

Original Research

The Experience of a Sustainable Large Scale Brazilian Telehealth Network

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Abstract

Background: In Brazil, the majority of healthcare resources are concentrated in the largest cities, whereas most communities lack proper healthcare assistance in primary care and have difficulties accessing specialists and diagnostic examinations. Considering this, the Telehealth Network of Minas Gerais (TNMG) was created. It is a public telehealth initiative that provides support to primary healthcare (PHC), performing teleconsultation and teleradiology (electrocardiogram [ECG], Holter, ambulatory blood pressure monitoring, spirometry, and retinography analysis) mainly for small and remote cities in the state of Minas Gerais, Brazil. **Purpose:** To describe the successful experience of the TNMG in 10 years of activities. **Methods:** The TNMG was created in 2005 and supported PHC in 82 cities as a research project and was progressively expanded. A methodology for implementation and maintenance was developed, including quality control. Nowadays it provides support to 750 cities, 88.0% of Minas Gerais state. The examinations performed by the PHC team, with additional basic clinical data, are transmitted through the Internet to the TNMG specialists for remote interpretation. The TNMG teleconsultations system has been used by the PHC team to address written clinical questions to university staff. **Results:** Until December 2015, 2,464,999 ECGs and 73,698 teleconsultations have already been performed: on average, 2,000 ECGs and 40 teleconsultations per day in 2015. More than 95% of users have declared to be satisfied or very satisfied with the service. A recent cost-benefit analysis of the project showed that for each dollar invested, 6.1 dollars are saved as a consequence of patient

referral reduction. **Conclusions:** The TNMG is a successful example of a sustainable telehealth service, integrated to primary care centers of remote and small cities. It overcomes geographical barriers to provide specialized healthcare, reducing the number of unnecessary referrals, and contributing to improve the case-resolving capacity and the quality of the PHC.

Key words: primary healthcare, telehealth, teleconsultation, quality of healthcare

Introduction

The Brazilian Constitution guarantees universal and equal access to healthcare for all Brazilian citizens. However, the country is full of economic, social, and political contrasts and the ideal represented in the constitution has not yet been achieved.¹ The majority of healthcare resources are concentrated in the largest cities along with most healthcare professionals and training centers.² Therefore, most communities in small and remote locations lack proper healthcare assistance in primary care and have difficulties accessing specialists and diagnostic examinations. This scenario generates a feeling of isolation in the mostly young and inexperienced professionals working in these areas,³ and this is one of the factors related to the high healthcare team turnover.

In the state of Minas Gerais, 19 million people live in 853 cities, 70% of them with less than 14,000 inhabitants.⁴ In 2005, resources from the state government of Minas Gerais and from Brazilian research agencies funded the creation of the Telehealth Network of Minas Gerais (TNMG), a public telehealth service connecting university hospitals from six different universities to primary healthcare in remote cities. It started as a research project, named “Minas Telecardio Project,” in 82 cities with less than 10,500 inhabitants. Due to the high prevalence of cardiovascular diseases (CVD) and to the limited number of cardiology specialists in those small cities, initially the project was focused on telecardiology, mainly on the teleelectrocardiography (tele-ECG).⁵

In this first phase, the service proved to be economically sound and generated great satisfaction from the physicians,⁶ and in 2007 the teleconsultation service was also incorporated to offer a diverse and multidisciplinary assistance to healthcare

professionals in remote areas of Minas Gerais. In that same year, it was implemented in 100 cities through the state. The network was progressively expanded and had reached 279 cities in 2009, 657 cities in 2011, and 750 cities by 2015 (Fig. 1). As some cities have more than one telehealth site in different primary care units, it includes 940 telehealth sites.

An important characteristic that was developed since the beginning of TNMG is a constant association between research and service, as TNMG is a partnership of universities. The synergy between these areas has been an extremely important factor for innovation and improvements on telehealth applications.

The objective of this study is to describe the successful experience of the TNMG in 10 years, a sustainable telehealth network.

Methods

This is an ecological study design to describe the TNMG activities in Minas Gerais State, Brazil, from June 2006 to December 2015. The telehealth services provided required low-cost technical equipment, easily accessible to poor villages: computers, printers, digital electrocardiographs, digital cameras, and low band width Internet.⁷ The services provided by the TNMG include teleconsultations in different specialties and telediagnosis. Quality of these activities and cost-benefit are regularly assessed. These activities are detailed below.

