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WORKFLOWS IN COMPLEX SYSTEMS: AN ANALYSIS OF STATE OUTPATIENT MEDICAL REGULATION

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Summary: The health system faces challenges in offering adequate care to the population, and it is essential to consider organizational models that guarantee universal and efficient access. Typically, systems can be fragmented, characterized by a lack of communication between levels of care, or based on health care networks (RAS), which integrate services in an articulated way. RAS promote continuous and integrated care for patients, facilitating access to different levels of care.

Regulation of assistance is essential to coordinate the provision of services and ensure adequate access to users. However, there are challenges related to communication between the different information systems used in the different stages of regulation, which can result in delays and service failures.

In the Brazilian context, regulation occurs at different levels - municipal, regional, state and national - and involves communication between different instances to ensure the adequate provision of services throughout the country. However, problems such as the lack of communication between information systems and the limited capacity to offer services can create bottlenecks and impact the quality of care offered.

Interventions to improve the regulatory system include improving information technology tools, training the health professionals involved and coordination between the different spheres of the health system. These measures aim to reduce delays, improve the system's efficiency and ensure more effective care for users of the Unified Health System (SUS).

Keywords: regulation of assistance; cognitive ergonomics; work process; public health

Introduction

Health care systems are programs aimed at meeting the needs and demands of the population at a given time, operating according to the health situation of users, and must be universal, equitable, comprehensive, effective and efficient, articulating with the desired results. (JATOBÁ et al., 2019).

According to the National Council of Health Secretaries (2015) and School of Public Health of the State of Minas Gerais (2011), the most common typologies found worldwide are fragmented systems and Health Care Network (RAS) systems.

Fragmented systems are based on the assumption of an organizational model of isolated points, which concerns the location of the components of the structure being in uncoordinated locations, resulting in a hierarchical system with incommunicability between the different levels of care - thus harming efficiency of health care, providing continuous user care and access to secondary and tertiary levels. (JATOBÁ et al., 2019; MENDES, 2011).

On the other hand, the operation of the RAS is structured through a set of interconnected points that together form the network. In the logic of this model, the patient is able to obtain continuous and integrated care, access to different outpatient levels and efficiency in the internal organization of the network, such as resource allocation, clinical coordination, among others (JATOBÁ et al., 2019; MENDES, 2011). Outpatient procedures are: emergency and urgent care, outpatient health care and services, outpatient services and clinical visits.

According to Ordinance No. 4,279, of December 30, 2010 (BRASIL, 2010a), the components of the RAS include: communication center, points of attention, support systems, logistical systems, transport system and governance systems.

To manage the availability of information in the RAS, aiming at continuity of care, there are three types of coordination: information coordination, clinical management coordination and administrative or organizational coordination. Information coordination encompasses communication between different services and levels of attention to the user. Clinical management coordination refers to "[...]coherence of care, accessibility between levels and adequate user monitoring" (ÁVILA, 2022). Administrative, or organizational, coordination concerns administrative activities to promote accessibility between primary, secondary and tertiary levels. (MENDES et al., 2021)

With the intention of ordering and coordinating the different points of the RAS system, Primary Health Care (PHC) became the communication link between the different components. (BRAZIL, 2010)

Conceptually, according to the Department of Health, ([s.d.]), PHC can be defined as a "[...] set of individual, family and collective health actions that involve promotion, prevention, protection, diagnosis, treatment, rehabilitation, harm reduction, palliative care and health surveillance[...]" which, articulating with the practices of a multidisciplinary group of professionals in the field and integration with vertical services, assume responsibility for the care of a certain group of individuals .

Its structure is based on seven premises, care at first contact, longitudinality, comprehensiveness, care coordination, family guidance and community focus, and on three functions, resolution, organization and accountability. (BRASIL, 2010b; SHIMAZAKI, 2009)

In Brazil, the expansion of PHC occurred in 1994, as a result of the formation of the Family Health Program with the National Primary Care Policy, based on the Family Health Strategy model in 2006 (JATOBÁ et al., 2019).

This event resulted in a significant increase in the demand for healthcare services, which now covers around 80% to 90% of the population. As a result, secondary and tertiary care also experienced an increase in requests for care.

To organize and rationalize the demand for services at the aforementioned levels of care, the National Regulation Policy emerged, established by Ordinance No. 1,559, of August 1, 2008, which focuses on strengthening the process of regionalization, hierarchization and integration of actions and health services (BRASIL, 2008).

