

# Electronic protocol of respiratory physical therapy in patients with idiopathic adolescent scoliosis

## *Protocolo eletrônico de fisioterapia respiratória em pacientes com escoliose idiopática do adolescente*

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### A B S T R A C T

**Objective:** To create a clinical database of respiratory function in patients with adolescent idiopathic scoliosis; computerize and store this clinical data through the use of a software; incorporate this electronic protocol to the SINPE© (Integrated Electronic Protocols System) and analyze a pilot project with interpretation of results. **Methods:** From the literature review a computerized data bank of clinical data of postural deviations was set up (master protocol). Upon completion of the master protocol a specific protocol of respiratory function in patients with adolescent idiopathic scoliosis was designed and a pilot project was conducted to collect and analyze data from ten patients. **Results:** It was possible to create the master protocol of postural deviations and the specific protocol of respiratory function in patients with adolescent idiopathic scoliosis. The data collected in the pilot project was processed by the SINPE ANALYZER©, generating charts and statistics. **Conclusion:** The establishment of the clinical database of adolescent idiopathic scoliosis was possible. Computerization and storage of clinical data using the software were viable. The electronic protocol of adolescent idiopathic scoliosis could be incorporated into the SINPE© and its use in the pilot project was successful.

**Key words:** Clinical protocols. Scoliosis. Physical therapy modalities. Adolescent.

### INTRODUCTION

Pulmonary function may be impaired in patients with severe scoliosis. The anomalies identified in lung mechanics, volumes and gas exchange are related to the severity of spinal curvature<sup>1-2</sup>. The total lung capacity in patients with adolescent idiopathic scoliosis is very small, with specific decreases in the components of vital capacity, inspiratory capacity and expiratory reserve volume. These volumes are often reduced to a greater degree than the residual volume, which may be normal or only moderately decreased<sup>3-5</sup>.

Knowing the importance of respiratory therapy for patients with adolescent idiopathic scoliosis who present severe thoracic curvatures and restrictive lung disease and the scarcity of systematic studies on this subject, we realized the relevance in creating an electronic protocol to standardize and monitor the performance of physiotherapy.

The creation of a computerized clinical database with the ability to collect information from patients in a prospective manner, with the possibility of retrieval and crossing of this information, enables the production of quality scientific studies, with reliability and in shorter time.

In the words of Shortliffe E, Perrault E.<sup>6</sup>, "...The medical informatics depends on the clinical information and how it is collected, stored and interpreted. This calls for the need of training tools to handle the information generated from clinical observations. The advantages of a paperless medical record are easily distinguishable, since all available information is digitized and is being easily manipulated." With this in mind, we attempted to standardize the process of collecting and analyzing data from patients with adolescent idiopathic scoliosis by helping professionals in the treatment area and in the conduction of prospective and multicentric studies.

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The goals of completing the electronic protocol for collecting clinical data of patients with adolescent idiopathic scoliosis were: creating a clinical database of respiratory therapy in patients with adolescent idiopathic scoliosis; computerize and store these clinical data by using a software called electronic protocol; incorporate this protocol to the electronic SINPE© (Integrated Electronic Protocols) and create a pilot project to examine the interpretation of results.

## METHODS

The "Protocol of Electronic Respiratory Therapy in Adolescent Idiopathic Scoliosis" is a descriptive study and the methodology applied in its development is divided into five main phases, which were: creation of the theoretical basis of clinical data on spinal deformities; computerization of the theoretical basis of clinical data; implementation of the theoretical basis of clinical data in the master protocol and design of a specific protocol; incorporation of the electronic protocol of respiratory therapy in adolescent idiopathic scoliosis into SINPE©; and interpretation of the information with demonstrations of the results in a pilot project.

A database on the theoretical vertebral deformities was set up and formatted after literature review and data collection in specific literature to the elaboration of the electronic protocol. In this step a systematic reading of textbooks and review articles published in referenced journals on the topic was carried out. We then created a database on clinical vertebral deformities, especially scoliosis, their types, lung function, assessment, physical examination and existing treatments, surgical and nonsurgical.

SINPE© was developed by Prof. Dr. Osvaldo Malafaia and transferred to the Graduate Program in Clinical Surgery, Federal University of Paraná, to create a research line concentrated in Medical Informatics and it uses the data management system from Microsoft® Access®, which allows development of applications involving both modeling and data structure, as well as the interface used by users. The programming language used in the SINPE© is the C # (C-Sharp), employing the .net technology from Microsoft®.

The system used to load the theoretical basis of clinical data in the "Master Protocol" is based on the data set, arranged in a hierarchical way, in items and subitems assigned to different generations, created by two commands: the command "Add Brother" and the command "Add Child."