TELECONSULTATIONS

Teleconsultation may be defined as a two-way communication between clinicians and patients or between healthcare professionals.⁸ The TNMG teleconsultations take place strictly among healthcare professionals, since Brazil’s Board of Physicians does not authorize teleconsultations between physicians and patients. They are held offline in a variety of areas such as medicine, nursing, dentistry, physiotherapy, nutrition, pharmacy, psychology, and audiology, and online exclusively for cardiology. The primary care professionals, using the TNMG teleconsultation system in its Web site,⁹ address written clinical queries to TNMG specialists. Primary care professionals can thus perform their clinical activities with the support of a network of TNMG specialists. Every primary care practitioner of the attended cities is allowed to register in the TNMG Web site and request a teleconsultation, as long as the practitioner has a university degree in health-related fields. At first, he chooses if the query is about a particular patient’s case or a general educational matter. In the first case, he is requested to fill out the following fields: (1) patient problem list, (2) medications in use, (3) results of previous examinations, and (4) a clear description of the query (or queries) about this clinical case. If it is educational, he writes the query in a free-text field.

Initially, the teleconsultations were directed straight to a specialist, but the response time was too long. Thereafter, a

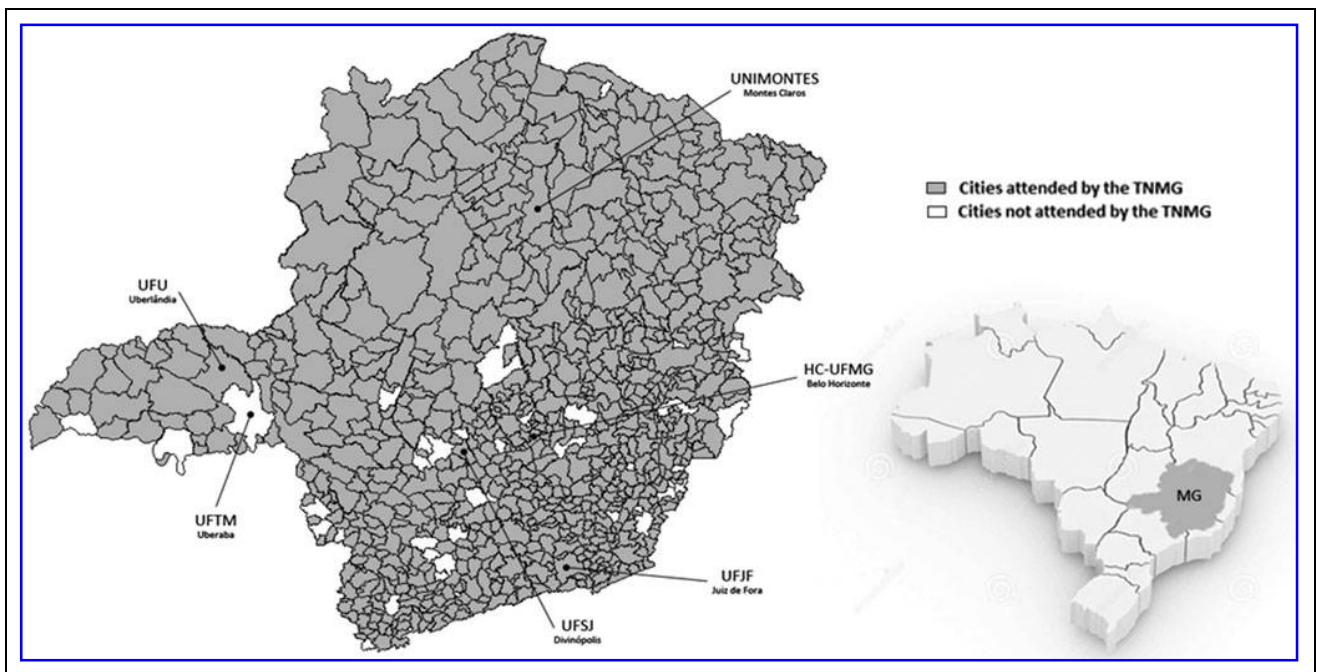


Fig. 1. Map of Minas Gerais state, its location in Brazil, the Telehealth Network of Minas Gerais (TNMG) coverage, and the participating university hospitals.

regulatory duty was established, so teleconsultations started being sent first to specialists from the medical specialties most demanded, such as family medicine, pediatrics, dermatology, gynecology/obstetric, and also nursing, dentistry, physiotherapy, psychology, nutrition, pharmacy, and audiology. Only then, if the question cannot be answered by the on-duty professional, it is forwarded to a subspecialist (Fig. 2). The TNMG offers more than 40 subspecialties. The response time for professionals on duty is up to 12 h and for subspecialists up to 48 h. This service is viewed as an ongoing educational tool, since every teleconsultation represents a learning experience.⁷ To study the most common queries, a retrospective observational study was conducted. Teleconsultations performed between January and March 2014 were analyzed based on the type of query and the ICD-10 chapter.

TELEDIAGNOSIS

Although ECGs are easy to perform, small and remote cities of the state lack trained technicians to perform the examination and physicians to interpret it. This reality was changed after the implementation of the TNMG.

