

Application of SSM in the Distribution Chain of Antiretroviral Medicines

Aplicação do SSM na Cadeia de Distribuição de Medicamentos Antirretrovirais

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Abstract

Purpose: The paper analyzes the distribution chain of antiretroviral drugs of the HIV/AIDS Program, through the application of Soft Systems Methodology- SSM, from the perspective of the professionals who work in the pharmacy of the university public hospital of high complexity responsible for the logistic coordination of the HIV / AIDS Program at the state level.

Design/methodology/approach: To obtain a systemic view of the functioning of the chain and the factors that lead to the rupture of the distribution channel, SSM was used.

Findings: The results obtained contribute to understand how complicated the logistics of these drugs are; them propose possible solutions to solved this situation.

Research, Practical & Social implications: The study showed the importance of the methodology applied to the organizational reality of a public organization.

Originality/value: The research subjects are: (i) four professionals from the HIV / AIDS Program of the hospital under study; (ii) three professionals in the coordination of the Planning of the Acquisition of Medicines and inputs of the HIV / AIDS Program of the State Secretariat of Health of Pernambuco.

Keywords: Soft Systems Methodology; Supply chain logistics; Provision of logistics services.

Resumo

Objetivo: O artigo analisa a cadeia de distribuição dos antirretrovirais do Programa HIV / AIDS, por meio da aplicação da Metodologia Soft Systems - SSM, na perspectiva dos profissionais que atuam na farmácia de hospital público universitário de alta complexidade responsável pela coordenação logística do Programa de HIV / AIDS em nível estadual.

Método/abordagem: Para obter uma visão sistêmica do funcionamento da cadeia e dos fatores que levam ao rompimento do canal de distribuição, foi utilizado o SSM.

Resultados: Os resultados obtidos contribuem entender a complexidade da logística desses medicamentos; além da proposição de soluções possíveis para esta situação.

Contribuições teóricas/práticas/sociais: O estudo demonstra a importância da metodologia aplicada à realidade organizacional de uma organização pública.

Originalidade/relevância: A abordagem SSM permite que se investigue uma situação estruturada para resolver os problemas. Os sujeitos da pesquisa são: (i) quatro profissionais do Programa de HIV / AIDS do hospital em estudo; (ii) três profissionais da coordenação do Planejamento para Aquisição de Medicamentos e Insumos do Programa de HIV / AIDS da Secretaria de Estado da Saúde de Pernambuco.

Palavras-chave: Metodologia de Soft Systems; Logística da cadeia de suprimentos; Prestação de serviços logísticos.

Introduction

The healthcare of the Human Immunodeficiency Virus - AIDS users and understanding the logistics supply chain of antiretroviral drugs (ARVs) are necessary due to the particularity that this public represents. This virus increases with a complex mixture of disease-specific and palliative therapies, such as antiretroviral drugs. It is an important phenomenon to study according to its morbidity and mortality in young adult populations.

A logistic rupture of these drugs and their consequent interruption may cause complications in the patients' lives and increase their symptomatic illness because AIDS has been converted into a chronic disease in earlier stages. A logistic rupture reflects not only economic losses but also human beings. The immediate results of the shortage are disbelief in the hospital management, employee demotivation, the risk of patients' symptoms, and unnecessary user hospitalizations.

According to estimates, from the beginning of the epidemic in 1980 to June 2012, Brazil had about 842,710 cases of AIDS (Ministry of Health, 2017). Therefore, the knowledge of the disease has advanced, it is still incurable and continues to increase (Acurcio & Guimarães, 1999). Antiretroviral drugs and the medical care system are essential to support the AIDS patients to remain to live, reducing their mor-

bidity and mortality, in addition to preserving and restoring their immune system (Veloso, Fink, & Lima, 2010).

Understanding the factors and the dynamics of the supply chain management of ARVs is necessary to point out what causes the failure during the supply (Reis & Perini, 2008). To comprehend the function of ARV drugs' logistics chain, we used the Soft Systems Methodology (SSM). In the study, we used the term "outpatient pharmacy", and the main logistical activities are user registration, monthly demand information flow, receipt, checking and storage of medicines and supplies, dispensing to users, meeting the individual needs of users and family and stock management (Paucar-Caceres et al., 2016).

Cezarino, Liboni, and Silva (2008) mention the importance of the SSM to analysis organization's complex problems. That involves several actors, scenarios, cultural organization, decision-making process, employees' vision, etc. The use of SSM offers a valued corrective planning, respecting the rhythm and the organizational culture. It also expresses the reflection of decision-makers on daily actions and activities (Antunes et al., 2016; Zeleznik, Kokol, & Vošner, 2017). The SSM promotes reflexive thinking on different actors (hospital employees and managers, stakeholders, and AIDS patient) of how well the organizational should be (Thomaz, 2003).

This paper aims to analyze the logistic of the AIDS antiretroviral drugs

Program, through the application of SSM methodology, from the employees' perspective in the pharmacy of the university public hospital in Recife/Pernambuco. This hospital has high complexity because it cares multidisciplinary operational and consultation team. The AIDS antiretroviral drugs Program involves pharmacists and pharmacy technicians, physician, nurse practitioner, social worker, chaplain, outreach worker, psychiatrist, ethicist, and professionals responsible for the logistic coordination of the AIDS Program at the state level.