The specific protocols are created using the command "Select a specific protocol." In this protocol we created the specific protocol of Respiratory Function in Patients with adolescent idiopathic scoliosis.

The protocol in its entirety is available on [www.sinpe.com.br](http://www.sinpe.com.br)

## RESULTS

Figure 1 displays data from the master protocol, creation date, last update, the health area it belongs to and the total items of the master protocol. We studied the area of orthopedics, specifically spinal cord and its deformities, focusing on adolescent idiopathic scoliosis.

The subitems of adolescent idiopathic scoliosis were divided into seven main groups: medical history, physical examination, neurological evaluation, radiography, pulmonary function, diagnostic exams and treatment (Figure 2).

To start the data collection a specific protocol of respiratory function in patients with adolescent idiopathic scoliosis was needed. The items composing the particular protocol derive from the master protocol (Figure 3).

Upon completion of the collection of data from 10 patients (pilot) the information was processed by the SINPE analyzer, which automatically generated the analysis form (Figure 4), statistics and graphs.

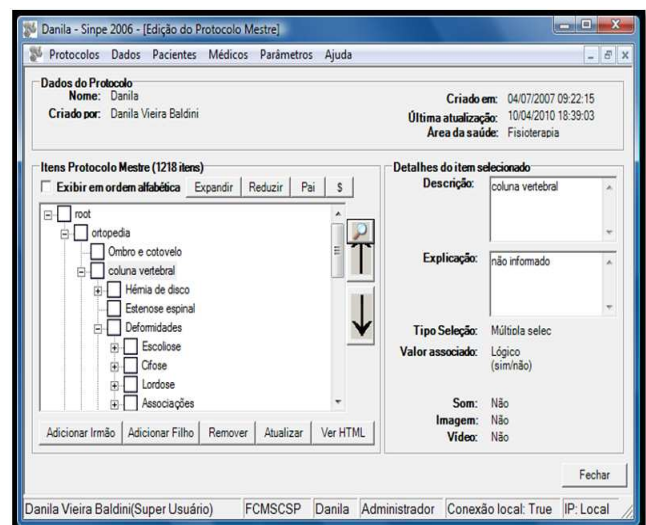


Figure 1 - Master Protocol.

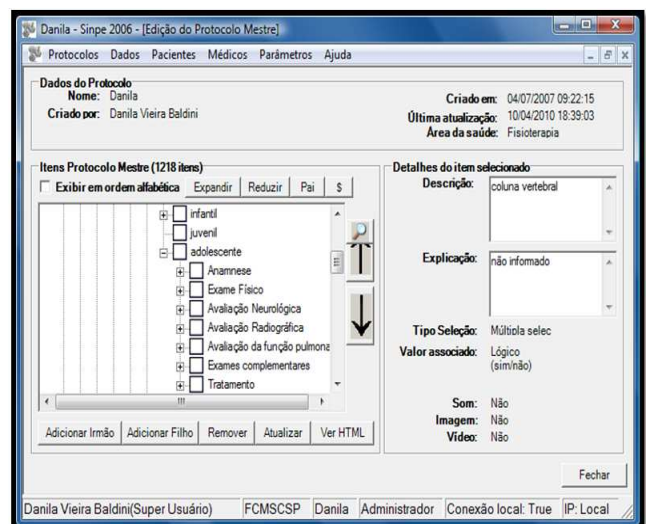


Figure 2 - Subitems of adolescent idiopathic scoliosis.

## DISCUSSION

The benefits of information technology in the medical field are numerous<sup>7</sup> and they are described in the literature as issues related to improving access to information, greater security, electronic data exchange between institutions, easiness for conducting collective studies, better quality in patient health care by optimizing the time of assistance, better management of resources, improvement of administrative and financial processes and reducing physical space needed for archiving records.

Although the electronic records are already being used in hospitals and clinics and retrospective studies based on these charts are easier and more reliable, electronic medical records lack information about the specific object of the study. The preliminary survey of the relevant data to a certain disease or therapy, as well as the possibility of collecting all this data for later analysis, makes SINPE© a rather complete tool in the development of clinical studies.

To observe the functionality of this protocol we carried out a pilot project with ten patients. Although the specific protocol contains 306 items, data collection proved to be objective, reliable and fast, confirming the studies by Vreeman, 2006, for whom data collection conducted through an electronic base was performed in 30% less time when compared to the collection on paper. Kaur, in 2004, also showed that the computerized data collection performed by a physiotherapist was completed significantly faster than the previous study with paper<sup>7,8,9</sup>.

