inhabitants
- 853 cities
- 93% cities < 50k persons



High
variability of
the Human
Development
Index (HDI)

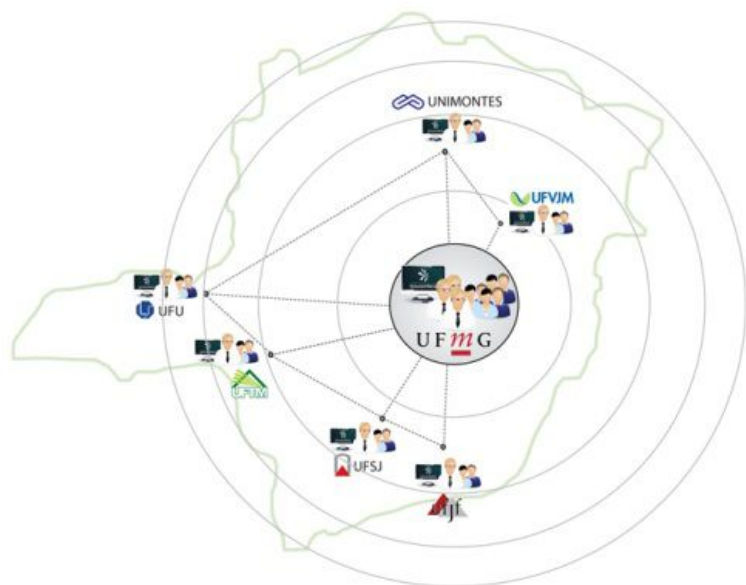


Low access
to ECG in
most cities,
specially in
small/poorest

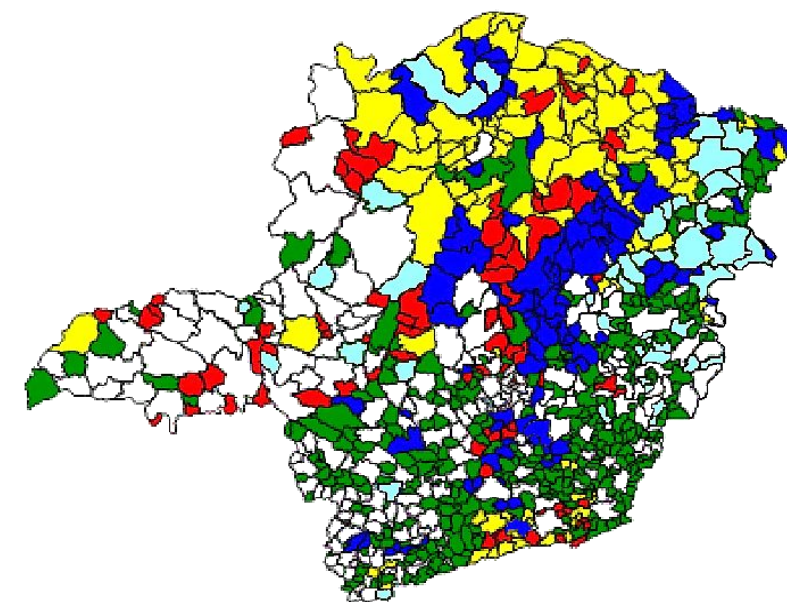
TeleHealth Network of Minas Gerais

Rede de Teleassistência de 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.



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



2016

780 municipalities
1,000 telehealth sites, 48 ambulances

Alkmim MB, et al. Improving patient access to specialized health care: the Telehealth Network of Minas Gerais, Brazil. Bull WHO. 2012 1;90(5):373-8.

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

Implementation of a Telecardiology System in the State of Minas Gerais: the Minas Telecardio Project

