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INFORMATION SYSTEM TO SUPPORT ICF APPLICATION ON THE CLINICAL PRACTICE OF THE PHYSICAL THERAPY

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ABSTRACT

The aim of the present study is to introduce the specification of an information system related to the application of International Classification of Functioning, Disability and Health (ICF) contributing to its use in clinical practice of a clinical-school of Physiotherapy. This is a development research that was carried out in Curitiba between the months of June 2016 and June 2017. During this period brainstorms were realized in order to obtain the system requirements and draw its model based on Unified Modeling Language (UML). Results were obtained by Use case, Class and Sequence diagrams. Contribution may be seen as the electronic registrations of the information generated by the school clinic based on the ICF, replacing the hardcopy registrations and constituting a database that support, beside the Operational Information, the Decision Support Information.

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INTRODUCTION

In view of the increasing number of people that live with restrictions on their functionalities in the last decades, it is necessary to understand how healthy the individual's life is (1). The use of a common and standardized language in the health area becomes fundamental to record, study and compare data about these experiences (2). In this context, the World Health Organization (WHO) has developed the ICF (3). This classification is recommended to record situations related to human functions and their restrictions throughout life cycles (4). In order to obtain such information, data are gathered from domains of Body Functions, Body Structures, Activities and Participation, and Environmental Factors (5). Each domain is represented by chapters, categories and subcategories. The measurement of the degree of difficulty is expressed on a scale ranging from 0 to 4, where 0 means without any difficulty and 4 complete difficulty (5). The ICF is an extensive document, with more than 1400 categories, generating a challenge for its full utilization in clinical practice (6). In this way it is suggested the selection of a group of categories that best represent the context and the individual that will be classified. There are currently some ways for this selection. One way is by consensus of the professional team that will establish representative categories of ICF from instrument content, such as assessments used in clinical routine, which address daily activities, mobility, muscle strength, clinical trials. This selection helps the professionals to operationalize the classification by generating the code of the selected categories expressing the data in a common language (7). Another way is to use clinical tools already used and link its content with ICF content in order to access a common language used through the tools (7). The WHO recommends the use of the CIF (5), however, studies conducted in Brazil presented more theoretical approaches (8). Recently, studies have operationalized the classification with the intention of generating codes (9-11). However, these studies mostly use paper protocols. This situation also occurs with the application of questionnaires, indexes, scales, and data from physical therapy charts, which are little used in researches mainly because they are on paper, often with incomplete information and because there is no standardization in the language used (12, 13). Just as it is necessary to systematize the language, it is also necessary to systematize the collected data. In addition to the current demand for the computerized process, especially in the health area, the analysis of systems becomes fundamental to gather information and to formally specify the users' needs (14, 15). The computational artifacts created can manage data and make intelligent processing by bringing timely information to users (16). Different approaches can be developed for system specification. The approach of the present study will be the Object-Oriented Analysis. The use of ICF together with information from a clinical evaluation and the results of questionnaires, through a computer system, would aid in the documentation and foundation of

the clinical practice(17), specifically physiotherapy (1). One way to make the classification viable can be by computational means. Therefore, the aim of the present study was to introduce the specification of an information system related to the application of ICF contributing to its use in clinical practice of a clinical school of Physiotherapy.

METHOD

Study description: The present development study was carried out in the city of Curitiba during the period from August 2016 to Jun 2017. Object orientation approach represents a standard for analysis, design, and programming in Information Systems. To express this approach through standardized diagrams, a systematized language called UML is used. In this approach, the units called objects are the ones that compose and interact with each other. This model aims to find the best set of objects capable of representing the system. In the present study UML diagrams were developed so that the system could be visualized, specified, constructed and documented. The use case, sequence and class diagrams were developed. To represent the scenarios of the application of the system and the actors and their interactions the use case diagram was performed; to show the flow between objects and messages the sequence diagram was performed; and the behavior for the objects with the system was represented by the diagram of classes.