In this way, this text is justified since monitoring the processes through the SSM helps correct the errors and propose actions that lead to a more efficient operational management to increase the quality of life of the users living with HIV/AIDS.

An efficient supply chain for antiretroviral drugs in the context of the HIV / AIDS epidemic has been a regular part of the search for the realization of the right to health and quality of life (Nwobike, 2006; Silva, Jerônimo, & Aquino, 2018). For this, it is necessary to monitor the logistics chain related to the care of infected individuals to identify strategies that can expand the benefits offered today (Portela & Lotrowska, 2006; Guimarães Junior et al., 2020a). Researchers such as Lieb and Randall (1996) directed their research to explain the causes of existing failures concerning the supply chain. They suggest that the biggest problem is associated with the potential loss of control

over logistical management activities and uncertainties about the level of service offered.

With this in mind, it is essential to monitor all links in the antiretroviral drugs' distribution chain in the HIV/AIDS of the public university hospital programs, regarding the logistical processes between the hospital organization responsible for the flow of information, receipt, and dispensing of medicines, coordination state logistics of the HIV / AIDS program responsible for the evaluation, demand forecast and management of the information provided by the program professionals and the logistics operator responsible for the storage and distribution of medicines so that there are no shortages and / or interruptions in their distribution.

However, it is necessary to adopt strategies in the face of the challenge of improving services by assessing established goals and operational procedures (Guimarães Junior et al., 2020b). Tontini and Zanchet (2010) mention, in their study, that the absence of some attributes of satisfaction in logistical services, such as punctual delivery, delivery of the correct product, index, the flexibility of collection and delivery times, etc.; brings great dissatisfaction and ignore their existence can lead to wrong decisions about in what should service improving.

Therefore, the hospital organization needs to know if the objectives established regarding distribution logistics are being achieved so that it can di-

agnose the flaws in the adoption of solutions and corrective actions, given that the speed in decision making becomes an essential requirement, under penalty of exposing the organization to financial losses, and users, to risks of health problems (De Souza & Land, 2020).

This paper is structured in five sections: (i) In the current sections is the

Literature Review

This section describes the concepts of integrated logistics, the supply chain for antiretroviral drugs in hospital associations, the Soft Systems Methodology, the logistics chain for the distribution and / or provision of logistical services, the distribution of HIV / AIDS antiretroviral drugs used in this paper.

Integrated Logistic

Ballou (2006, p. 27) states that “integrated logistics is the process of planning, implementing and controlling the efficient and effective flow of products, services and information, from the point of origin to the point of consumption, according to the customer requirements”.

Integrated logistic seeks to synchronize and support the organization's processes linked to physical and information flows, throughout the supply chain, to obtain gains in terms of agility, flexibility, quality, and add value to customers / users (Souza et al., 2020). Hospital organizations looking for an

introduction that highlighting the problem’ contextualization, justification, and the purpose of this research; (ii) literature review shows the Soft Systems Methodology; (iii) describes the methodological procedures; (iv) describes the application of SSM in the logistic chain of antiretroviral drugs on the public hospital; (v) the last section are the conclusions of this study.

integrated logistic system, it is necessary to reach a desired level of service to their users at the lowest the operational cost, achieved by coordinating activities such as a network project, aligning its elements which are: information, transport, stock, storage, etc. For this, the value of logistics is manifested primarily in terms of time and place (Ballou, 2006; Santos et al., 2020).

Logistics has a vital role in seeking market differential, bringing good results to the organization through its activities (Martins, Simon & Campos, 2020). In this context, it can be observed that logistics must be viewed strategically, it is the link between the company and the customer (Santos et al., 2020). Thus, it is assumed that logistical activities corroborate a competitive position, which is essential to monitor their performance to align organizational strategies (Martins, Simon & Campos, 2020).

To be administered in an integrated manner, the logistics of antiretroviral drugs in the outpatient pharmacy of the public hospital must be analyzed as a complex system of interconnected components starting from

the registration of users diagnosed with AIDS. It is necessary to send the information to the coordination state logistics and the Ministry of Health and logistics operator.

It is essential to highlight the logistical activities to have a clear understanding of the means necessary to identify and understand the requirements of the professionals who use them (Almeida et al., 2020). For Ballou (2006 p. 31), the activities can be divided into: Key or main activities (User services, Transportation, Inventory management and Flow of information and order processing) and Support activities (Purchasing and storage, Material handling, Development and choice of protective packaging and Information maintenance).

The logistical activities are divided in this way; because the key activities contribute to a greater degree with the total cost, occurring in all logistics channels, while the support activities occur according to an organization's circumstances (Ballou, 2006).

These are essential activities for the functioning of the logistical objectives regarding the distribution of antiretroviral drugs, which, when well-managed, can create value for the patients on these drugs. On the other hand, secondary activities are related to the handling of medications and the flow of information from existing systems, which are responsible for supporting essential or primary activities. All these operations translate into harmonious processes that are interrelated

so that the products or services are delivered, with efficiency, quality and within the desired deadlines (Gomes, 2008).