According to Ordinance No. 1,559 (BRASIL, 2008), there are three dimensions that permeate regulation:

> I - Regulation of Health Systems: its object is the municipal, state and national health systems, and its respective public managers as subjects, defining, based on the principles and guidelines of the SUS, macro-guidelines for the Regulation of Health Care and carrying out actions monitoring, control, evaluation, auditing and surveillance of these systems;
> II - Regulation of Health Care: exercised by the State and Municipal Health Departments, in accordance with the agreement established in the Health Pact Management Commitment Term; aims to ensure the adequate provision of services to the population and its object is the production of direct and final health care actions, and is therefore aimed at public and private providers, and their respective public managers as subjects, defining strategies and macro-guidelines for the Regulation of Access to Assistance and Control of Health Care, also called Care Regulation and control of the provision of services, carrying out monitoring, control, evaluation, auditing and surveillance of health care and assistance within the scope of the SUS; It is
> III - Regulation of Access to Assistance: also called regulation of access or assistance regulation, its objects are the organization, control, management and prioritization of access and assistance flows within the scope of the SUS, and its respective public managers as subjects, being established by the regulatory complex and its operational units and this dimension covers medical regulation, exercising health authority to guarantee access based on protocols, risk classification and other prioritization criteria.

Although all dimensions of regulation are important for the efficient use of RAS, the regulation of access to assistance stands out as it requires the user to prioritize and appropriately direct at the right time, in which these actions are operated by local regulatory complexes.

According to Brasil (2010b), regulatory complex "consists of an organization of the set of actions of the Regulation of Access to Care, in an articulated and integrated manner, seeking to adapt the supply of health services to the demand that most closely matches real health needs".

Taking this into account, the implementation of emergency regulation centers, hospital admissions, medium and high complexity outpatient consultations and exams seeks precisely to manage beds, schedule specialized consultations and therapeutic diagnostic support services. (BRAZIL, 2006)

However, when analyzing the Brazilian health system, it is fair to admit that with the attenuating advent of demand for care and low resources made available by the State, regulating doctors and nurses have faced a hostile work environment on a daily basis, generated by bottlenecks in outpatient regulation procedures, pressure to make appointments, attention when filling out forms and a large workload.

In this sense, the article aims to identify bottlenecks in the process of medical regulation of outpatient care in a given state of the Brazilian Federation. In this context, the work sought to identify and conduct a preliminary analysis of the different flows that make up this process, focusing on the support of information technology (IT) tools for these flows, in addition to analyzing the cognitive aspects of regulatory agents.

Methodology and Development

The study was formulated based on an exploratory qualitative design, with a view to identifying, describing and analyzing the main workflows related to the process of regulating vacancies for outpatient procedures. The Methodology was divided into four stages, described below.

The first stage was to review the scientific and technical literature in the field of public health regulation, with the aim of understanding the dynamics of work within regulation centers and regulatory complexes, through public, technical-scientific and institutional documents which describe aspects of regulating access to assistance.

The second stage involved the collection of primary data through semi-structured interviews with doctors and nurses who work in regulatory centers, in which statements were

collected regarding the operation of care regulation at different levels of health care, complexity and government.

The third stage consisted of coding the data based on content analysis (BARDIN, 1989).

Finally, the last step involved data modeling through the creation of flow diagrams and preliminary analyses.

Results

The literature review undertaken allowed the identification of the process of regulating outpatient care at a high level.

In this sense, the National Council of Health Secretaries (2016) schematically presents the process flow, Figure 1, in order to illustrate the procedure adopted to regulate public health care.

