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Proposal for selection of mental health indicators in the management of health networks: from heuristic to process modeling

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Abstract

In 2011, Brazil instituted the Psychosocial Care Network (RAPS) for people suffering from mental disorders and needs arising from the use of alcohol and other drugs within the Unified Health System an electronic information system that supports the planning, regulation, control and evaluation of mental health actions. Several studies have been done to select a complete set of indicators for mental health in Brazil; however, these studies do not describe how these principles are transposed into indicators. In this work we will use Business Process Management Notation (BPMN) to analyze the process of patient care in a mental health unit and to search through this analysis to select and map those that apply to the specific RAPS institutions. We propose a method, using process modeling along the Thornicroft and Tansella matrix, to select the relevant indicators and their mapping along the network. The method was effective allowing the application of indicators to the concrete reality of a psychiatric hospital in Brazil.

Keywords: Indicators Mental health; Mental Health Matrix; Business Process Modeling Notation.

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1. Introduction

The World Health Organization (WHO)[1], through the Mental Health Action Plan for 2013-2020, has as one of its four priority objectives the strengthening of information systems, evidence and research on health and mental illness. The WHO further recommends that one of the principles for creating such a system is the use of indicators that can summarize relevant information to a particular phenomenon and can be used to quantify a particular change. However, through information gathered in 2005 (and reiterated in 2010) by the Brazilian Ministry of Health, the absence of an electronic information system was found to subsidize the planning, regulation, control and evaluation of mental health actions, in addition to the dissemination of information[2]. Indeed, in the Ministry of Health guidelines[3], the only indicator recommended by the Ministry of Health for mental health focuses on a very superficial level related to the increase in the level of coverage of CAPS - Center for Psychosocial Care. This indicator, although important, does not have the capacity to measure the effectiveness of the service provided, concentrating on its availability at national/regional level. Several studies have been done to establish a set of complete indicators for mental health in Brazil [4][5][6][7], which adopt, with several degrees of explanation, the principles of the so-called Brazilian Psychiatric Reform as evaluation parameters.

In view of the exposed scenario, a very complete research protocol was recently proposed that intends to construct a matrix of mental health indicators for mental health care networks[8], for the modelling of processes of Psychosocial Care Network (RAPS) and its contribution for the suggestion and selection of mental health indicators relevant to health management.

Therefore, this article intends to show how procedures in the guidelines could be translated into processes and used to create models that represent how the health information system should be used to manage patient data. Through this model, we intend to suggest and select indicators of mental health that can be calculated and used within the process, as well as to investigate how they are being used in practice and to make a comparative analysis of the proposed mental health matrix[9] [10].

The next section describes key theoretical elements used for the development of the goals of this work. The third section will introduce the research methods and the steps of carrying out, the fourth section presents the Results and Discussion, the fifth section, the conclusions of the work and future research steps.

2. Background

2.1. *Business Process Modeling Notation (BPMN)*

Business Process Management Notation (BPMN) combines knowledge found in information technology and management paradigms and uses them to identify, design, execute, document, measure, monitor, business processes so that the desired results can be achieved[9]. Information technology combined with BPMN paradigms can result in significant gains, such as time, input savings, and satisfaction, thus generating good end-results at the sites that are applied[11][12].

It is worth noting that in the health area, knowledge and constant updating of business processes are also extremely relevant, as in other types of organizations. This fact stands out due to the main characteristics of its processes: the high degree of dynamism, the high complexity and the multidisciplinary[13]. BPMN allows answers to critical questions about the processes of the organization, such as: Why is it done? By whom? Where? When? and how is it conducted?[14]. The process is contained by a starting point and end point marked by circle shapes at either end, beginning or end [9].

2.2. *Contextualization*

The ordinance nº 3088 of December 23rd, 2011, established in Brazil the Psychosocial Care Network (RAPS) for people suffering or mental disorder and with needs arising from the use of crack, alcohol and other drugs, within SUS[15]. The RAPS consists of: basic health care, such as basic health units; specialized psychosocial care, such as the Psychosocial Care Centers (CAPS); urgency and emergency care, such as the 24 hour Emergency Care Unit (PAU); residential care of a transitional nature, such as the collection units; hospital care, such as psychiatric hospitals; and strategies for deinstitutionalization and psychosocial rehabilitation, such as therapeutic residency services[15].