The telediagnosis service from the TNMG started with tele-ECG. TNMG provides to the assisted cities a 12-lead digital ECG device with specific software allowing the examination to be associated with data from the patient: height, weight,

risk factors, current medications, signs, and symptoms. That permits the cardiologist to formulate a precise diagnosis and evaluate the necessity to discuss the case with the remote physician. The ECGs performed in the primary care centers are transmitted through the Internet to the TNMG cardiologists, trained and experienced in ECG analysis. They analyze the ECG using standard criteria¹⁰ and send the report back to the primary care centers through the TNMG Web site.

An important feature of the TNMG is the decentralization of telehealth activities in the partner university centers, managed by a single telehealth system, which automatically distributes activities by on-duty specialists, regardless of their geographic location.

Since 2011, the service attends also emergency care units of Belo Horizonte, the state capital, as part of the myocardial infarction system of care.¹¹ Emergency care teams were trained and a flow was established for thrombolysis and primary angioplasty. The digital ECGs are transmitted from the emergency care units to be analyzed by the physician on duty in the coronary care units.

In 2013, the TNMG starts to diversify its telediagnosis activities. It currently also conducts Holter, ambulatory blood pressure monitoring (ABPM) analysis, retinography, and spirometry.

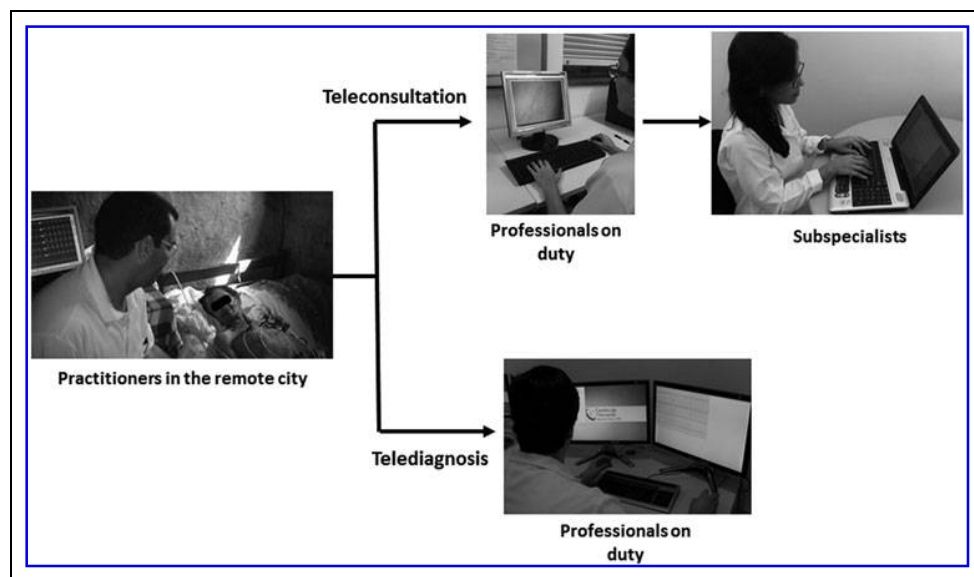


Fig. 2. The healthcare practitioner in the remote city sends the teleconsultation or the examination (electrocardiogram, Holter, ambulatory blood pressure monitoring, retinography, or spirometry) to the TNMG through its Web site. The telehealth system automatically distributes activities to on-duty specialists, regardless of their geographic location. In case of teleconsultations, if the question cannot be answered by the on-duty professional, it is forwarded to a subspecialist (see text for further details).

QUALITY CONTROL

The clinical quality control of the TNMG was created to ensure quality and agreement in ECG readings and quality of the teleconsultations. It includes tele-ECG and teleconsultation audits and satisfaction surveys. For the ECG, the most common reasons for disagreements were discussed in periodic meetings of the clinical coordinator and the cardiologists, to establish protocols based on standard guidelines for ECG analysis and a structured format for reporting. Teleconsultation audit involves evaluation of size, objectivity, quality, ethics, courtesy, and grammar.

Users' satisfaction is regularly monitored. After every teleconsultation, the user is requested to answer three questions: (1) "Did the

teleconsultation avoid the patient's referral?" (2) "Did the teleconsultation answer your question?" (3) "What is your level of satisfaction with the teleconsultation system?"