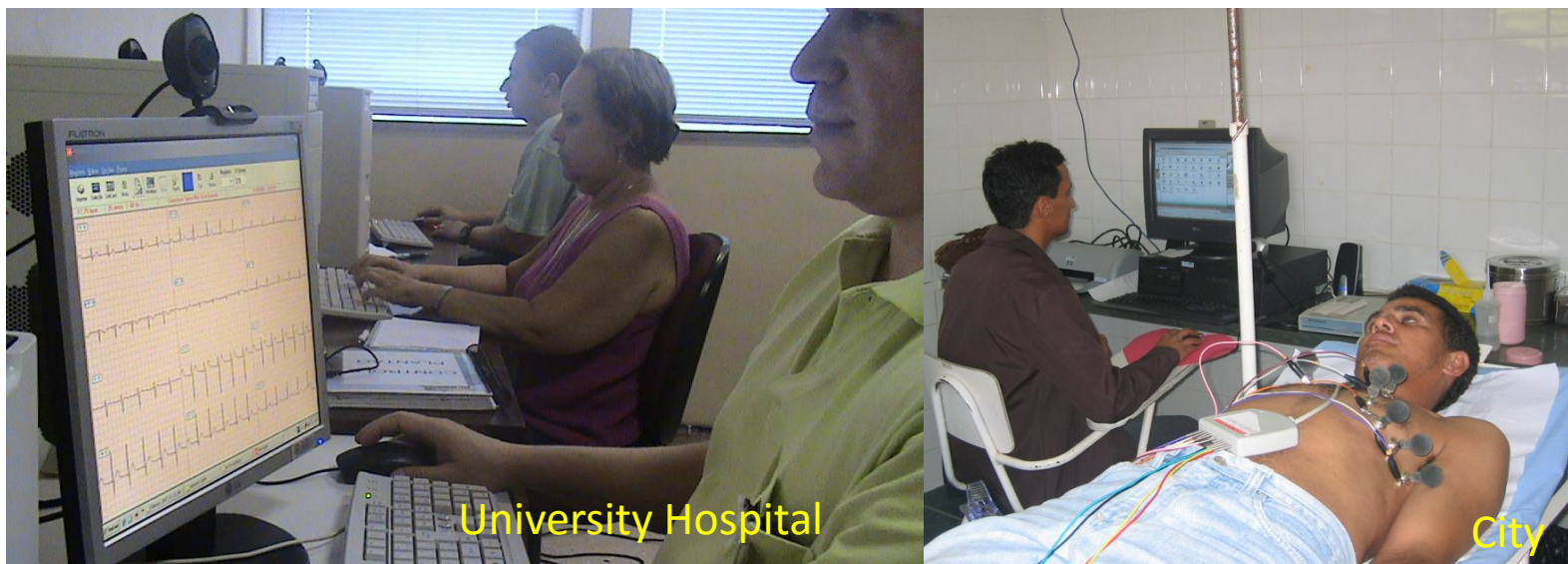
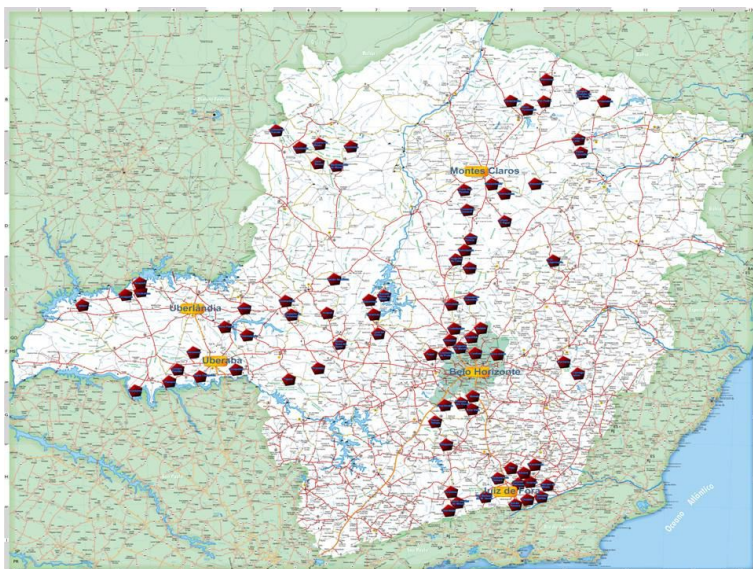
Arq Bras Cardiol 2010;95(1):70-78

Antonio Luiz P. Ribeiro¹, Maria Beatriz Alkmim¹, Clareci Silva Cardoso², Cláudio Caleno R. Carvalho¹, Waleska Teixeira Caiáffa¹, Monica Viegas Andrade¹, Daniel Ferreira da Cunha³, Andre Pires Antunes⁴, Adélson Geraldo de A. Resende⁵, Elmiro Santos Resende⁶

Cost-Benefit of the Telecardiology Service in the State of Minas Gerais: Minas Telecardio Project

Arq Bras Cardiol 2011;97(4):307-316

Mônica Viegas Andrade^{1,2}, Ana Carolina Maia^{1,2,3}, Clareci Silva Cardoso^{1,4}, Maria Beatriz Alkmim¹, Antônio Luiz Pinho Ribeiro^{1,5,6}



Funding - TeleHealth Network of Minas Gerais

Governmental ministries and departments



Research and Innovation agencies



Private clinics

Services - TeleHealth Network of Minas Gerais

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 eletrocardiograms
(2006 a 2016)