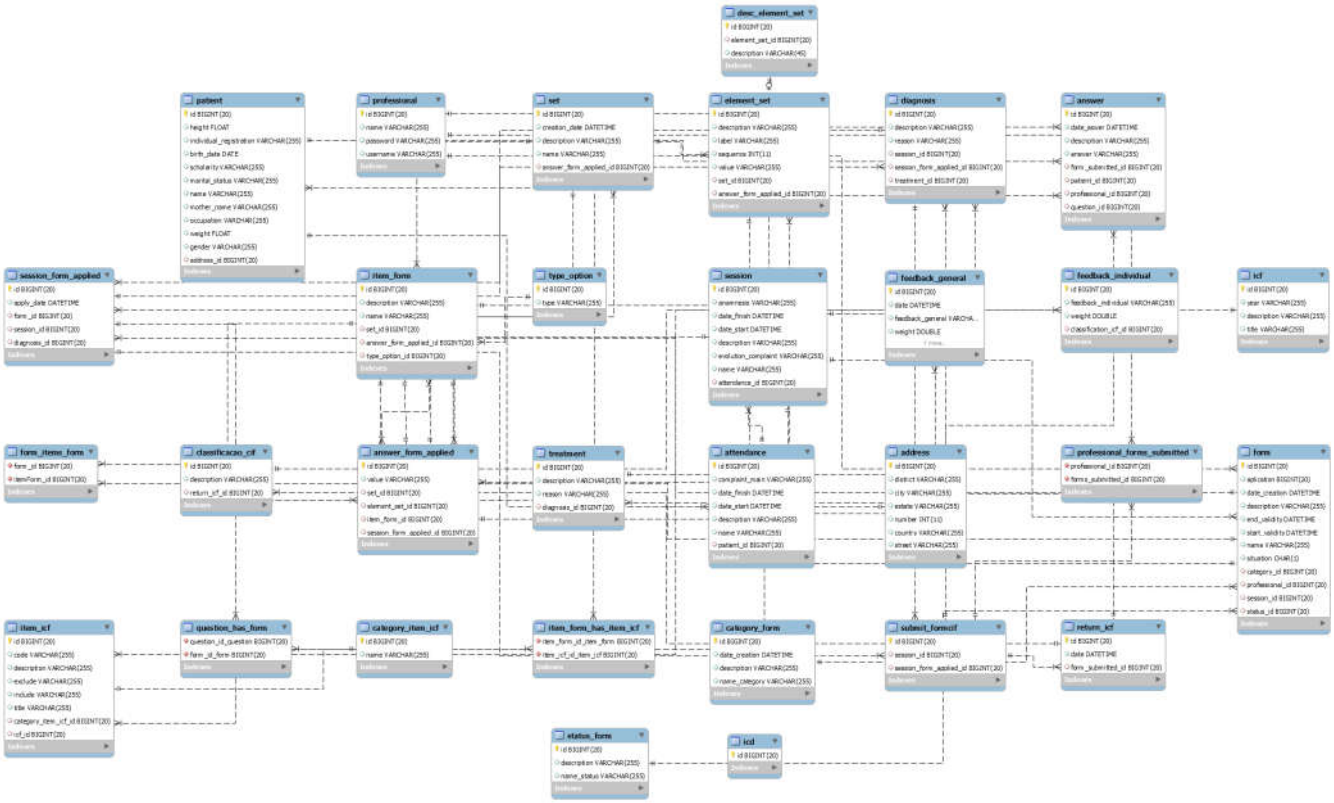

Figure 1. Relational entity model

Study steps: The study followed 7 steps: definition of the scope, survey of requirements, construction of the relational entity model (physical design), construction of the class diagram, and analysis of use case diagrams, sequence diagram analysis, and system architecture definition. In the first stage the scope of the project was defined. The limitations of the use of the ICF were identified and objectives were proposed aiming to automate the classification to build the system. In the second stage the functional requirements were defined to specify the functionalities of the system and the nonfunctional ones, which are represented by the technical language of information systems. This phase was a joint action between developers and users. The third step was the construction of the relational entity model (physical design) that served to describe the components of the bank's physical structure and how entities relate to it. For example, a questionnaire can be answered by more than one patient, or a patient can complete one or more questionnaires. In addition, all possible objects of the system were identified and for each of them, the verification and validation of the functionalities were carried out. The fourth step of constructing the class diagram allowed us to identify and organize the hierarchies of objects by observing all the data that will be stored and manipulated. The fifth step was the analysis of use case diagrams. In this step, we verified the functionalities will be used in the system and how they interact with each other. The sixth step was the analysis of the sequence diagram that aided in describing the flow that runs through given functionality within the system. The last step consisted of system architecture. This step included the technical tools for building the system.

RESULTS AND DISCUSSION

From the definition of the scope it was established that the system would have as data entry for the medical record the physiotherapeutic evaluation, the content of which could be linked to that of the ICF, the evolution of the treatment, as well as information through the completion of clinical practice questionnaires, the with the ICF. Regarding the functional requirements, the attributes that currently compose the health records and physical