For the tele-ECG, user's satisfaction was assessed at the implementation in the first 82 cities aiming to verify the effectiveness of the Minas Telecardio Project. A scale with 15 multiple choice questions and 3 open questions was developed and validated. It included queries regarding general satisfaction with the capacity of the city to treat patients with CVD, satisfaction with the infrastructure, diagnosis, agility and accuracy of diagnosis, solvability and professional security, ability, and support in attendance. The scale was applied before and after the implementation of the Minas Telecardio Project in the cities.³

MONITORING

Despite all the benefits of telehealth, there are examples around the world where teleconsultation usage is still limited for various reasons. Among them are high turnover of healthcare professionals, lack of appropriate training, complexity of the system, and failing to meet the real needs of the users.¹² To control the usage of the system, an intensive monitoring strategy was developed in 2010, according to the PDCA (plan, do, check, act) method. The user rate, which is the number of cities with the implemented system that actually access the system, is constantly monitored. Each month, the cities are classified as user (at least one teleconsultation in the previous month) or nonuser (zero teleconsultation) and the administrative staff contacts all nonusers by telephone to determine the causes of nonutilization. The causes are grouped into six categories: lack of interest of health manager, lack of interest of healthcare practitioners, technical problems with the system, technical problems with the equipment, Internet connections, and infrastructure.

Monthly goal achievement meetings are done to discuss causes of nonuse and corrective actions are taken. All procedures are standardized and the monitoring staff is trained periodically.

A report is issued to municipal managers every month with some monitoring information: number of teleconsultations and examinations performed by the city, monetary savings for the city from the use of the system, among others.

COST-BENEFIT ANALYSIS

Cost-benefit analysis has been an important tool used to convince financial supporters to expand and incorporate telehealth as a tool for healthcare. Along the implementation process of TNMG, two main studies were developed to evaluate economic impact of telehealth use on the public healthcare

system. Both studies, the first one in 2008/2009 involving 20 cities and the second one in 2009/2010 involving 68 cities, were developed to evaluate the economic impact for public health service (cities are responsible for patient transportation) resulting from the reduction of patient referral to secondary healthcare level. Number of referrals and its costs were assessed in these cities.

An important parameter for economic evaluation in this situation is the efficiency factor, defined as the percentage of avoided referrals resulting from any telehealth activity (teleconsultation or teleradiology). After each teleconsultation/teleradiology, the user has to inform whether that activity avoided the patient referral.

Referral costs can be classified into two categories: fixed costs and variable costs. Fixed costs, such as salaries and benefits, do not vary according to the number of referrals. Variable costs, like combustible for the vehicles used for patient transportation, strongly depend on the number of referrals. Since telehealth cannot eliminate patient referral completely (there will always be emergencies), fixed costs (like salaries) do not change. Consequently, only changes of variable costs have to be considered.

Based on these premises, it is possible to calculate the monetary saving for the public health service resulting from the use of telehealth as the multiplication of the number of cost-effective telehealth activities and the difference between the referral variable cost and the telehealth activity unitary cost. Telehealth activity unitary cost is defined as the total operational cost of the telehealth system divided by the total number of activities.

$$\text{Saving} = \text{efficiency factor} \times \text{number of telehealth activities} \times [\text{variable referral cost} - \text{activity cost}]$$

Such a simple equation shows the important parameters for telehealth economic sustainability: resolvability (efficiency factor), scale of activities (number of telehealth activities and unitary activity cost), telehealth system cost, and referral distance (variable referral cost).

The saving resulting from the use of telehealth can be then compared with the investment made through a financial indicator defined as return of investment (ROI)

$$\text{ROI} = \text{saving}/\text{investment}$$

FINANCIAL SUPPORT

TNMG financial support can be divided into two periods: an initial period by nonrepayable funds and since 2012 through service contracts with public and private sectors.

TNMG received nonrepayable grants from 2006 to 2012, primarily from federal and state governments and in minor scale from research funds. These funds were used initially to

structure and organize the service up to scale of activities that clearly demonstrated its importance for the state public health system. In 2012, recognizing its importance, the state government decided to incorporate telehealth as a routine process for healthcare by signing a service contract. On a minor scale, private sector contracts help to finance TNMG.

Results

The TNMG was created in 2005 with activities in 82 cities as a research project and was progressively expanded. Nowadays, it provides support to 750 cities, which correspond to 88.0% of Minas Gerais.

Up to December 2015, 2,464,999 ECGs and 73,698 teleconsultations were performed. *Figure 3* illustrates the number of ECGs and teleconsultations per month since the beginning of the project. On average, 2,000 ECGs and 40 teleconsultations were performed per day in 2015. In addition, 1,029 Holter, 212 ABPM, and 634 retinography analyses were performed.

Monthly monitoring of teleconsultation has been demonstrated as an important tool to maintain and increase its use by the city. The monitoring system shows different causes of non-use of teleconsultation and telediagnosis. For teleconsultation, the main causes are lack of interest of professionals or health managers and necessity of training because of professional rotation. For telediagnosis, the main causes are problems with

equipment, but there are only a few cities that do not use this system per month.

The median population from the city where teleconsultations were originated was 6,778 inhabitants (interquartile range [IQR] 4,425–10,805), median HDI 0.645 (0.577–0.690), with a median number of two primary care units (IQR 1–4) per city.

