● **Original article**

USE OF ELECTRONIC REGISTRATION IN TUBERCULOSIS DETECTION: POTENTIALS AND DIFFICULTIES ACCORDING TO PROFESSIONALS

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Objective: identify the potentials and difficulties in the use of a computerized registration system to detect tuberculosis cases in primary health care. **Method:** intervention study in the cities of Sapucaia and Pelotas, Rio Grande do Sul, between 2013 and 2014, involving the implementation of a computerized registration system at the primary health care services, followed by a qualitative interview. For the data analysis, Bardin's Thematic Content Analysis technique was applied. **Results**: three analysis categories were identified: Agility in the monitoring of respiratory symptomatics, Engagement and sensitization of professional and Difficulties faced in the use of the information system. **Final considerations:** the computer system enhanced the agility of the registration, the communication between health professional and services and reflections on tuberculosis care. The difficulties were related to the physical and organizational structure of the primary health care services.
DESCRIPTORS: Tuberculosis; Primary health care; Health services; Computer literacy.

USO DE REGISTRO ELETRÔNICO NA DETECÇÃO DA TUBERCULOSE: POTENCIALIDADES E DIFICULDADES NA VISÃO DOS PROFISSIONAIS

Objetivo: identificar as potencialidades e dificuldades do uso de um sistema de registro informatizado para a detecção de casos de tuberculose na atenção primária à saúde. **Método:** estudo de intervenção nos municípios de Sapucaia e Pelotas, Rio Grande do Sul, no período de 2013 a 2014, com implantação de sistema de registro informatizado nas unidades de atenção primária à saúde, com posterior entrevista qualitativa. A análise dos dados foi realizada por meio da técnica de Análise de Conteúdo Temática de Bardin. **Resultados**: identificaram-se três categorias de análise: Agilidade no acompanhamento dos sintomáticos respiratórios, Envolvimento e sensibilização dos profissionais e Dificuldades enfrentadas no uso do sistema de informação.**Considerações finais:** o sistema informatizado permitiu qualificar a agilidade dos registros, a comunicação entre profissionais e serviços de saúde e a reflexão sobre a atenção à tuberculose.As dificuldades estiveram relacionadas àestrutura física e organizacional das unidades de atenção primária.
DESCRITORES: Tuberculose; Atenção primária à saúde; Serviços de saúde; Conhecimentos em informática.

USO DE REGISTRO ELECTRÓNICO EN LA DETECCIÓN DE TUBERCULOSIS: POTENCIALIDADES Y DIFICULTADES EN LA VISIÓN DE PROFESIONALES

Objetivo: identificar las potencialidades y dificultades del uso de sistema de registro informatizado para detectar casos de tuberculosis en la atención básica a la salud. **Método:** estudio de intervención que ocurrió en los municipios de Sapucaia y Pelotas, Rio Grande do Sul, en el periodo de 2013 a 2014, con implantación de sistema de registro informatizado en las unidades de atención básica a la salud, con posterior entrevista cualitativa. Se realizó el análisis de los datos por medio de la técnica de Análisis de Contenido Temática de Bardin. **Resultados**: se identificaron tres categorías de análisis: Agilidad en el acompañamiento de los síntomas respiratorios, Participación y sensibilización de los profesionales y Dificultades en el uso del sistema de información. **Consideraciones finales:** el sistema informatizado posibilitó cualificar la agilidad de los registros, la comunicación entre profesionales y servicios de salud y la reflexión acerca de la atención a la tuberculosis. Las dificultades se asociaron a la estructura física y organizacional de las unidades de atención básica.
DESCRIPTORES: Tuberculosis; Atención básica a la salud; Servicios de salud; Conocimientos en informática.

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INTRODUCTION

In the global context, Brazil concentrates a significant number of people with tuberculosis. The disease control actions in the country focus on specific guidelines for their early detection and the consequent timely initiation of treatment in different health services. These actions have promoted a slight reduction of health indicators, considered far from the ideal parameters, in view of the magnitude of this infectious disease and its close relationship with the social problems in the country. In ten years, the incidence of the disease dropped by 20.4%, while mortality rates decreased by 45%[1]. In 2014 and 2015, respectively, the incidence rate was 33.5 / 100 thousand inhabitants and 30.9 / 100 thousand inhabitants, while the mortality rate was 2.3 / 100 thousand inhabitants and 2.2 / 100 thousand inhabitants[2].