therapy evaluation were searched in the school clinic. Then, it would capture the data related to cadastral and clinical information (anamnesis, physical examination, measurements) that would generate a final code of the ICF, and of questionnaires answered that would serve as input to generate the classification. In addition there will be a history of the patient, session to session or pre / post consultations, to follow the treatment and the intervention in order to assist the professional records and the evolution of the patient. The patient's chart will be made with the personal data record, the choice of the scenario (which is the health condition) and the choice of the questionnaire. The search for the medical record will be performed by the CPF (brazilian individual registration), or name, or date of birth, or mother's name. The course of conduct shall consist of anamnesis, diagnostic

hypothesis or clinical diagnosis or ICD and functional diagnosis. All sessions will be registered with date and time. The result of the requirements survey is expressed by the functionalities of allowing the creation, management, maintenance and validation of the questionnaires in the system; allow the categorization of forms in one or more areas of health; allow assigning one or more ICF categories for each question in the questionnaires; assigning response options for each question; allow the professional to submit the information recorded with the questionnaires and with the ICF; that the professional select the most representative categories for each patient from the physical therapy evaluation (anamnesis); that the system receives the classifications of the questionnaires and the ICF and allows the comparison of pre and post intervention evaluation. In relation to the non-functional attributes, which correspond to the technical information, the system was developed on the JAVA platform, version 1.7. The frameworks used were: SpringMVC (v4); AngularJS (v1); and Bootstrap (v3.3.6). For control of dependencies will be used the Maven (v3.3). For MySQL database communication, MySQL Java DataBase Connectivity (JDBC) (v5.6) will be used. All entities of the system have been identified and described in the relational entity model and are represented by Figure 1. The class, use case and sequence diagrams are represented by Figures 2, 3 and 4, respectively.