Table 1 shows the professionals who requested the highest number of teleconsultations. Family physicians/internal medicine physicians (41.3%), dermatologists (17.7%), obstetricians and gynecologists (12.6%), nurses (12.3%), pediatricians (7.0%), dentists (3.6%), and physiotherapists (1.8%) answered most queries. After the creation of the regulatory duty, these professionals answered 83% of all teleconsultations. In 2015, subspecialists (other than dermatologists) answered 17% of the queries. Among teleconsultations performed in 2015, 37% were sent from Monday to Friday outside the primary care working hours and 9% were sent on the weekends.

A separate analysis was performed on teleconsultations sent from January to March 2014 ($n = 1,209$). It showed that 74.4% of queries were related to patients' assistance and 25.7% were general queries. *Table 2* shows the types of queries among physicians and nurses. According to the ICD-10 classification (*Fig. 4*), the areas in which the healthcare professionals had more queries were skin and subcutaneous tissue diseases (16.0%), infectious and parasitic diseases (11.9%), endocrine (10.3%), genitourinary (7.1%), and circulatory system (6.3%) diseases.

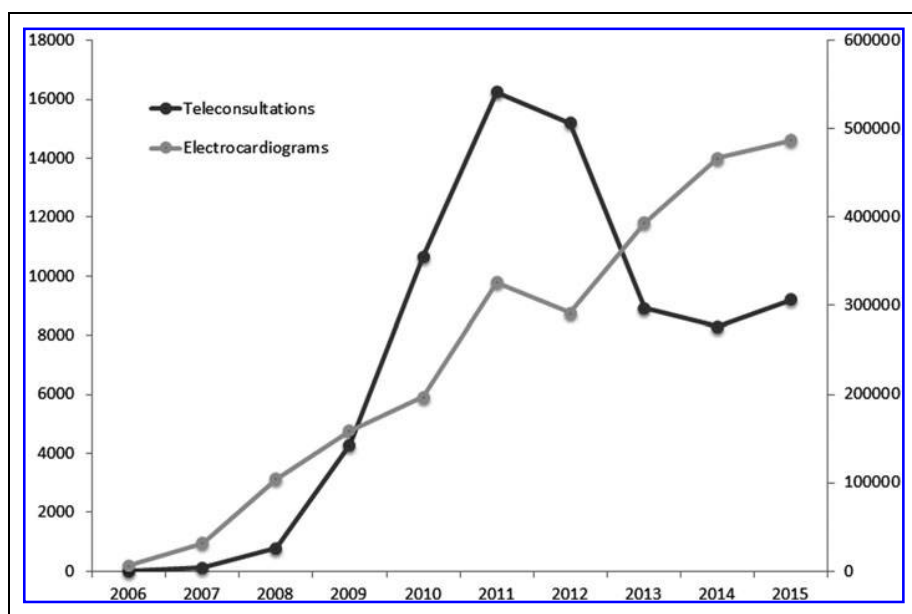


Fig. 3. Electrocardiograms and teleconsultations performed by the TNMG, Brazil, per year, from June 2006 to December 2015.

Figure 5 shows the indexes of users' satisfaction survey of the teleconsultation service and the proportion of teleconsultations that avoided patient referral from 2009 to 2015.

Regarding the ECG, the satisfaction scores showed statistically significant differences for all items, dimensions, and global scales (*Fig. 6*). On baseline, the professional satisfaction ranged between 2.0 and 3.0 (1 to 5), suggesting dissatisfaction with the structure of care for CVD in remote cities, but after the implementation of the program, the satisfaction scale items changed, ranging from 3.0 to 4.0. The same was observed for the global scale (3.3) and the two dimensions (3.4 and 3.2, respectively). In this evaluation, satisfaction increased compared with baseline, suggesting an improvement in the satisfaction of the medical professionals after

Table 1. Healthcare Professionals Who Requested Teleconsultations from April 2007 to December 2015 (n= 73,698)

CATEGORY	FREQUENCY, n (%)
Nurses	37,132 (50.4)
Physicians	28,241 (38.3)
Dentists	2,509 (3.4)
Physiotherapists	1,283 (1.7)
Pharmacists	1,197 (1.6)
Nutritionists	915 (1.2)
Psychologists	604 (0.8)
Audiologist	364 (0.5)
Biochemists	172 (1.5)
Biomedical	72 (0.1)
Other	1,209 (1.6)

the implementation of the telecardiology system in remote areas of the state.³

To assess the prevalence of ECG abnormalities, all the consecutive ECGs performed from 2009 to 2013 (n= 1,101,993) were assessed using the automatic analysis by the

Table 2. Types of Queries from Physicians and Nurses, January to March 2014

TYPE OF QUERY	PHYSICIANS (n= 468), % ^a	NURSES (n= 723), % ^a
Etiology	39.9	29
Pharmacological treatment	32.2	18
Propaedeutics	19.8	8.1
Patient follow-up	10	8.9
Medical or nurse advice	6.8	8.9
Nonpharmacological treatment	5.9	13
Pregnancy assistance	5.4	7.8
Surgical treatment	5	3.4
Prognosis	2.3	4.9
Growth and development	0.9	2.3
Vaccination	0.7	2.5
Cervical cytology	0	2
No specific doubt	1.8	5.8

^aThe sum is higher than 100%, as each teleconsultation could contain more than one query.