The early detection of tuberculosis requires the development of programmatic actions through the organization of public management and health services, so that the diagnosis can be guaranteed in a timely manner. Therefore, the availability of an integrated service network with pre-established flows is required. In this context, primary health care should be prioritized through easy access and the organization of the work process to permit articulation with the community and users. The professionals, when faced with respiratory symptomatics (people with cough for three weeks or more), need to welcome the patient and clinically manage each case (request for sputum smear in two samples), in addition to having timely access to the laboratory result to initiate the treatment early[3-4].

Several difficulties have been highlighted scientifically in the case detection process though, related to access barriers, structural and process weaknesses[5], lack of professional qualification[6] and consistent health information for the planning of actions and especially the difficulty to articulate primary health care and laboratory support, both essential services in the detection process[7].

Experiences in other countries regarding the use of electronic health registration have shown the potential to overcome some barriers through the production of health information that can portray the disease situation in the population, allowing the teams to plan actions and approaching the services necessary to carry out the diagnosis[8].

In this sense, this study aimed to provide the primary care teams in priority cities for tuberculosis control in the State of Rio Grande do Sul with the experience of using technology for the registration of case detection information registration technology use of case detection information. The purpose of this study is to highlight the possible contribution of technology to the communication between professionals and health services, in order to speed up the process of timely tuberculosis detection through the management of data collected in the electronic registration system, and thus support the Brazilian Health Information and Informatics Policy, which has broadened the access to computerization in health services to improve the work process[9].

Thus, the aim in this study was to identify the potentials and difficulties of using a computerized registration system for the detection of tuberculosis cases in primary health care.

METHOD

Intervention study, with implementation of Tuberculosis Information System (SInTb) software, and subsequent qualitative interview. This study is linked to the research "Primary health care in the detection of tuberculosis cases in priority cities in Southern Brazil: challenges and investments in information strategies". The software is an information technology developed by the Peruvian Ministry of Health, provided in technical cooperation for pilot testing by the researchers of this study. This technology presents an on-line database, which concentrates a digital version of the registration documents used in the detection, diagnosis and treatment of tuberculosis. System completion is by multiple choice.

The health professionals of each service execute the registration in the system after the development of health actions aimed at the detection of tuberculosis cases. All professionals involved in this process can immediately visualize the data, regardless of the health service, permitting virtual referral and counterreferral in a flexible way.

The implementation of the program occurred as a result of the project funding, providing for computers, printers and internet access in each participating health service, as well as training on software use and monitoring of the teams throughout the study period. The SInTb operating manual and the telephone contact of a technical reference person were made available for communication in case of doubts or problems with the equipment or the network.

The system was developed in the health services that develop case detection actions in Sapucaia and Pelotas, two cities in the state of Rio Grande do Sul, in February 2013. After the implementation of SInTb, interviews were held in February 2014 with professionals who managed the program, aiming to discover their experience.

The selection of the primary care services for software installation occurred upon request to the coordinators of the Municipal Tuberculosis Control Programs of the cities participating in the study, which indicated four services with high tuberculosis incidence rates in each city, totaling eight primary care services.

The selected staff for the use of the software were doctors and nurses with more than one year of professional experience and who were already accustomed to manual tuberculosis detection records. In addition, the program was implemented in the laboratories that receive the sputum smears from the primary care services, in the municipal tuberculosis control programs and in the epidemiological surveillance of the cities.

For the construction of this manuscript, the interviews of the nursing team and physicians working in the primary care units were considered. The inclusion criterion adopted was all the professionals from the primary care services who received training and who used the software during its implementation. No exclusion criteria were foreseen. The questions that led to the construction of this article were: "What are the advantages in the use of the computerized system in tuberculosis care?" and "What are the disadvantages in the use of the computerized system in tuberculosis care?".