In this process, the information received from the patients and about them flows the demand and order forecasts. This information is filtered into production orders that consequently generate the supply of products and materials, in which values are created, through their transformations in the production process, resulting in a service provided. The organization must identify the requirements and develop logistical solutions that bring operational improvements and the satisfaction of their employees and users. Strategies for logistical activities must be based on continuous performance assessment, directly reflecting on the level of service offered to the customer and on the quality of the product (Silva et al., 2020).

In the studied outpatient pharmacy, the main logistical activities are user registration, inventory, demand information flow, receipt, checking and storage of medicines and supplies, picking to the users and stock management. These are essential activities for the functioning of the logistical objectives regarding the distribution of antiretroviral drugs, which, when well-managed, can create value for users who depend on these drugs. On the other hand, secondary activities are related to the handling of medications and the flow of information from existing systems, which are responsible for

supporting essential or primary activities.

Management, through planning and coordination of all activities, to meet the desirable levels of services, is the link between the market and the organization's operational activity, thus fulfilling its main competence, which is to link or bring organizations together and its customers (Martins, Simon & Campos, 2020). Therefore, the quality of a service needs to be perceived by everyone involved based on their expectations (Oliveira et al., 2019).

Throughout the logistical process, there are many tasks to be accomplished, which would hardly be solved without effective logistical planning and inherent to all involved (Almeida et al., 2020). Thus, the quality perceived through the effectiveness of the logistics chain processes is essential to offer a higher level of service and achieve customer satisfaction (Silva et al., 2020).

Supply chain for antiretroviral drugs in hospital organizations

Accessing quality pharmaceutical care for AIDS patients represents one of the most significant challenges for the public health system. The growing expansion of AIDS in not developed countries has led to an increase in the demand for medical care, including the use of ARV drugs (Oliveira et al., 2002; Silva, Jerônimo & Aquino, 2018; Ribeiro et al., 2020).

In Brazil, the Ministry of Health implemented, in 1991, the policy of distributing ARV drugs, representing savings of approximately 190 million dollars. However, until 1996, there were still irregularities in its supply, through pharmaceutical assistance devoid of efficient logistics (Ministério da Saúde, 1999).

To meet the logistics of ARV drugs, the Ministry of Health has implemented, since 1997, SICLOM, allowing the control of data flow and stock, in relation to the supply of drugs to patients undergoing treatment in the various regions of the country, also supplying, a series of administrative information related to the clinical and demographic profile of the clientele served (Ministério da Saúde, 2007; Ribeiro et al., 2020). The main objectives of SICLOM are:

- (I) Expand the capacity for planning the acquisition of ARV drugs.
- (II) Improve the response capacity of the drug logistics area of the National STD and AIDS Program, of the Federated Units and of the Medicine Dispensing Units.
- (III) Improve the quality of the information generated in the logistical control of medicines.
- (IV) Improve the flow of activities in the logistical process.
- (V) Enable the expansion of actions to promote adherence to ARV therapy.

- (VI) Control the stock of each medication in the management to obtain an estimate of the stock available in the service network.
- (VII) Enable the expansion of local control of drugs used for AIDS.
- (VIII) Monitor AIDS treatments in different categories of patients.
- (IX) Allow assessment of the quality of care.

According to Oliveira et al. (2002), the establishment of a national treatment policy for people living with AIDS must contemplate all aspects of the concept of pharmaceutical assistance since the supply of medicines in all stages. The pharmaceutical supply chain extends from raw material suppliers (drugs) to the final consumer, passing through manufacturers (laboratories), who deliver medicines directly to the chains or, indirectly, through distributors or logistics operators.

The National STD / AIDS Coordination has invested in the management of basic information needed for this type of treatment, through the creation of an updated national registry of patients using antiretroviral drugs and an assessment of the adequacy of prescriptions and the programmed and well-dimensioned supply of medicines to rationalize costs and facilitate the logistical control of the planning processes for the acquisition, distribution, and dispensing of the various antiretroviral drugs used in the treatment of people living with AIDS in Brazil, through SICLOM.

In the early 1990s networks were established for the diagnosis, counseling, treatment of AIDS on the SUS – Brazilian public health system (Hallal, Ravasi & Kuchenbecker, 2010). Since then, different assistance modalities have been structured in the country, such as the Specialized Outpatient Services in HIV and AIDS.

As a result of implementing the New Clinical Protocol for the Treatment of Adults with HIV and AIDS, launched by the Ministry of Health in December 2013, through advertising pieces for radio, television, magazine advertisements, etc., and by encouraging the diagnosis combating late treatment. In one year, there was a 30% increase in people who started treatment with antiretrovirals in Brazil. The number of new patients with access to ARVs increased from 57 to 74 thousand. Currently, approximately 404 thousand people are using these drugs offered by SUS (Ministério da Saúde, 2015).

There are, in the country, hundreds of units dispensing ARV drugs providing guidance on their use, their adverse effects and pharmacological interactions. The new clinical protocols proposed through the SAE (Specialized Assistance Services) have brought about profound changes involving the logistical services for distributing these drugs. In the case of SAE, in the state of Pernambuco, the management, under storage, movements of entrances and exits, stock control, and monthly provision, should be under the responsibility of the pharmaceutical professional.