Glasgow 12-lead ECG analysis program. After exclusion of fatal errors (0.11%), the proportion of normal or normal variant ECGs was estimated to 69.6%. The percentage of normal ECGs was lower in men (65.8%) than in women (72.3%) and was significantly dependent on the patients' age: it decreased by 7.43% every 10 years of patient life. The most frequent abnormalities were repolarization abnormalities (39.4%), left ventricular hypertrophy (9.5%), complete or incomplete left bundle branch block (6.0%), first degree atrioventricular block (5.8%), complete or incomplete right bundle branch block (4.1%), atrial fibrillation or flutter (3.6%), left ventricular hypertrophy (2.8%), long QT interval (2.6%), and multifocal or ectopic atrial rhythm (2.1%).¹³

The cost analysis has demonstrated that total unitary referral cost is US\$ 56.00 and telehealth activity (ECG or teleconsultation) cost is US\$ 5.00. Even considering that telehealth impacts only on the variable part of referral cost, which represents 63% of total cost (US\$ 36.00), the monetary saving resulting from avoided referral can be quite important depending on the telehealth resolvability. Based on user's information after each activity, on average 80% of ECG analyses/teleconsultations avoid patient referral. Consequently, TNMG telehealth system has saved for the public health system until December/2015.

$$\text{Savings} = 0.8 \times 2,538,697 \times [36.00 - 5.00] = \$63 \text{ million USD}$$

Until December 2015, about 10.3 million US\$ were invested (TNMG is a nonprofit organization that reinvests all financial results), including nonrepayable funds and contracts, resulting in an ROI=6.1.

Discussion

This study reports a viable and successful experience of a large scale telehealth service that increases access for the population of small and remote cities to specialized health-care, avoiding unnecessary referrals or hospitalizations and improving primary care case-resolving capacity. The large number of activities performed by the TNMG, users' satisfaction and the fact that the service avoids referrals 80% of the time, points out the success of the TNMG and is evidence that telehealth can overcome geographical barriers to healthcare, using inexpensive technology. The economic viability study results have given important arguments to justify a constant flow of funds, not only to maintain and expand the services but also for innovation researches and to guarantee acceptance by municipal managers. These results clearly proved to the state government that a contract to provide telehealth services on a regular basis was possible and suitable, demonstrating that a public telehealth network can be sustainable in the long term.