In 2011, a web-based information system (SISAM 13) was developed, which allows the registration and follow-up of information on psychiatric patients with regard to consultations, hospitalization, referrals and against referrals in the different mental health units of the 26 municipalities that make up the area covered by the DRS XIII Regional Department of Health of the State of São Paulo [15]. In the hospital context, Delfini [16], from the study of the minimum data for mental health that should compose a hospital discharge, selected a set of 11 indicators that were possible to be calculated with the data collected by SISAM 13. A similar work was done within the scope of basic care[17] and describes the study of the flow of care through which the patient is submitted to each DRS XIII CAPS involving the users throughout the process and, starting from a detailed study of the service flows for each type of CAPS in the region, this study proposed a set of 11 indicators to measure the performance of CAPS. In spite of this, until now, no study has been done that based on the impact of the use of these indicators at this level of management.

3. Methodology

Throughout the research protocol[8] we use as a guiding method the Mental Health Matrix[10] as a feasible heuristic to define health indicators and the types of relationships between the attention points of RAPS. The matrix of THORNICROFT and TANSELLA provides a model that can be used to increase clinical efficacy through evidence-based practice. This model has two dimensions, a geographical, which is divided into three levels: national/regional, local and individual (of the patient), and a temporal, defined by three phases: input, process and results. When using BPMN in mental health process modeling, we will be able to ask if the findings when using the Mental Health Matrix are adequate, if the allocation of the indicators for each process is correct, and if we can suggest an adaptation or improvement of the usefulness of these indicators in each process. Thus, the research carried out here constitutes a case study with the objective of identifying mental health indicators in the process of patient care in the CAPS. The case study is a research method whose choice has occurred because of the need for a comprehensive holistic approach and for enabling a better understanding of the complexity and uniqueness of specific organizational phenomena[18].

The first stage of this work was the definition of the protocol of case study that guided the execution of the research. The next step consisted in the characterization and modeling of the patient care process that enter the CAPS, through BPMN notation, from the RAPS processes. A commonly used procedure to characterize and gather as much relevant information about the process are interviews[19]. In this case study, the characterization of the process was carried out from a semi-structured interview of the patient care process in the CAPS with a specialist in mental health management involved in this process. The main objective of this interview was to identify the activities, the events and the trajectory performed during the patient care in the CAPS.

This interview was carried out following a script that covered the following questions:

- What activities involved in the patient care process?
- Who performed each activity?
- How each activity was performed in the context of the process?
- Where each activity was performed?
- When each activity was performed in the context of the process as a whole?
- The reason why each activity was performed in the process in question and
- How was the use of the information system during each activity?

After this first interview, an initial representation of the process was elaborated using BPMN notation Bizagi Modeler. However, it was possible to observe that the information obtained in the first interview was insufficient for the adequate modeling of the process. This was followed by a second interview, conducted from the previous answers, with the expert in mental health management in which the specific detail of the patient care trajectory in CAPS and other complementary information were searched. The next step was to perform the validation of the process with the specialist of the area, in search of a model that approximates of the practice obtained through the interviews and modeled in the notation. Then, a Selection of the relevant indicators in the modeling process was made and a Critical analysis of the application of the indicators from the BPMN and of results with Matrix Thornicroft and Tansella.

4. Results and Discussion

One of the results of this study was the identification of the outpatient care of patients with mental disorders in a CAPS through the construction of representative models of the current state of the process ("AS-IS" model) from diagrams constructed with the BPMN notation. The summary view of the “AS-IS” model containing the process representation and its sub processes is presented and the description of this process will be performed in the following paragraphs.

The observed process of patient care, based on the BPMN, starts when the patient attends the mental health unit at any time, being referred by a Basic Health Unit or by spontaneous demand. When it is the patient's first time in the unit he will necessarily go through the reception to check the register or make a new registration, if he has never been attended in the municipal network. The receptionist will be in charge of communicating a health professional who will perform the care of the patient. All patients when starting the care process are welcomed by a health professional. The reception is done inside a reserved room or office. The team includes three psychiatrists, three psychologists, one occupational therapist, two nurses, one social worker, three nursing assistants, one musician therapist, two receptionists and one administration officer. The professional who performs the first patient care prepares a preliminary report, which is discussed later in a multidisciplinary team meeting, and counts on the presence of the other professionals of the unit. It is defined in which activities it will be inserted, the dispensation of medication, if necessary, and the psychological or psychiatric accompaniment that will bring greater benefits to the patient. He can be referred to sections with psychologists, cultural workshops and or manual activities. Figure one (1) shows all the modelling details when using BPMN.