Thus, according to the proposed model, SAE could manage their logistical activities more efficiently focused on the care of users who live with HIV / AIDS.

A receipt is the first stage of the product's trajectory, followed by internal movement temporary custody for later dispensing. The separation and subsequent dispensing of ARV drugs takes place through pharmacists and pharmacy technicians and is responsible for the distribution of ARVs and logistical control through SICLOM. Consequently, information on consumption and stocks and logistical control are essential for ARV logistics to be effective, avoiding shortages of stocks, users' dissatisfaction, and loss of continuity of treatment.

Soft Systems Methodology – SSM

The SSM was developed by Peter Checkland in the late 1960s at the University of Lancaster in the United Kingdom to address real organizational problems to solve a problem and obtain a desirable system by applying ideas and using the employee's experience daily routine (Checkland & Scholes 1990; Checkland & Poulter, 2010; Armstrong, 2018).

It is a problem-structuring management methodology, the result of which would be a set of "research questions" to be answered by other means, based on interpretive and participatory activities (Rose, 1997; Augustsson, Churruca & Braithwaite, 2020; Asadi,

2020; Checkland & Poulter, 2010) and designed to help formulate and solve situations called "soft", that is, complex problems, poorly defined and usually with several human components (Liu et al., 2012; Cezarino et al., 2016; Stamoulis, 2020). The methodology is presented in Figure 1, focusing on the following attributes: examining real world perceptions; definition of actions to act in the real-world; reflections on the effects resulting from the actions taken.

It discovers the critical aspects of a problem situation, causing people to reflect on how this problem arose and what are their motivating processes (Cezarino, Liboni & Silva, 2008). Checkland (2000) complements by stating that the SSM is based on four principles: people have different views of the world and act according to their understanding of the world; many interpretations are possible for any goal; a change in the idea of a problem may occur. SSM is appropriate for the diagnosis of problematic situations and for managing many variables that are difficult to identify and control (Thomaz, 2003) and is subject to seven steps that encompass the analysis of the problem. It involves the participants in elaborating conceptual models (Ferreira et al., 2009; Checkland & Poulter, 2010).

Stages 1 and 2: Problem situation unstructured and expressed

Stage 1 refers to the investigation of the problem situation, it is made from in loco observations, interviews and information gathering. Therefore,

it is possible to verify each stakeholder's different perceptions in the same situation. Stage 2 deals with defining and structuring the problem situation, relating structure and process, and identifying the most significant number of existing relationships (Ferrari, Fare & Martinelli, 2002).

However, Checkland (1981) suggests that "rich picture representations" be developed to show individual understandings about problems. For Patching (1992), the use of graphics en-

courages the ideas' formation and facilitates the observation of relationships and conflicts. Checkland (1981) draws attention to the main characteristics to be considered in the construction of these graphs: the structure of the situation, static items (such as physical layout), formal and informal hierarchies and communication systems; process of the situation: understandings of how things work and who does what; and the relationship between structure and process (the "climate" of the situation); organizational culture.

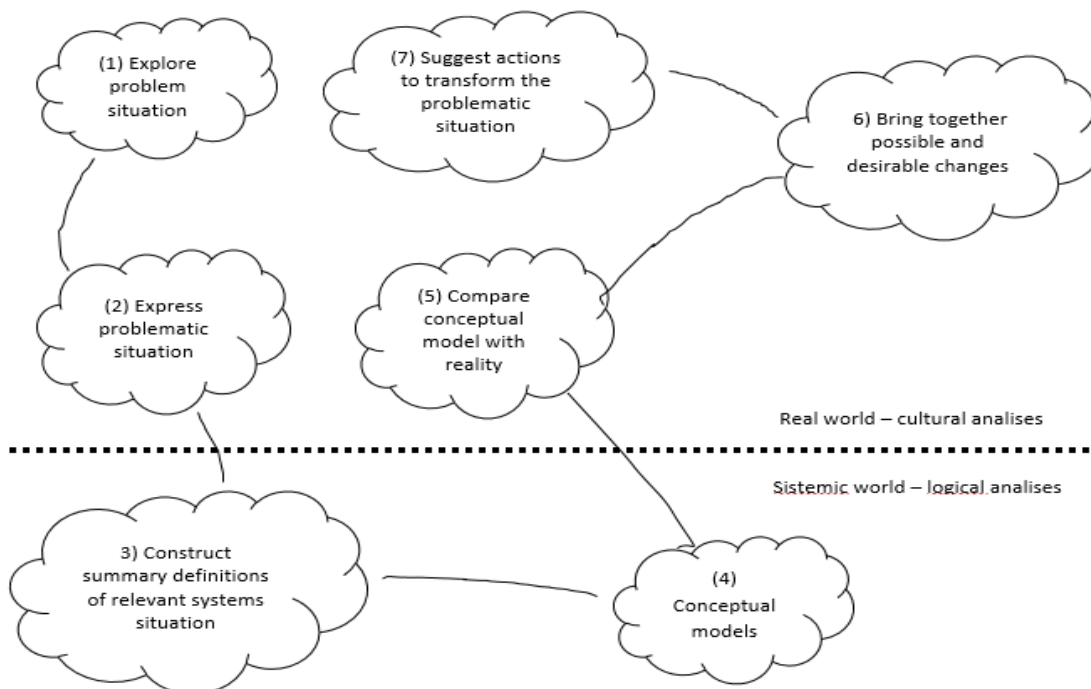


Figure 1. Stages of the systemic SSM analysis
Source: The Authors (2021).