2,500 ECG per day
(2016)

1,788 Holter and ABMP
(2013-2016)

1,750 fundus photographs

87,108 teleconsultations
(2016)

TeleOphthalmology



LAUDO DE RETINOGRÁFIA - Exame 324

Exatidão: Total Exatidão
Data 1º de Maio 2019 11:00:00 - 14:00

OLHO DIREITO		OLHO ESQUERDO	
Qualidade imagem	Suficiente	Qualidade imagem	Suficiente
Disco óptico	Normal	Disco óptico	Normal
Exatidão 0.2	Normal	Exatidão 0.2	Normal
Retina vascular	Normal	Retina vascular	Normal
Perifoneia vascular	Normal	Perifoneia vascular	Normal
Alterações específicas	Microaneurismas EMG hemorragia preretina	Alterações específicas	Microaneurismas Mácula aguçada Exatidão 0.2 Microaneurismas Documentação fotográfica de retina
Observação	Observação de olho direito		
Observação geral	Imagem presa no fundo Alcance: Paulo Gomes001.jpg Observação: Paulo Gomes001.jpg		

Site: <http://www.telessaude.hc.ufmg.br> E-mail: telessaude@hc.ufmg.br
Tel: (31) 3409-6001 Página 1

Imagem retinográfica:

Direito: Paulo Gomes001.jpg

Esquerdo: Paulo Gomes001.jpg

Site: <http://www.telessaude.hc.ufmg.br> E-mail: telessaude@hc.ufmg.br
Tel: (31) 3409-6001 Página 2



Teleconsultation

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

Quality Control - TeleHealth Network of Minas Gerais

Audit system for diagnostic reports (ECG, Holter, FF)

Audit of teleconsultations

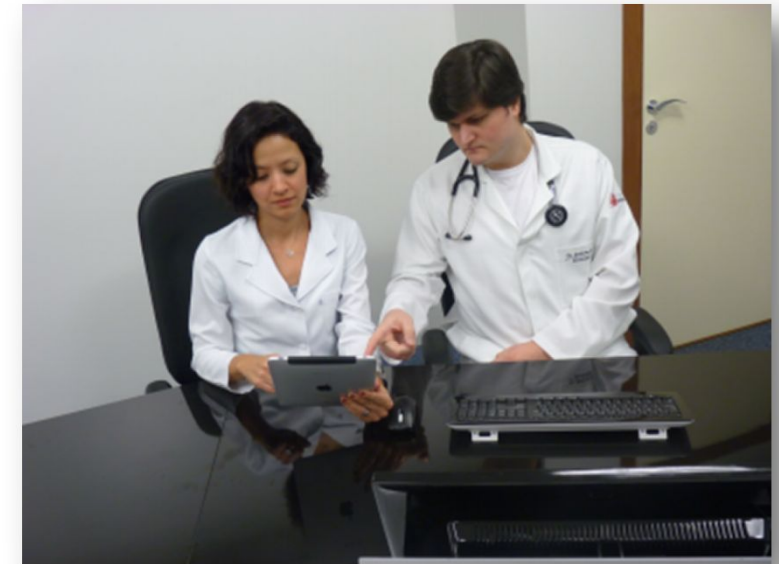
Patterns / routines for clinical services