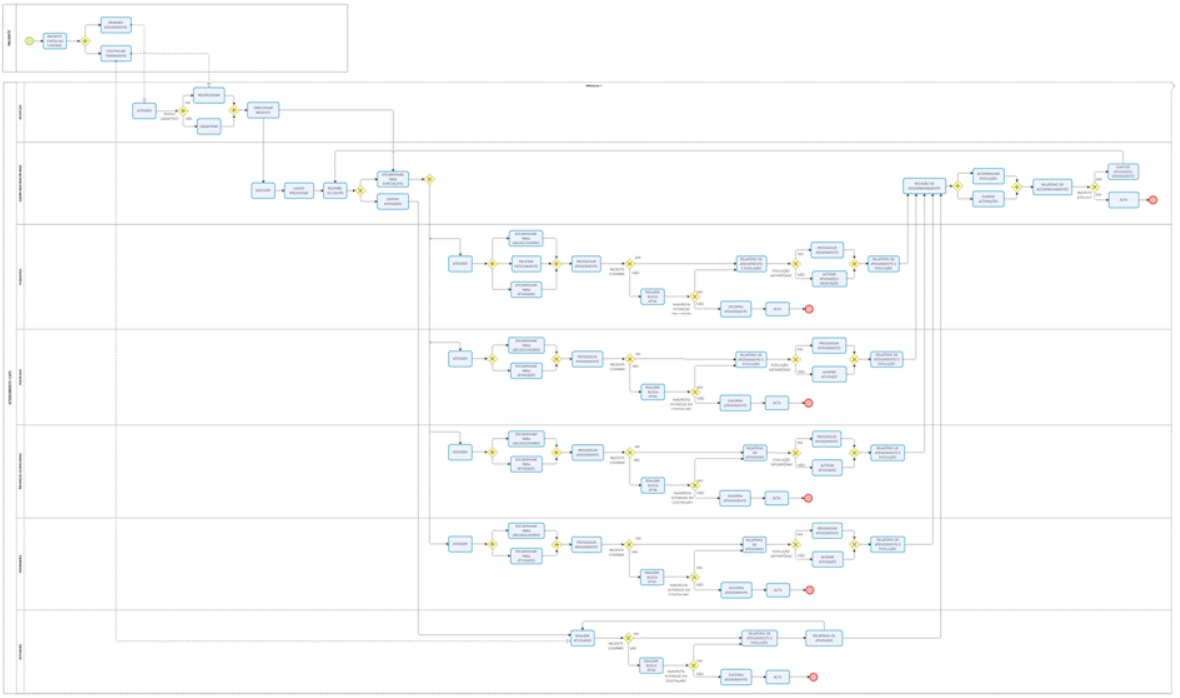

Figure 1 - Detailed view of the BPMN of the current state ("AS-IS" model) of the Patient Attending Process in CAPS.

Due to the size of the picture and possible difficulty in reading all the details specified there, the reader can load it directly from the link: BPMN for Process in CAPS.

After each activity is performed, by the professional that accompanied, a report informing the evolution of the patient. If the patient is absent in the sessions, the person in charge of the activity performs the active search of this patient to inquire about the reason for the absence. Telephone calls are made initially and, if necessary, a home visit may be required. Medical care is performed by psychiatrists or psychologists. If the need for another specialist is identified, referral to primary or secondary care is done, the patient is referred to the Basic Health Unit or referenced service. The evaluation of the evolution of the cases is done for all the attendances and activities and its annotation

is carried out in the electronic medical record for later comparison. These evaluations are carried out by any professional of higher level, or by the professional himself that accompanies the accomplishment of the activities.