Stage 3: Concise definitions of relevant systems

It refers to the formulation of the essential definitions existing in the system, to better understand it, through an

illustrative representation of the problematic situation to be structured, in which all elements of the system and their relationships will be identified, such as: Which are the key actors? What organizational structure is involved: departments, sectors? At this stage, the primary relevant systems are identified. The most important thing is chosen according to criteria pre-established by the people involved in the study (Bellini, Rech & Borenstein, 2004).

Checkland (1981) proposes the use of the essential elements for analysis and discussion of the graphs, this analysis is known by his mnemonic "CATWOE", they are:

- (I) Clients - beneficiary or object of the proposed action.
- (II) Actors - who perform or conducts the main activities of the system.
- (III) Transformation – the transformation of inputs and output of the system.
- (IV) Weltanschauung - how the actors perceive the system.
- (V) Owner - who has the power to decide on the system's future.
- (VI) Environmental Constraints - limitations and factors that affect the environment.

CATWOE is elaborated under the exploration and incorporation of the various points of view and with several individuals who will decide on the research problem (Ministry of Health, 2007). At this stage, an analysis of the situation must be carried out in depth, to identify, in the perception of the actors involved, the means and ends of

the specific problem (Trindade et al., 2007).

Stage 4: Conceptual models

Conceptual models should incorporate a brief definition of the real-world complexity. According to Checkland (1981), the models serve as the basis for the analysis that will result in action, which could be taken to improve the initial problematic situation. It seeks to show a sequence of activities in the system and their relationships through verbal diagrams of the interconnection of activities (Asadi, 2020; Anisarida, Janizar & Prima, 2020). At this stage, monitoring and control processes should be considered. The debate on the current problematic situation expressed should be stimulated in the search for desirable and viable changes (Checkland & Scholes, 1990).

Stages 5 and 6: Comparison of the conceptual model with the real world and possible changes

A debate is started considering desirable or feasible changes. Stage 5 involves comparing reality and the ideal conceptual model elaborated in stage 4. The actions and changes needed to transform the situation involved in the problem are compared. The constructed model serves as a basis for comparison with reality and that, from the perceived differences. The conceptual models are compared from four

forms, for Checkland (1981) are: (i) using the conceptual model to support the required research - the conceptual model is not shown to the people involved in the situation being modeled; (ii) traversing the conceptual model, with sequences of past events - investigations of how events would have occurred and comparison with practice; (iii) discussing the conceptual model with the main actors of the situation (the analyst needs time to explain the characteristics of the conceptual model to those involved); (iv) overlapping models - comparison of the conceptual model with reality, when one identifies the presence or not of the activities of the conceptual model in the real world. Stage 6 evaluates the possible changes found in the analysis phases to determine which are the most feasible and desirable proposal changes (Checkland, 1981).

Stage 7: Actions to be implemented for transformation

This stage allows the proposition of actions to solve the problem and its respective implementations (Checkland, 2000; Asadi, 2020; Anisarida, Janizar & Prima, 2020; Tabone, Mortara & Zanfrillo, 2021). Checkland (1981) emphasizes that the application of the methodology allows changes in three categories: organizational structures; activities / procedures; and attitudes. Patching (1992) and Ebrahimi (2020) complements that the benefits of its application are: encouraging the analyst

to consider issues and problematic issues, rather than specific problems; promotion for better understanding, about organizational weaknesses, being able to reveal the reason for the problems; does not impose technological solutions or idioms; and requires the participation of those involved in the problematic situation, avoiding the formulation of policies unrelated to the organizational reality.

Logistic chain of distribution and / or provision of logistic services

According to Ballou and Srivastava (2007), logistics must be viewed strategically, as the link between the company and the customer, they are divided into key or critical activities (management of user service, inventory, transportation, information flow, among others) (material handling, packaging, supplier selection, layout study, among others),

To achieve perceived quality in the distribution chain is essential to offer a high level of service. In the case of hospital organizations, the measurement of the quality of health services is linked to the perception of society's performance (Mohebifar et al., 2016).

Distribution of antiretroviral drugs from the AIDS program

In Brazil, the Ministry of Health (MS) implemented the policy of distributing ARV drugs in 1991, representing

an economy of approximately 190 million dollars. However, until 1996, there were still irregularities in its supply. To improve the distribution of these medicines, the MS in 1997, implemented the SICLOM (Medicinal Logistics Control System), allowing the control of the data and inventory flow in the various regions of the country, also providing a series of related administrative information to the clinical and demographic

profile of patients (Ministry of Health, 2007).

Improvements in the distribution of ARVs occurs each year, but very slowly and unable to cope with the increase in the number of patients. Currently, approximately 404 thousand people use these drugs offered by the SUS of Ministry of Health (2007). The distribution of these drugs is carried out through of the process drawn in Figure 2.