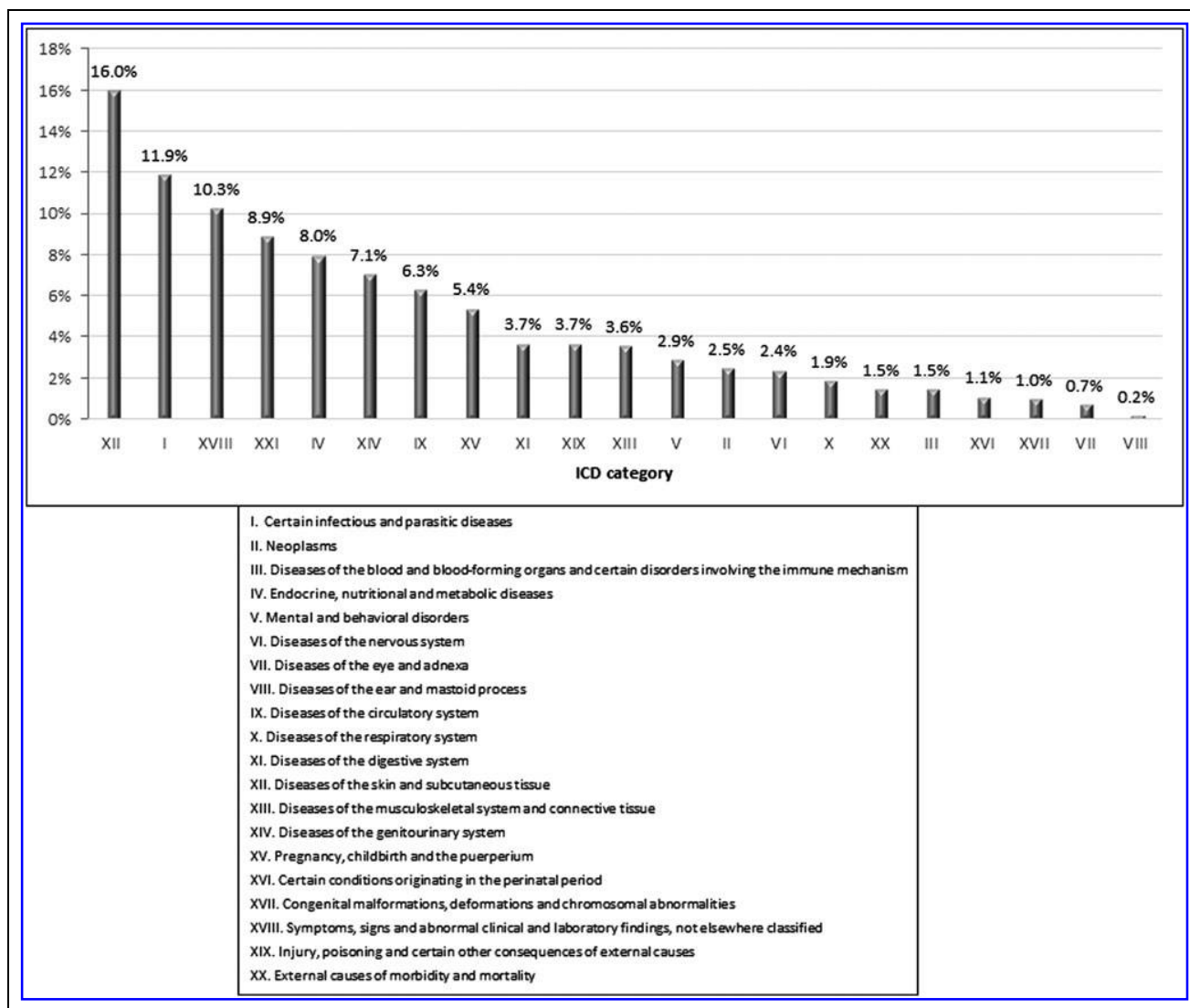


Fig. 4. Types of queries according to ICD-10 classification among teleconsultations performed from January to March 2014 ($n = 1209$).

This study also highlighted the potential of telehealth to promote continued education for healthcare professionals who are isolated from education centers, by promoting clinical case discussions based on real queries from their practice. It is already known that knowledge is retained more frequently when it is obtained from solving concrete problems and challenges or when the acquired knowledge can be immediately used on daily practices.¹⁴ Thus, it contributes to reduce the sensation of professional isolation and helps to improve the quality of healthcare.

The analysis of the queries showed that often one teleconsultation contained more than one query regarding the

same clinical case, which highlights the role of teleconsultations in providing real case discussion. The TNMG performs multidisciplinary teleconsultations, which increases the benefits to the primary care centers.

The great majority of the teleconsultations were about primary care sensitive conditions, in other words, they were diseases that are most amenable to management in primary care with quality.¹⁵ It is believed that hospitalizations related to these conditions would be avoided or reduced if the patients could be adequately managed by primary care teams, so it is a measure of primary care performance.¹⁶ It has already demonstrated that primary care has the

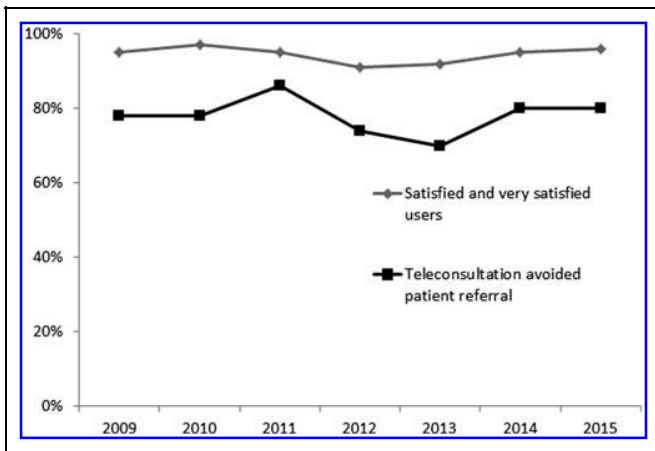


Fig. 5. User satisfaction and patient referral from 2009 to 2015.

potential to solve up to 85% of health conditions of a population.¹⁷ However, a malfunctioning primary care can have a negative impact on the indicator “hospitalizations for primary care sensitive conditions.” By reducing the number of referrals to specialized centers, as well as by potentially reducing the hospitalizations for primary care sensitive conditions, the TNMG may contribute to increase primary case-resolving capacity.

Performing auditing and satisfaction surveys is essential to assess and assure the quality of the service. The satisfaction survey demonstrated that the majority of the healthcare practitioners are satisfied with the service. In all teleconsultations in which the user reported to be unsatisfied, an assessment was performed to determine the possible reason, to implement actions to increase users’ satisfaction.