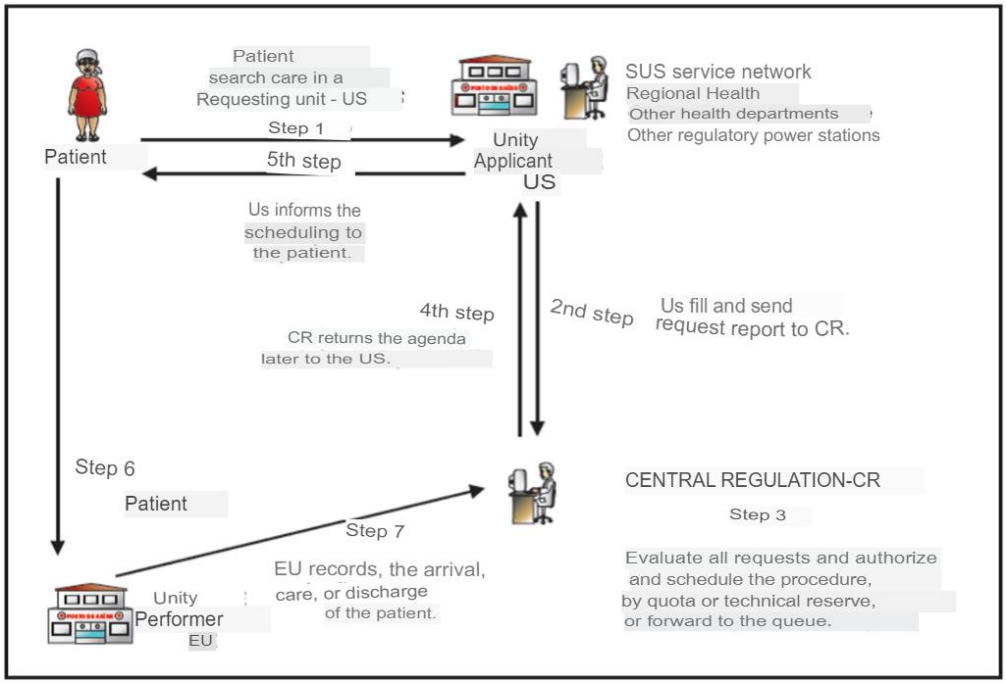

Figure 1: Procedure flow diagram for regulating access to assistance.
(SOURCE: NATIONAL COUNCIL OF HEALTH SECRETARIES, 2016)

The procedure for regulation is based on the assumption that the patient is referred to a requesting unit (US) in search of outpatient care, in which during the care, the responsible doctor, upon realizing that the user will need more robust treatment, fills out and sends a request to the regulatory doctor at the regulatory center (CR) to carry out the following transmissions of the appointment.

The forwarded document is then evaluated by the regulator, who will analyze and make a decision to authorize the scheduling, deny or ask the applicant to reevaluate the request.

Assuming that the regulatory physician authorizes the request, the next step is to schedule the request and notify the US to then notify the user of the final result of the referral request.

The user receives the notice, goes to the executing unit on the scheduled day and time and receives outpatient care. After the service, the provider notifies the CR about arrival, the service provided and whether the patient has been discharged.

All procedures presented proceed through reports and software in the units involved in the scheme.

However, during the interviews carried out, it was observed that depending on the flow between regulator, requester and offeror, there is no communication between these agents, except for those flows that are operated via one of the IT platforms used. In many cases, each municipality has its own IT system, the regional ones have standard software and the state one varies with one or more programs.

When the requester makes a request, the IT tool used will be the one the regulator uses.

To give an example, assuming that the US uses the TI Saúde program and the applicant Saúde TI, for the US to make the request, the US will have to learn how to use the TI Saúde, because in it they will have to fill out the form, bearing in mind that the regulator uses this software.

Also regarding IT support, the research identified, through the data collected, failures in communication between the different points of the RAS, starting from the lack of notification between the regulator, provider and requester to the lack of synchronization of the system with other government digital platforms to update user data.

Regarding the notices between the authors involved, it was noted that the responses to the requests, especially if they were denied, could not be passed on by the system to those responsible, causing long waits for patients in queues for outpatient care. On the other hand, warnings about the failure to notify users about the appointment due to unforeseen events could not be reported to IT support, resulting in the patient not showing up for the appointment.

Another reason that causes patient absenteeism, according to respondents, is the lack of updating of the patients' own data, which could be carried out through reconciliation with other digital platforms.

In a similar way, and also related to updating data, in this case specifically about the waiting list, another obstacle that was noticed is the lack of synchronization with digital death registration tools. In cases of death of patients waiting in line, removing the patient from the waiting list needs to be carried out manually, rather than automatically.

The last problem to highlight in relation to IT support is the cancellation of requests that were pending and not resolved within a given period of time. When there is a need to pending a request, a follow-up is generated in the system. However, as communication between the requester, executor and regulator is sometimes compromised by external and internal factors, notifications end up not being passed on to the specific person responsible.

Having done this, at the present time in the studied state context, there are four levels of assistance regulation, which vary according to the degree of complexity, supply and demand of requests, which are: municipal, regional, state and national.