The visits, in most cases of the unit, refer to patients who have lost their social life. Therefore, the activities aim to rehabilitate the individual to return to his normal activities, by discharge, in cases in which the patient presents significant improvement. The service of the unit is carried out in an attached region. There is no transfer or referral to other mental health care units in the city, except in cases where there is a change of address. The purpose of these activities is to recreate the patient's bond with society, which for some reason was lost and led to mental problems. In the income generation workshops, handicraft products are made, which, after being sold, generate income for patients who often do not have a fixed job. It is worth remembering that modeling using only BPMN does not allow to verify its completeness, but it allows to have a visualization of the procedures as a whole and this enables: a) Identifying bottlenecks; b) An analysis of whether each step can be optimized; c) An analysis of the steps and a check if there are significant missing steps; d) Define/identify process performance indicators that allow their monitoring and improvement.

Suggestion and Selection of Mental Health Indicators

In a study conducted by Delfini[16] these indicators were selected, after a BPMN analysis of the patient care process in the Caps, identifying the presence of the indicators in the process. In the same, way they were analyzed and positioned in the Mental Health Matrix[10] according to the instructional characteristics of each level of this.

- ***Admissions indicator for depression****: Numerator:* Number of patients whose ICD-10 code for severe depression without psychotic symptoms is F32.2. *Denominator*: Resident population older than 15 years.
- ***Alcohol-related Admissions Indicator for Behavioral and Mental Disorders****: Numerator:* Number of admissions involving as main diagnosis mental and behavioral disorder due to alcohol use. *Denominator*: Estimate of the population in the middle of the year.

The next three selected indicators were proposed[17] in the 2005 Ministry of Health Audit document[6], defined as follows:

- ***Adherence rate of CAPS beneficiaries****:* Number of beneficiaries enrolled at the beginning of the year in CAPS who did not abandon the therapeutic project until the end of the year or who were discharged during the year / Number of beneficiaries enrolled at the beginning of the year.
- ***Family Membership Rate:*** Number of beneficiaries whose relatives or guardians participated in activities at CAPS at least once a year / Total number of beneficiaries served during the year. It demonstrates the effective participation of family members in the CAPS therapeutic project.
- ***Household Visitation Rate****:* Number of beneficiaries served in the month or year whose families were visited by the CAPS team in the month or year / Total number of beneficiaries served during the year. It aims to measure the percentage of beneficiaries attended at CAPS.

4.1. *From heuristic to process modeling*

Through this BPMN notation exercise it is possible to observe that the patient care process within CAPS is compatible when we start from a mental health management model based on the heuristic proposed by the Matrix model of mental health by Thonicrofit and Tansella[10] and we walk in the direction to specify the process and to analyze the feasibility of selecting mental health indicators to assist the management in the different levels and phases of care.

Following the steps designed by the method, we analyze the indicators proposed in previous studies[16][17] and positioned them according to the instructions recommended by the mental health matrix of Tornicroft and Tansella and observed that the indicators are located correctly in the matrix. Thus, the indicators of admissions for behavioral and mental disorders related to alcohol and of admissions for depression are allocated in the National / Regional geographic dimension and in the temporal dimension of processes. With regard to the analysis made with the other indicators, such as Family Membership Rate, Household Visitation Rate, Adherence Rate of CAPS beneficiaries[17], they were allocated in the individual geographic dimension and in the temporal dimension of processes. Particularly in these dimensions, it is identified the subjective quality of the treatments, continuity of the clinical team, frequency of appointments, standards for care procedures for individual patients. We observed in the process of patient care in the CAPS that several information can be considered and transformed into indicators such as admission rates of patients with different ICDs, prevalence and incidence of mental disorders indicators, service

performance indicators, financial expenditure indicators, indicators number of consultations with specialists (psychiatrist, psychologist, nurses, occupational therapist), indicators of social reintegration, indicators of drug dispensing, indicators of discharge and abandonment, and others.

5. Conclusion and future works

This work is one of many examples that were designed to assist the health service and mental health care. The BPMN notation was used as a first step in order to observe in a more detailed way and to allow the discussion of improvements and new regulations within the processes. Thus, the Matrix of Mental Health as guiding the management as a whole in mental health and the use of suggested indicators aim to allow the optimization of the actions of management and care to allow the development and the search for better alternatives. This is a first attempt in this direction to select a set of mental health indicators that can organize and point the direction to a more appropriate management. As future steps, we intend to make another notation using BPMN, this time, in the scenario of hospital care, in order to also identify indicators of mental health in tertiary psychiatric care. Certainly, future works should be carried out in order to achieve this goal.

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