The interviews took place in a private setting, so that the dialogues could be recorded, with the participants' approval through the signing of the Informed Consent Term. The interviews were previously scheduled via telephone contact and took 40 minutes on average. Twenty-one health professionals were interviewed.

The material collected by the recorder was transcribed and analyzed, using the Thematic Content Analysis technique, which includes the phases of pre-analysis, material exploration and treatment of results[10]. The thematic axis that guided the reading of the statements and the analysis of the data was the identification of potentials and difficulties in the use of information technology for the detection of tuberculosis cases.

The anonymity of the study participants was guaranteed by the use of codes to identify the interviews, which corresponded to the numerical order, followed by the letter M, corresponding to the city - code 1 was attributed to Sapucaia do Sul and 2 to Pelotas. This study complied with National Health Council Resolution 466/2012[11], was submitted to the Brazil Platform and approved by a Research Ethics Committee under opinion 310.801 in 2013.

RESULTS

Of the 21 interviewees, 12 were nurses, five doctors and four nursing technicians. After the thematic analysis, three categories emerged related to the potentials and difficulties in the use of the information system, namely: Agility in the monitoring of respiratory symptomatics, Involvement and sensitization of professionals and Difficulties faced in the use of the information system.

Agility in the monitoring of respiratory symptomatics

In this category, it was evidenced that the implementation of the computerized system for the development of the tuberculosis case detection actions permitted agility in the communication between the health services needed to reach the diagnosis. The system allowed for the identification of the respiratory symptomatic register, the sputum smear request and the result of the bacteriological analysis for all the services linked to the SInTb. The pertinence of this information system contributed to the "real time" (M[1]8) monitoring of the user flow in the service network.

The fact of interconnecting epidemiological surveillance and the laboratory with the services, because then they know that we made the request. If this sample went astray midway, they can also find out that a sputum smear was requested, that a sample was collected, where did this sample go? Did it get lost in transport? Or did it get to the lab, but the result did not come out? In that sense I thought it was positive. (M[2]1)

I think the main advantage is having the result so that you can monitor the patient. I think the main advantage is there, I could access (the system) *there and see if he had actually taken it* [referring to the sputum sample to the lab]. *I began to see that many did not.* (M[1]3)

The flow through the computer is great, wonderful to work in this way, because the paper and the car [transportation] *takes much longer. So the attitudes to be taken when we have a result via the internet are much faster.* (M[2]4)

Based on the statements, the information system's potential to monitor the user's path through the health services until the diagnosis of the disease is emphasized. The interviewees highlighted the organization of the registration as a characteristic the use of the system provides.

When you can eliminate paperwork that you have to complete, that's much better. It's a way that you have to store that information without having paper accumulating ... I think it was a qualification leap for the health service, even to allow us to monitor the tests in the laboratory, to have contact. Before, any contact was via phone, or else it came by e-mail, in our e-mail [personal e-mail accessed at home] *with all users in the city. I thought it was an exposure.* (M[1]9)

It is all in the same place so that we can survey these cases for which we made the request, we can print the result and see the result of the sputum smear as soon as the laboratory releases it. (M[2]1)

According to the reports, the use of the information system sped up the registration of the sputum smear results, the availability of the data and real-time visualization of the respiratory symptomatic's situation in relation to the development of health actions for the diagnosis of the disease.

Engagement and awareness of the health teams

The access to the information system mobilized the interviewees. They had spaces for reflection on their work process and the situation of tuberculosis in the assisted community, and the importance of health surveillance actions emerged based on the records produced in the territory.

The implementation of the information system at the UBS [Primary Health Care Service] *seems to have brought to the surface a dormant problem* [referring to tuberculosis]. *It ended up mobilizing the whole team, because it was discussed* [tuberculosis]. (M[1]9)

With the information system interconnecting the services, we are able to have more of this health surveillance perspective. (M[2]1)

We started looking at our written part, but is that all? [Referring to the number of sputum smear requests recorded in the service's register of respiratory symptomatics]. (M[1]9)

The team improved the amount of records in the book. Before, if the sputum smear was requested, if it identified a respiratory symptomatic and it was not registered, that request and the conduct was taken based on the result, but without registering anything. (M[2]1)

In the statements, the questions the professionals raised about the quality of the written records made, besides the lack of registration of respiratory symptomatics.