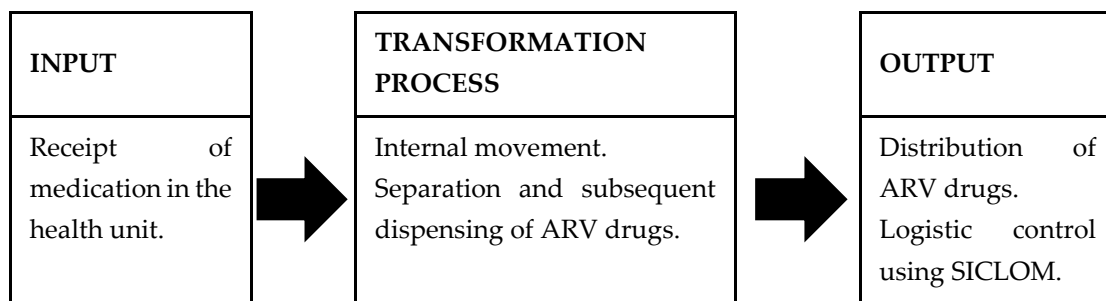


Figure 2. Process of distribution of ARVs
Source: The Authors (2021).

By dispensing is the act of providing one or more drugs to the patient, by presenting a medical prescription, the pharmacist being responsible for the guidelines, contributing to adherence to the treatment, safeguarding the confidentiality and confidentiality of the patient.

Methodology

The method used in this research is qualitative and the case of study. It relates the problem to the supply chain of antiretroviral drugs of the AIDS program of a public hospital located in Re-

cife/Pernambuco. The main logistic activities are registration; information flow of demand; picking; conference and storage of medicines and supplies; dispensing to users; attendance on the individual needs of users and family and stock management. These are essential activities for the operation of logistic objectives regarding the distribution of antiretroviral drugs that, when well-managed, can create value for users who depend on these drugs.

The method used is justified because it is a way of understanding the social nature of the phenomenon, it is

involved in the real experiences of the participants (Bayley, 1982).

The company case study is a university public hospital organization of reference in high complexity, constituted as: (i) scientific research center for all areas of health; (ii) provider of medical and hospital services, which has outpatient and inpatient care, and with resolution capacity in overly complex pathologies.

The research subjects are: (i) four professionals from the AIDS Program of the hospital case of study; (ii) three professionals in the coordination of the Planning of the Acquisition of Medicines and Inputs of the AIDS Program of the State Secretariat of Health of Pernambuco. The methods of data collection were documental and semi-structured interviews. The use of semi-structured interviews allowed for greater flexibility in ordering and formulating the questions, according to a previously established form.

The aspects related to the understanding of the distribution chain of the ARV medicines through the evaluation of the perception of how much its chain of distribution was realized in four steps are (i) bibliographic survey in books and publications; (ii) use of SSM with the objective of assisting in the formulation and resolution of complex problems and generally with several human components; (iii) preparation of the script of the semi-structured interview, it is worth noting that the recording of the interviews was through re-

cording the interview, previously authorized by the interviewers (Bayley, 1982); (iv) transcription of the interviews and evaluation of the data by content analysis (Bardin, 1977) since the reflection and interpretation of the interviews were elaborated.

The present study used semi-structured interviews and forms for the interviewees to evaluate the logistical performance of the distribution chain for antiretroviral drugs in the AIDS program at the university public hospital.

Martins (2008) suggests the researcher's attention when planning the interview, obtaining some prior knowledge about the interviewee, listening more than speaking and recording data and information during the interview. In this sense, the registration of the interviews form was carried out employing direct recording and or notes taken during the process.

Initially, all clarifications were made regarding the research objectives, so that the participants were comfortable and could agree with the study.

As instruments of data collection, the interview was used, with different applications according to the actors' perception, allowing greater detail and deepening of the points of interest. In this way, it allowed the interviewer to obtain more information in the interviewees' speech to understand better the research problems related to the quality of logistical services. Initially, all clarifications were made regarding

the research objectives, so that the participants were comfortable and could agree with the study.

The analysis of the research data, resulting from the respondents' speech transcripts, was guided by the content analysis technique. For Bardin (2009), this type of analysis guarantees the possibility of making inference, as it is:

[...] a set of communication analysis techniques, aiming to obtain, by systematic and objective procedures, the description of the message content, indicators (quantitative or not) that allow the inference of knowledge related to the production / reception conditions (inferred variables) of these messages (Bardin, 1977, p. 42).

The stage of data analysis was given from the interview using the SSM structure, which provided a view of the whole, the ability to analyze conflicts and abstraction in the search for the most relevant aspects, especially in a problem situation - such as the distribution of antiretroviral drugs in the AIDS program.

Results

This section presents the SSM application in the logistics chain of antiretroviral drugs of the case of study

Stages 1 and 2: Survey of the unstructured problem situation

Initially, the most relevant problems in the supply chain of antiretroviral drugs were collected in the different

hospital organizational units: outpatient pharmacy of the Hospital of Clinics, Infectious and Parasitic Diseases Outpatient Clinic (DIP), and Coordination Logistics of the municipal council of AIDS Program). This stage has an objective to understand the operation dynamics of the AIDS program at the university public hospital – case of study.