Regulation carried out at the municipal level, according to the literature, is normally of low complexity and for vacancies offered in the municipality itself. In other words, it is from institution to institution in the city itself. The regulatory complex that operates in this type of location is the Municipal Regulation Center (CMR). Furthermore, each municipality has its own CMR, with the exception of the capital, which is managed by another regulatory complex.

The regional level is made up of regions of the state, which is made up of a group of specific municipalities, in which each region has a Regional Center (CREG) that governs regulation. When a municipality does not have a certain vacancy for a certain request and another municipality in the same region has a vacancy offered, CREG is called to carry out communication between the cities and schedule the procedure. Furthermore, as the capital does not have a CMR, it is governed by the CREG to provide communicability between the offering points and the requesting points.

In some cases, cities enforce the contract. The municipality that does not have certain vacancies available for certain procedures and another municipality does, the city with a supply deficit buys the vacancies from other cities for its citizens to use.

At the state level, regulation is carried out by two or more centers, namely: High Complexity Regulation Center (CERAC), State Internal Regulation and, if the state decides, other centers.

Through them, communicability between regions of the state is achieved to carry out regulation between them. In other words, if a region does not have a certain vacancy available and another region has an offer, the Centers at the state level carry out the transaction between them.

Finally, at the national level, the National High Complexity Regulation Center (CNRAC), which regulates requests at this level. CNRAC carries out interstate communication with the aim of allocating patients from state to state with high or very high complexity.

Therefore, Figure 2 seeks to exemplify in a playful way the levels of regulation currently present in Brazil.

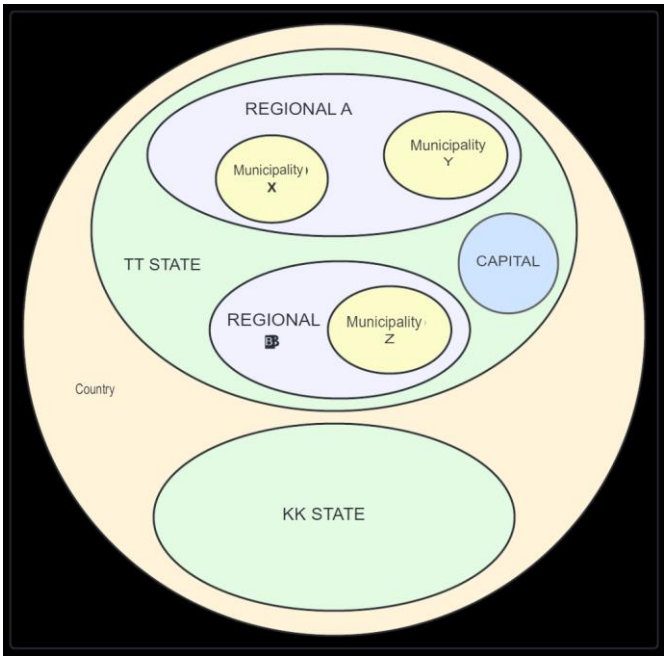

Figure 2: Representation of health levels.

The orange color represents national regulation. Green corresponds to the regulation referring to the State, in which the abbreviations KK and TT represent the acronyms of the state's name. The lilac color is the regions, which can be seen by the acronyms A and B, that make up the state. The yellow ones relate to municipalities, represented by the acronyms X, Y and Z. Finally, the blue one refers to the state capital.

Based on the transcriptions of the interviewees' speeches, the flow diagram presented on screen, in Figure 3, was created, with the aim of comparing different flows and focusing on aspects of IT support.