Difficulties experienced in the use of the information system

The difficulties the professionals reported were related to restrictions in the use of computer equipment, as these were located in environments that are difficult for health professionals to access. Thus, the availability of the internet and the adaptation to the new registration routine are observed in the following excerpts:

The computer was stuck in a room, and then you have to wait for that room to be free to be able to use it. (M[1]2)

The computer is not in my room, so it changes the routine a bit, because if I had it in my office, I would do the registration. As it stayed at the nursing station, for me not to fail to meet my schedule, I ended up forwarding it for nursing to do the registration. (M[2]2)

I found the internet issue quite difficult. We typed everything and it never loaded. So most of the time we had a lot of trouble because of the internet, not the program itself, but the internet. (M[2]4)

In the management of the system, we have people who found it easier, others had more difficulty, but it is something new, until everyone gets accustomed, afterwards it's okay. (M[1]8)

In addition to the difficulties related to the availability of the Internet and restricted access to equipment, the skills inherent in the adaptation process to the new registration system were also mentioned. Thus, responsibilities each professional in the Primary Health Care Services assumed were identified as situations that made the use of SInTb difficult.

The part of inserting the data into the system, that was more nursing who actually did it, because the doctor is actually concerned with doing the consultations. (M[1]3)

One thing I found bad is that the doctor did not participate much, he did not put the data there, he did not use the system. (M[2]10)

Only the technician and the nurse began to insert into the SInTb system the patient who was suspected or had tuberculosis. (M[1]3)

If all team members used it, it would be more functional. But as the doctor did not complete it, the laboratory did not complete it, sometimes there was the delay of the laboratory to insert the result, so there were some weaknesses. (M[2]10)

The nursing team was most cited as the category that effectively used the SInTb. In contrast, the medical category was highlighted for not using the program.

● DISCUSSION

Most of the health professionals' experiences in the primary health care services were positive regarding the contribution of the computer system to speed up the actions for the early detection of tuberculosis cases. The difficulties, then, were related to the challenges regarding the operation of internet and computer use and the organization of the assignments in the health services. The interviewees did not mention disadvantages related to the early detection of the disease.

The detection of tuberculosis cases was sped up because the computerization facilitated the communication among the services, permitting the monitoring of the respiratory symptomatics until getting the sputum smear result. Access to that information is essential to start treatment and track respiratory symptomatic contacts in a timely manner. The Tuberculosis Control Policy provides for a minimum of three days to complete the detection process - provision of the requested tests and receipt of the result - for treatment to be started if the disease is detected, due to the transmissibility and spread of

tuberculosis[3]. After this period, if there is no result, the health team could make the decision to perform an active search.

A study carried out in Lima, Peru, related to the implementation of information technology in the laboratories that analyze sputum smear samples, evidenced an increase in the receipt of the diagnosis in health centers, reducing the number of people who did not complete the entire detection process of the disease[12]. These results were related to the agility of communication, which permitted the use of electronic registration between professionals and health services.

In this sense, the use of the software can contribute to the articulation between health services[13-14], an essential aspect when it comes to the early detection of tuberculosis. Another aspect of the system, however, was the possibility that the primary health care services would transfer to the user the activity of coordinating and organizing tuberculosis care. This was particularly observed in the reports from Pelotas, which is characterized by the responsibility of the user to collect the sputum sample, transport it to the laboratory, and return with the result of the diagnosis to the service that requested the sputum smear or go directly to the referral clinic to start treatment.

This form of organization to detect tuberculosis negatively affects the care flow, as transferring the responsibility to transport the sputum sample to the user raises barriers to access the diagnosis[15]. In addition, it may involve factors related to biosafety, improper storage and insufficient samples, leading to the need to repeat the test and, finally, loss of opportunity for early diagnosis. In addition, the user may face geographical difficulties to access the health services, besides transportation and poor financial conditions for this process to take place[16].

With the range of records produced by SInTb, the professionals verified the ease and the possibility to plan the detection actions and enhance the search for respiratory symptoms of tuberculosis. The planning and organization of tuberculosis control actions in primary health care are essential, because they favor problem identification and decision making based on community health needs. For this purpose, however, the teams need access to health indicators and a structure that permits this action[4,17].