One of the key challenges facing professionals is to make the electronic protocol used in the routine of everyday life, becoming a major source of clinical data. However, one of the barriers encountered is the very professional behavior change. Kaur et al noted, in their 2004 studies, the difficulty in changing the behavior of physical therapists that were used to document their care in unstructured text<sup>9</sup>. His proposal was to support analysis of data in electronic systems built upon the selection of menus, similar to those provided by SINPE©.

Electronic protocols offer many facilities and promise to improve the information management and quality of research. It is expected that the electronic protocol of adolescent idiopathic scoliosis may assist in the projection of treatment and prognosis. With this, it would obtain more effective interventions against the clinical outcomes,

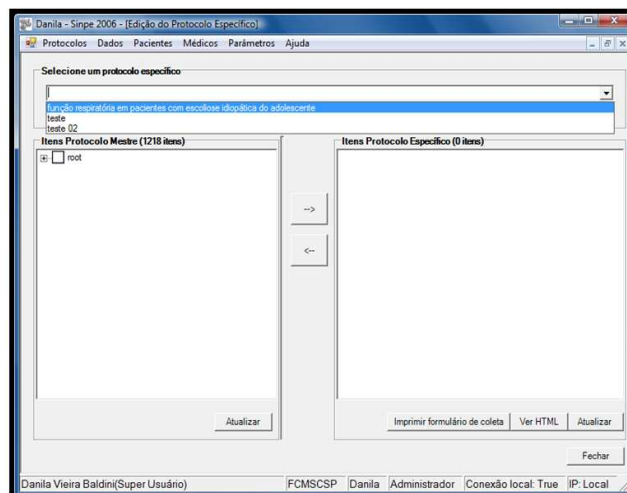


Figure 3 - Edition of specific protocols.

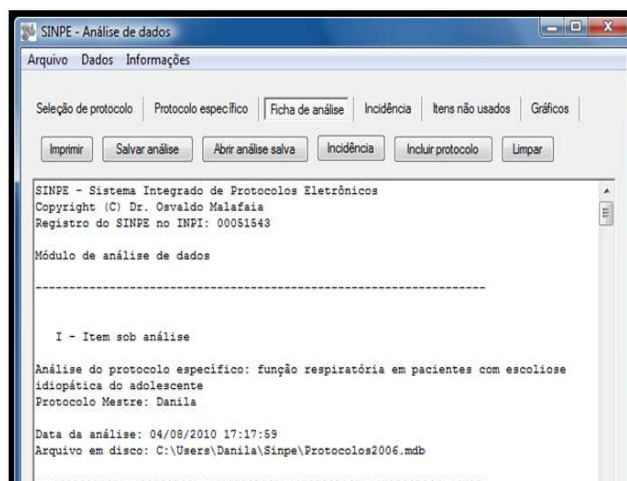


Figure 4 - Data Analysis Sheet.

strengthening the evidence-based practice for the everyday professional physiotherapist.

In conclusion: 1) the creation of a clinical database of adolescent idiopathic scoliosis was possible; 2) the computerization and storage of clinical data using a specially created computer program were viable, making it available to physical therapists, medical students and health care; 3) The electronic protocol for adolescent idiopathic scoliosis could be incorporated into SINPE © (Integrated Electronic Protocols); 4) the use of SINPE© in the pilot project was successful for data collection and analysis..

## RESUMO

**Objetivo:** Criar uma base de dados clínicos da função respiratória em pacientes com escoliose idiopática do adolescente; informatizar e armazenar estes dados clínicos através da utilização de um software; incorporar este protocolo eletrônico ao SINPE© (Sistema Integrado de Protocolos Eletrônicos) e analisar um projeto piloto com interpretação dos resultados. **Métodos:** A partir da revisão da literatura foi criado o banco de dados informatizado de dados clínicos dos desvios posturais (protocolo mestre). Mediante a realização do protocolo mestre foi criado o protocolo específico da função respiratória de pacientes com escoliose idiopática do adolescente e realizado um projeto piloto com a coleta e análise de dados de dez pacientes. **Resultados:** Foi possível criar o protocolo mestre dos desvios posturais e o protocolo específico da função respiratória de pacientes com escoliose idiopática do

adolescente. Os dados coletados no projeto piloto foram processados pelo SINPE Analisador® gerando gráficos e estatísticas das informações coletadas. **Conclusão:** A criação da base de dados clínicos de escoliose idiopática do adolescente foi possível. A informatização e o armazenamento de dados clínicos utilizando o software foram viáveis. O protocolo eletrônico de escoliose idiopática do adolescente pôde ser incorporado ao SINPE® e sua utilização no projeto piloto foi realizada com sucesso.

**Descritores:** Protocolos Clínicos. Escoliose. Modalidades de fisioterapia. Adolescente.

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