Protocols

User line / contact for queries and claims

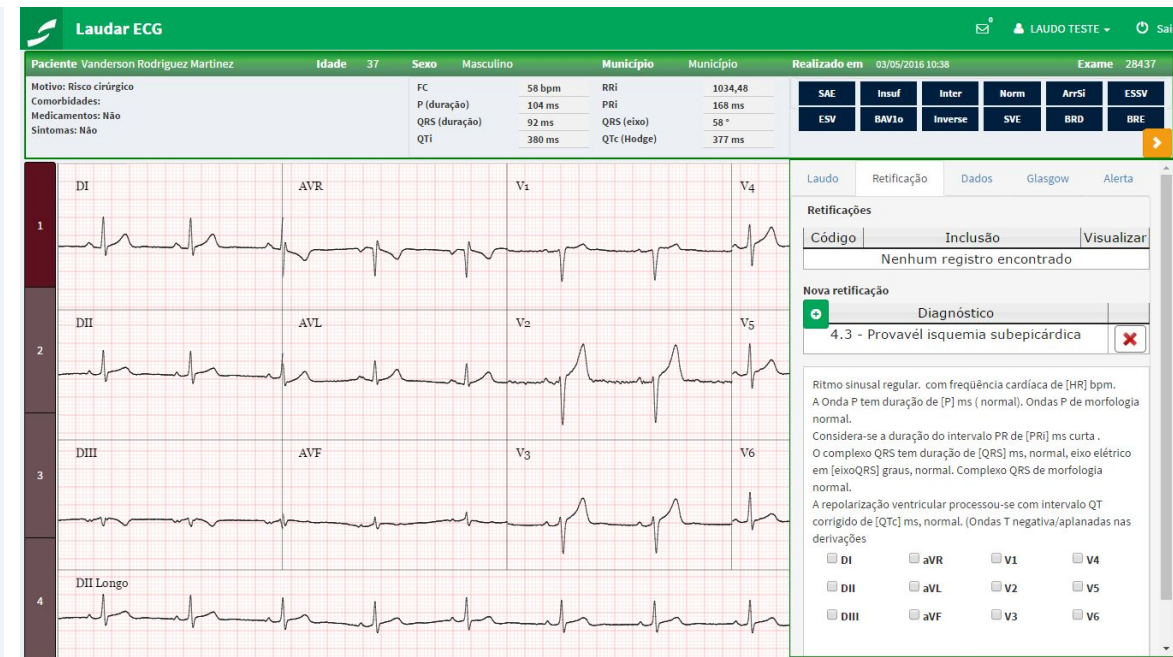
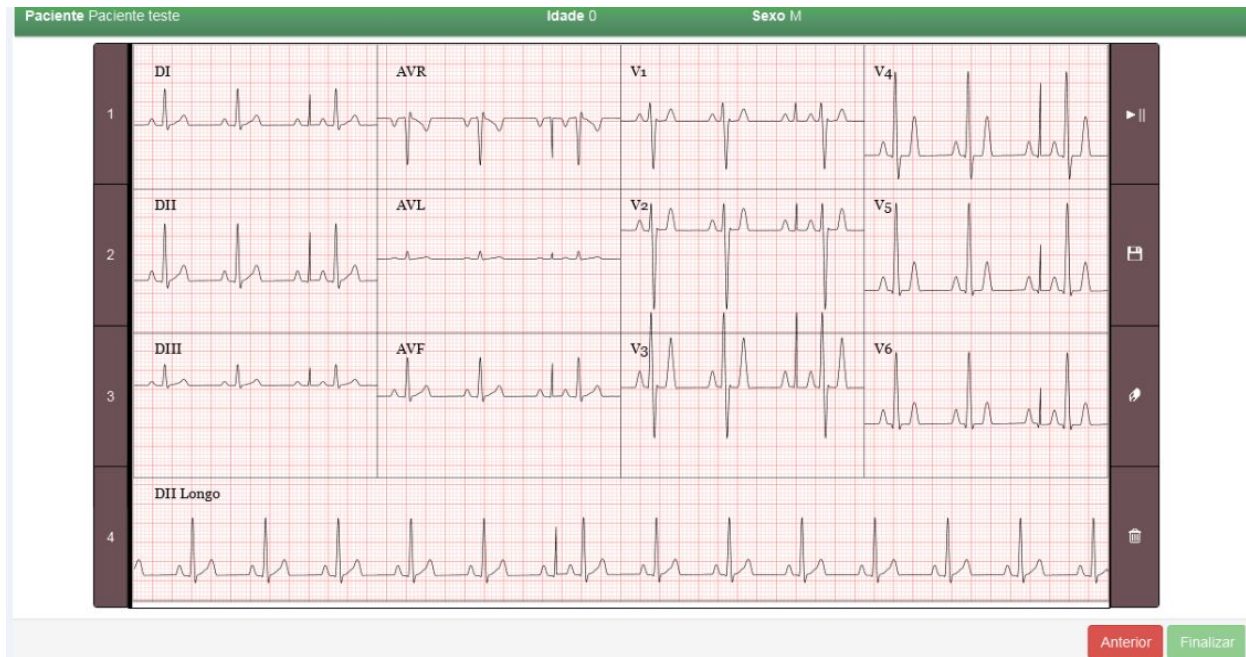
Analysis of clinical data

Involvement of undergraduate / postgraduate students



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



TeleHas Mobile

REDE DE
TELEASSISTÊNCIA
DE MINAS GERAIS

TeleHas Mobile

Usuário: TELEHAS

Senha:

☒ Lembrar Usuário ☒ Lembrar Senha

Confirmar Cancelar

10h58

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%



TeleHas Mobile

Lista de indicações

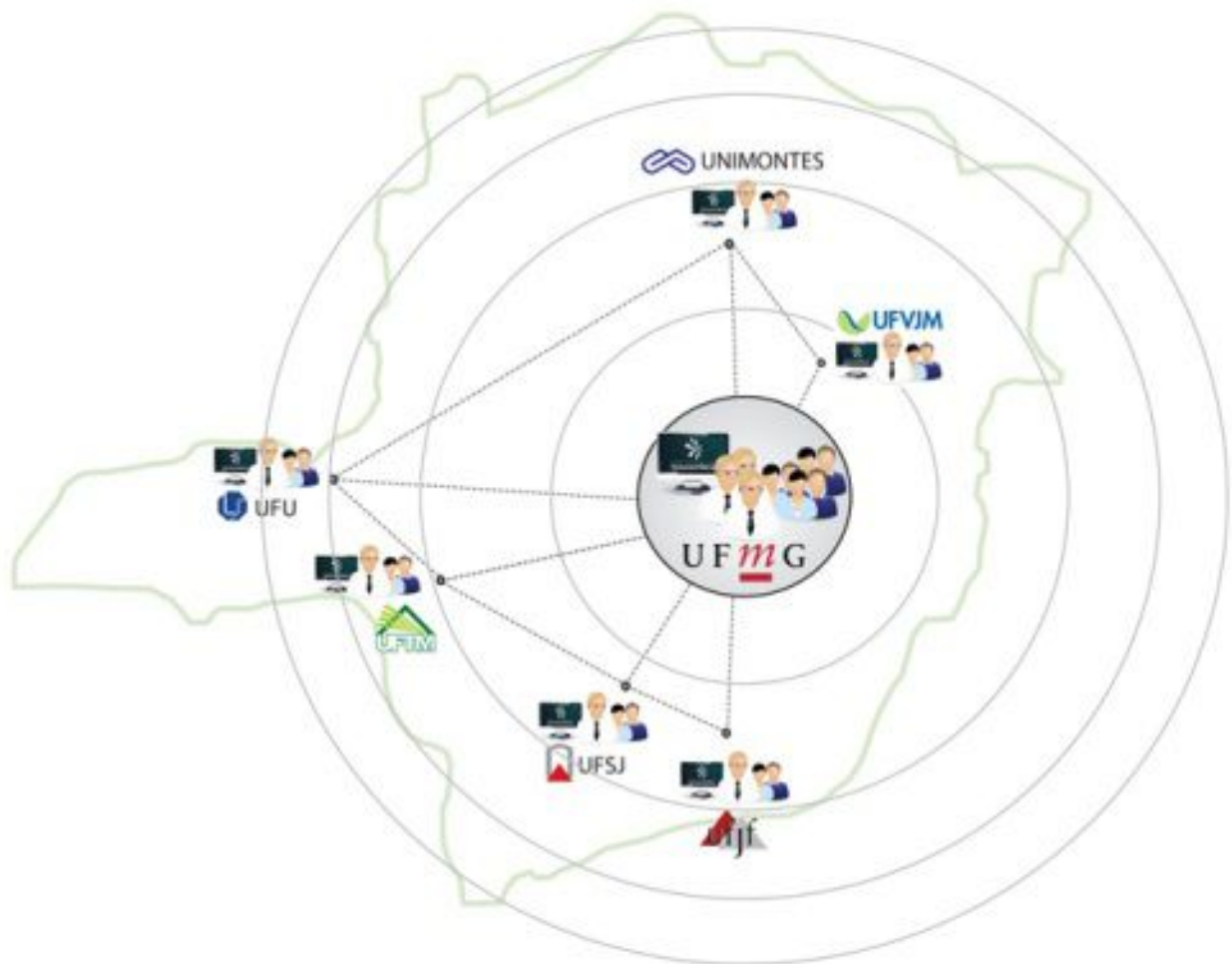
Identificação	⚠ O paciente se encontra na faixa de sobrepeso.
Comorbidades	⚠ Risco cardiovascular maior que 20% em 10 anos. Sugere-se a prescrição de sinvastatina 40mg +
Exame físico	⚠ Recomendar e reforçar a necessidade de atividade física. +
Medicamentos	
Exames complementares	⚠ Recomenda-se o uso de dieta que enfatize frutas, vegetais e produtos pobres em gorduras, ricos em fibras, grãos integrais e proteína de fontes

Gravar exames Resultados

10h59 11h08

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

Renato Minelli Figueira

Antonio Luiz Pinho Ribeiro