It should be noted that the health professionals rarely use existing national information systems[18] because they do not contain information to aid decision making, either in municipal management or in health services. First, because there is a qualitative lack of information; second, because there is duplication of data, as already demonstrated in a Brazilian database study between 2008 and 2009[19], which generates improper indicators, incompatible with reality and hardly feasible in operational terms[4]. Therefore, effective information systems present themselves as important tools capable of modifying this reality, because they are operationally feasible for primary care professionals.

The use of the software also promoted the health professionals' awareness for the control of tuberculosis (M19). This was triggered, firstly, by the specificity and direction of the program and the resources expended for its implementation. Subsequently, with the implementation, the teams were able to discuss on the subject internally, compare previous records to the information technology and reflect on the work process, identifying errors / weaknesses, which alerted them to the responsibility of each in the control of the disease, bringing up the tuberculosis problem. In a study developed in Natal, the state capital of Rio Grande do Norte, it was identified that the access to tuberculosis control manuals and guidelines can also intervene in the professionals' daily reality, favoring the tuberculosis control actions, mainly regarding the information they can provide to the respiratory symptomatics[20]. Thus, we consider that the use of computer systems in the detection process, which permits real-time monitoring, in combination with municipal protocols to organize the flow of respiratory symptoms in the service network, can contribute to speed up the early diagnosis and start the treatment timely.

Changes in the development of routine actions cause internal reorganizations in the health teams for the sake of the necessary adaptation, which sometimes promote enthusiasm and/or discomfort. The enthusiasm in the use of the SInTb was achieved by the easy access to the data of the user in the different health services, by the agile completion and by the possibility to discuss collectively the disease situation in the territory under the primary care team's responsibility, explaining forms and possibilities to improve the health professionals' performance in the detection of tuberculosis cases.

The discomfort regarding the use of the system occurred due to structural and organizational issues of the teams. The unfavorable aspects are mutually related, as the slow Internet access (M²4) and the physical structure of the service do not provide proper environments to install resources of common use (M²2), influencing the use of information technology and the adaptation to the new practices.

Other factors that may influence the use and functionality of the system may be related to the requirements of previously non-essential skills, such as understanding the handling of computers, understanding the program and its applicability in reality, increasing the time spent on user care, including the incorporation of typing[21].

It should be noted that the fact that the study provided each service with a computer also contributed to the use of the system. In addition, according to the reports, doctors were those who mostly did not use the system. This reality has already been experienced in another context, in which these professionals behaved only as information producers, not manipulating or inserting data into the information system[22].

In individual consultations, for example, medical consultation or nursing consultation, the movement of professionals and users to the environment where the computer was located to perform the registration in the system became unfeasible, making access difficult. The adaptation to new practices in health services is a slow process, but the difficulties reported in this article have been observed previously[4,21].

The limitations of the study are related to the poor handling of health professionals regarding the insertion of data into the system. In addition, there is the non-inclusion of other professional categories from the health teams, besides the medical and nursing staff, to try out the use of the electronic registration, as the detection of tuberculosis cases is the responsibility of all professionals. Also, there is the lack of quality of the internet signal in some locations, which may have influenced the return to manual registration, as well as the place where the computers are located in the services, which may have impeded their use by other professionals.

FINAL CONSIDERATIONS

The use of computerized records of tuberculosis could speed up the receipt of information for health professionals in primary care, the integration and communication of essential services in the control of the disease, the promotion of spaces for reflection on their work process and the situation of tuberculosis in the coverage area of the health services.

The difficulties were related to the physical and organizational structure of the services, which impeded the use of the system by all health professionals. Despite the difficulties, the proposal contributes to the use of new tools in the health work process, in line with the Brazilian Information and Health Informatics Policy.

Finally, the proper use of information technology made it possible to improve information processing, facilitating the articulation among the health services. Thus, it is considered an advance in the consolidation of the implementation and sustainability of the electronic information systems in the health services, mainly in primary care, in order to enhance the detection of cases and significantly contribute to the control of tuberculosis.

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