The observations on the routine, some complaints about employees and patients are used to identify the unstructured problem situation. Because of these views, some questions can arise spontaneously, like: What are the main limitations in the logistics of ARV distribution? How does the flow work of picking, ordering, and delivering? Who are the actors who influence and who are most affected by the failures that happen?

From the observations and collaboration of the different employees' perceptions and patients, unstructured problems were identified and expressed as described below:

(I) Precarious physical space (outpatient pharmacy) hinders users' care and their families.

(II) The high temperature in the supply environment and in the stock process at the hospital case of study. These factors can damage the quality of the service offered and the properties' stability of the ARV drugs.

(III) Superficial assessment, along with the patients. Their satisfaction survey is only related to the logistics chain of antiretroviral drugs of the AIDS program.

(IV) Inadequate and inaccurate information flow between Infectious and Parasitic Diseases, clinic staff and outpatient patient. The staff regarding the lack of medications and the AIDS program routines.

(V) Failure to communicate between the logistics operator, the municipal council coordination, and other organizational units.

(VI) Wrong inventory analysis in terms of quantity and diversity of ARV drugs demand for municipal council logistic coordination.

(VII) The patients do not receive, all ARV drugs that are needed every month.

(VIII) Expired drugs do not have reverse logistic in their supply chain.

(IX) Delay in the scheduling and collection of patients' emergency requests.

(X) Failure to supply antiretroviral drugs by the National AIDS Coordination in Brazil.

The answers obtained from the questions related to the problematic situation under study are showed in the Figure 3. Which presents the problematic situation, the actors involved, their relationships and the problems identified. We can call the Figure 3, rich figure because it formally illustrates the ARV logistics flow and their organizational connections.

Stage 3: Identification of research and research systems

The primary relevant systems were identified and chosen to search for

viable changes to an express a problem situation. From a total of six relevant systems, the fourth was understood by the interviewees, due to the complexity of ARV logistic chain: Health Department logistics coordination, logistics operator and other units' dispensers, the AIDS program of the Hospital, and a failure in its inventory management prevent proper planning of the entire distribution chain; moreover, the quality of the service provided is strongly related to how available the items in stock are. The following are the six systems initially developed:

(I) Develop a continuing education program for all AIDS hospital employees, including the Infectious and Parasitic Diseases clinic, regarding the norms and routines of the AIDS program, difficulties, and needs.

(II) Expand the outpatient pharmacy, promoting humanization in the care of family.

(III) Encourage meetings with state logistics coordination and other program managers, highlighting the needs and specific characteristics of the logistics chain, to identify potential conflicts.

(IV) Manage the distribution logistics of antiretroviral drugs efficiently in partnership with Health Department's logistics coordination, logistics operator, and the other dispensing units, avoiding the shortage, out of stock, disbelief in management, the expired products, the lack of credibility of the ARV logistic service.