At first, the network implementation was difficult for the following reasons: the Internet connection was poor in the beginning of the project; health workers had to be trained and monitored continuously because of the high turnover in the workforce in remote cities; difficulty of health professionals using technology, considering that the equipment offered by the project was to be used for many cities and the difficulty in implementation of technology in the health service. Currently, the major challenge for the network is the low use of teleconsultation activities, the problem also presented in other realities.¹⁸⁻²² Monthly monitoring of teleconsultation use has been demonstrated to be an important tool to understand, maintain, and try to increase its use by the city. As a high turnover of healthcare practitioners is still a reality in remote and poor cities, it is very important to have a strategy to keep new training continuously available for the potential new users. A fall in the number of teleconsultations after 2011 is not clearly explained, but sufficient training and lack of possibility of discussing clinical cases out of the teleconsultation services have shown to have a significant impact on teleconsultation utilization, in a study recently published by our group.¹² In the same study, whether the user considered that the “service helps to solve everyday problems” had the highest impact on the utilization (odds ratio = 4.37; 95% confidence interval, 1.14–16.69).¹² Keeping this in mind, the service has constantly been monitored by audits and is frequently improved.

The large ECG database made the analysis of the prevalence of ECG abnormalities in primary care patients possible.¹³ When the telemedicine service is integrated into the

healthcare system, as in this case, the results of analysis of digital ECGs may have an important role in the recognition of important conditions to health policies and public health planning. A recent study published by our group assessed the prevalence of atrial fibrillation in primary care patients and showed an alarming low proportion of patients taking oral anticoagulants.²³

After 10 years of its inception, the TNMG aims to expand its scope and territory of action. Since 2011, the TNMG is acting to organize myocardial infarction systems of care, first in the city of Belo Horizonte,¹¹ and more recently, as a research project, in the

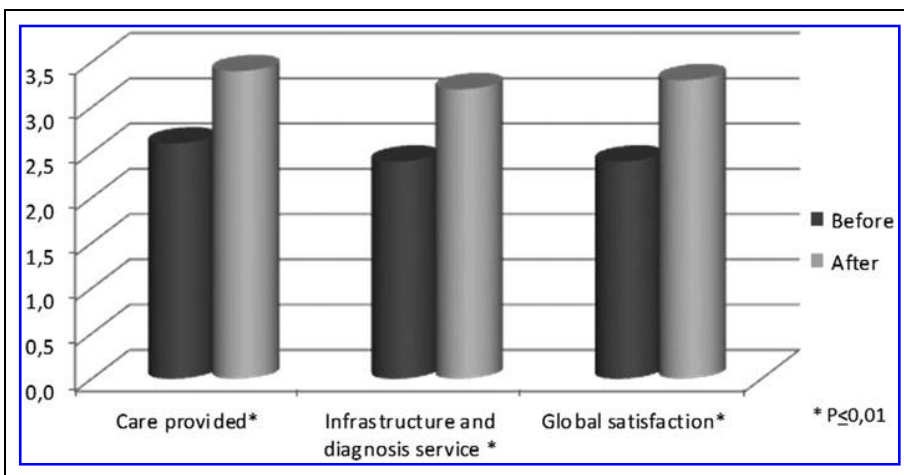


Fig. 6. Satisfaction of the medical team before and after implementation of the telecardiology system in remote areas (n=81).

northern region of Minas Gerais. Using software developed in-house, a tablet-based ECG was implanted in all 48 ambulances of the emergency system of the region, and all health professionals involved in the care of myocardial infarction patients were trained. Preliminary results are promising and there is a perspective of expanding this system for the whole state of Minas Gerais. Several new modalities of care are in development or entered recently in service, including new diagnostic methods (retinography, spirometry, and echocardiography), decision support systems for more prevalent chronic (diabetes and arterial hypertension) and acute diseases (acute coronary syndrome and stroke), and telemonitoring strategies (cardiac telerehabilitation). Further approximation with the health authorities made possible the use of the teleconsultations for the reduction of waiting lists for specialized consultations in the primary care, an initial experience in a few cities that will be implemented state wide. A teleeducation sector was created in 2015, with elaboration of educational content for healthcare professionals in both primary and specialized care. Finally, with partnership of the Brazilian Health Ministry and of universities from other states in Brazil, the TNMG is offering tediagnosis services to patients from other states, especially in those with barriers to access to specialized care.

In conclusion, the TNMG is a successful example of a long-term sustainable telehealth service, integrated to primary care centers of remote and small cities. It overcomes geographical barriers to specialized healthcare, reducing the number of unnecessary referrals, contributing to improving the case-resolving capacity and the quality of primary care. Some factors support the sustainable and continuity of the TNMG: government-academia partnership, support of public managers, services provided by a collaborative network, systematic monitoring of the services, periodic auditing of ECG analysis and teleconsultations, short response time, ease use of the system, growth and diversification of telehealth activities, research development, and economic viability monitoring.

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Disclosure Statement

No competing financial interests exist.

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MARCOLINO ET AL.

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