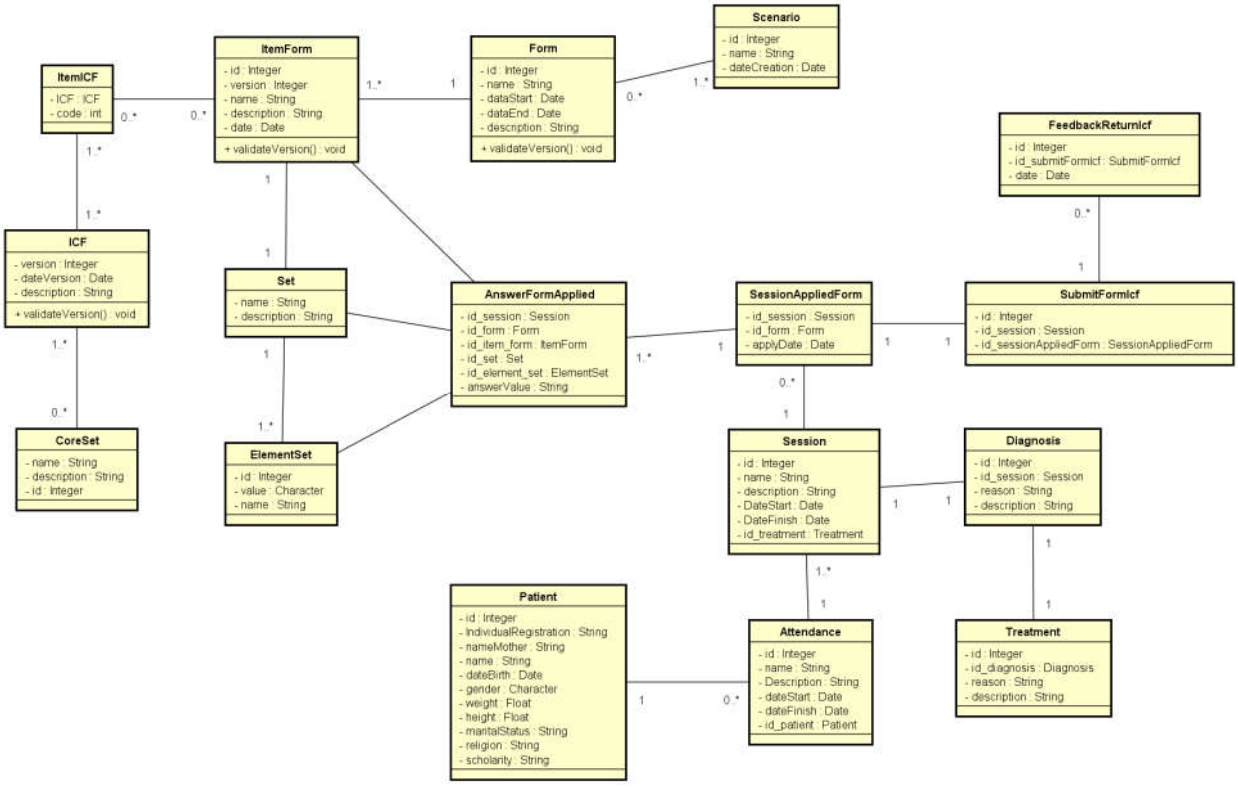

Figure 2. Class diagram

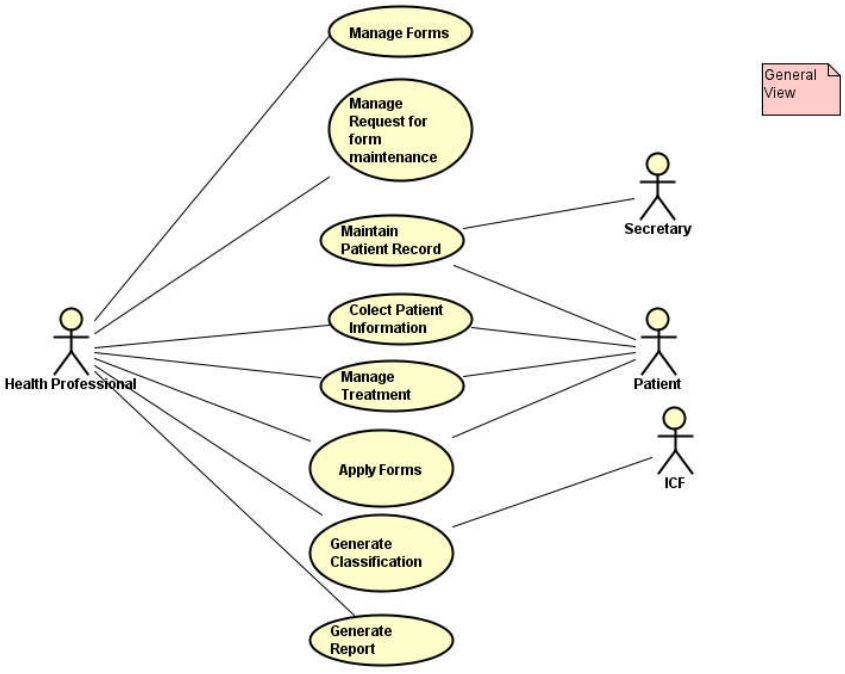

Figure 3. Use case diagram

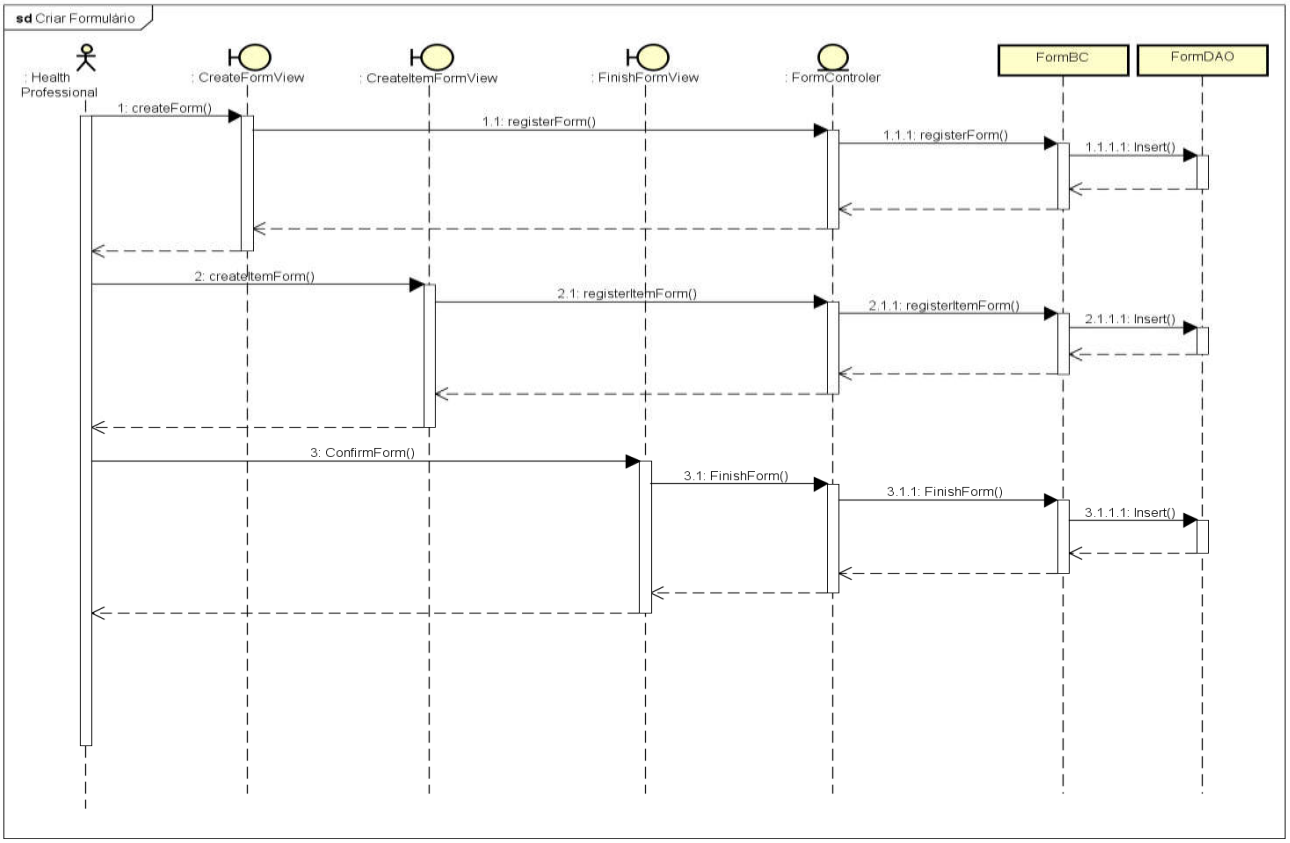

Figure 4. Sequence diagram to create form

The actors, secretary and / or teacher, participate by registering the registration information at the moment of arrival of the patient in the clinic, but only the health Professional would perform the screening, identify the patient and select form. System architecture, programming language, Database Management System (DBMS), standard of graphical interfaces, hardware structure were also identified.

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