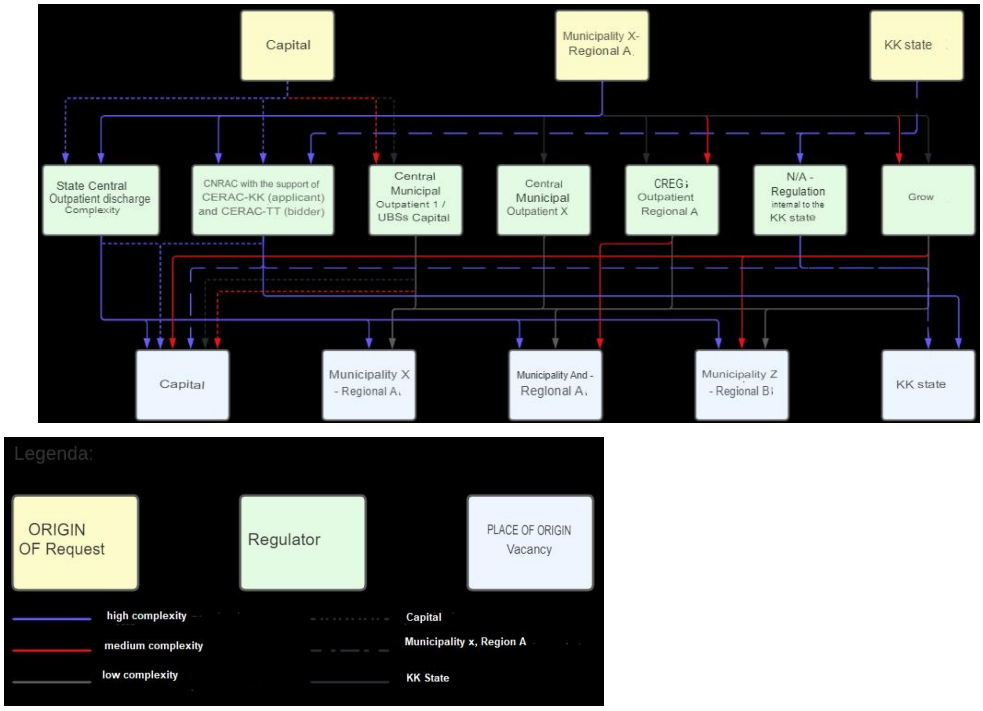

Figure 3: Flow Diagram for Outpatient Medical Regulation in the TT state.

Discussion

The first point to highlight is in relation to the technological supports for carrying out regulatory procedures. In this regard, the results indicate a scenario capable of generating obstacles in several of the mapped flows, as there is no standardization of technical support at municipal, regional and state levels, in addition to the lack of synchronization with other digital platforms for updating user data and waiting list for registered deaths, harming the agents who operate, the patient and generating bottlenecks.

As programs are often different between applicants, regulators and executors, US professionals will need time to adapt and learn about new IT tools, as well as conditions for training new professionals hired by US who will operate the request for outpatient procedures.

The potential impacts of the aspects raised regarding gaps in support by IT tools are: accumulation of functions during the regulation operation, mistakes in filling in patient data, cognitive work overload and difficulty in decision making.

From the observation of Figure 3, it is clear that there is a great demand for highly complex procedures. Therefore, it is possible that there may be bottlenecks at this level of complexity that would act as obstacles to providing outpatient care.

Another point to note is the high demand for requests from municipalities for different levels of complexity, as well as the fact that vacancies located in the capital are eventually required by all requesting municipalities. This requirement, referring to the capital, is the result of it having the largest number of offers for different procedures. However, despite the

number of vacancies in performing units being high, the demand for requests exceeds this for many of the procedures, generating waiting lines.

In summary, the bottlenecks generated by the high demand for regulatory procedures, mistakes in user forms, gaps in adequate IT support and aspects of work organization, can impact both the quality of the regulation operation and the resoluteness of care. to the SUS user patient.

Conclusions

This study carried out a preliminary analysis of the workflows carried out based on a macro-process of regulating outpatient care at the state level.

Throughout this study, the existence of several aspects with the capacity to generate potential obstacles in relation to the regulatory flows of access to assistance was noticed.

The main difficulties identified in the regulation system were the lack of communication between the different support software, the alignment of the navigation workflow of these software with the regulation process and the organization of work between offering agents. Such problems end up being precursors to bottlenecks, delays in outpatient care and an environment that is less conducive to resolving certain requests.

With the intention of contributing to solving the aforementioned obstacles, the preliminary results obtained indicate opportunities for interventions in the regulation system, such as the functionalities of the software used, the number of regulatory doctors, as well as the training of health professionals who work in the requesting units and performing outpatient procedures.

Based on interventions in the IT tools used, it is also considered relevant to formulate training for regulatory teams of regulatory complexes at municipal, regional and state level regarding the updates made available to the use of software, in addition to studying the impacts on policies public health policies that relate to the regulation of access to outpatient care.

Regarding IT tools specifically, the results highlighted the need for interface mechanisms that allow communication between systems, enabling data migration between systems, thus reducing errors when filling out user forms, and rework, thus avoiding delays in carrying out procedures, reducing absenteeism and contributing to improved care resolution.

It is also important to note that, for bottleneck procedures with supply typically lower than demand, strategies that coordinate the municipal and state spheres to increase the number

of vacancies available in certain municipalities and regions can have a significant impact on reducing waiting lists, contributing to achieve the principles of the SUS.

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