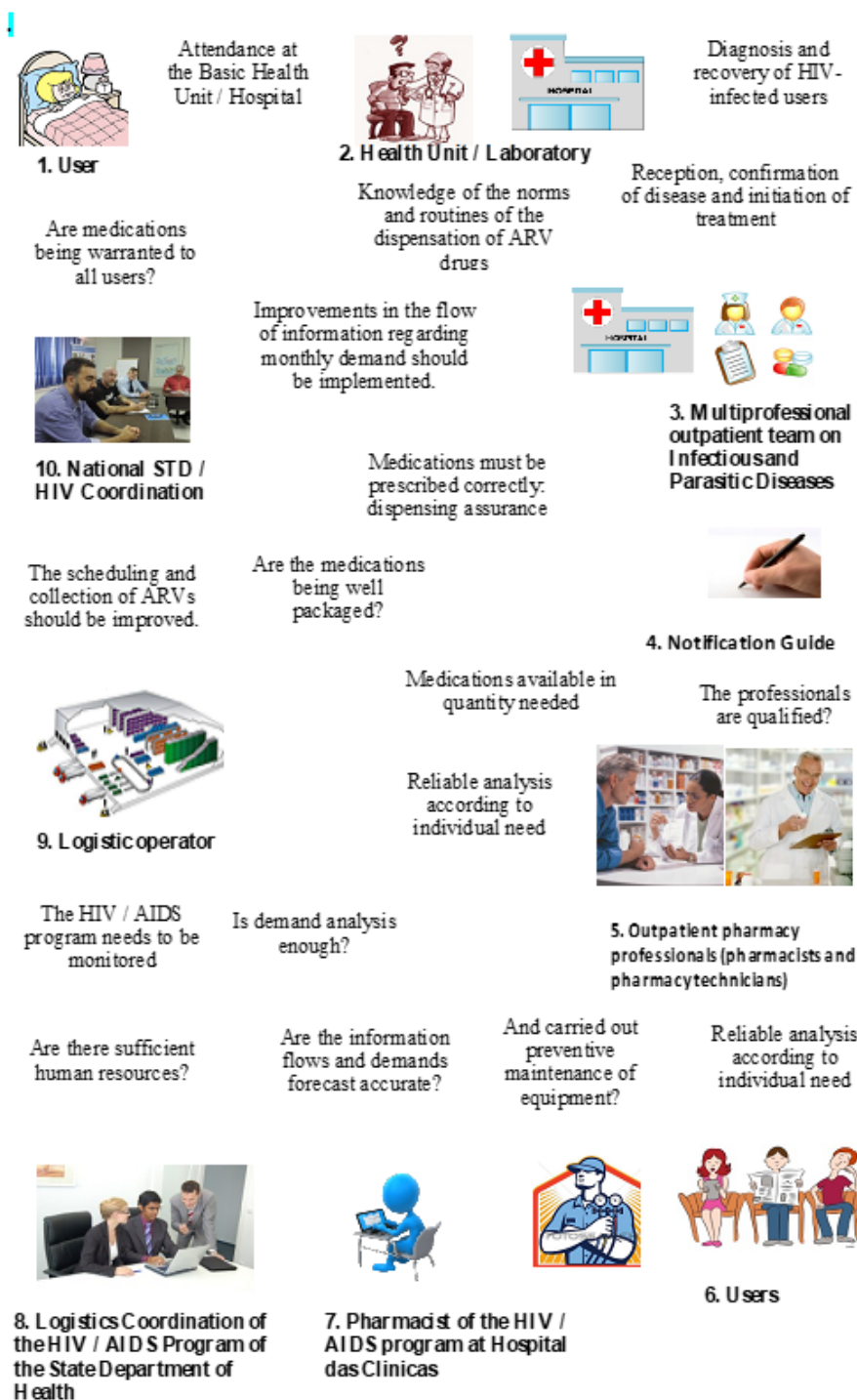


Figure 3. The Problematic situation illustrated
Source: The Authors (2021).

(V) Develop, in partnership with the municipal and state council logistics coordination and contract manager, incremental and / or modifications in the contractual clauses between the logistics operator and the State Manager, according to the need and uniqueness of the AIDS program, based on the different perceptions of the actors (technicians in pharmacy, pharmacists of the dispensing units of the ARV medicines and the professionals of the State Logistic Coordination).

(IV) Develop a program of equipment's preventive maintenance in the outpatient pharmacy, repressing the users' dissatisfaction and professionals and guaranteeing the quality of the products due to their peculiarity

Of the six systems, the fourth became subject to adjustments, expressed in the construction of CATWOE, according to Checkland (1981): Customers: Professionals of outpatient pharmacy, professionals in the state logistics coordination, users of the AIDS program and logistic operator; Actors: Users, Doctors, pharmacists and technicians in pharmacy of the AIDS program, Municipal council and State council Logistics Coordination and National Coordination of the AIDS Program, Logistic Operator and Contractual Manager; Transformation: Effective functioning of the logistics chain of distribution of antiretroviral drugs, from the point of origin (purchase) to the point of consumption, based on the perception and interaction of the differ-

ent actors involved; World Vision: Effective functioning of the logistics chain of ARV drugs, from the point of origin (purchase) to the point of consumption, satisfying the needs of professionals and users with the availability of medicines, at the moment the user needs; Owners: Brazilian AIDS Coordination, State Pharmaceutical Coordinator and logistic operator; Environment: Image of the AIDS program, with users, credibility, interpersonal relationship between the actors (state logistics coordination and logistics operator), availability of medicines, lack of culture to forecast demand.

Stage 4: Conceptual model

This stage comprises the conceptual model's creation, based on the observations and interviews, referring to the problem situation represented by Figure 4. The first transformation process is the diagnosis and prioritization of the employees' and patients' needs, to reduce and eliminate the failures in ARV logistic. In the sequence, training is done using the methodology to identify conflicts of prioritized needs. Finally, there is general monitoring and evaluation of transformation processes.

In this stage, the focus is the commitment of all actors of ARV logistic chain. Because the hospital already knew what their difficulties and obstacles are and can easily create or seek solutions to overcome them

Stage 5 and 6: Comparison of the conceptual model with the real world and possible changes

The construction obtained by the earlier stages can compare what real happens in the organizational infrastructure and management view. In this stage was conducted the comparison between the conceptual model of the ARV logistic chain of the case of study and the possible modifications desired described by employees and patients.

In Table 1 (see below), the Changes in structure, whatever organizational or functional, usually happen in the long run. Procedural changes,

since they involve naturally dynamic elements, can be implemented more quickly and efficiently. Changes in attitudes, in turn, are the most unpredictable results, since they are linked to the so-called appreciative model of individuals (Ferrari, Fares & Martinelli, 2002).

The comments portray the need to identify and monitor the logistics chain of distribution of HIV/AIDS drugs to respond to the challenges, which is the effective functioning of the distribution chain under study. From the discussion of the table below, suggestions will be made for the problems identified in the initial stage.

Conceptual Model	Real World	Comments
List the needs of the AIDS program and publicize the functioning of the logistics chain.	No	There is no employee to do this activity, and any protocol is described. It turns dissatisfaction of professionals and users.
Prioritize, gather, and communicate the needs.	No	There is not a prioritization activity.
Train multi-professional team.	Yes	There is not a defined training schedule.
Sort and implement the best alternatives.	No	There is no planning for meeting needs; lack of financial resources; processes and professionals involved.
Monitor the functioning of the logistics chain.	Yes	An evaluation exists, but it has been done superficially and is limited to one hospital organizational unit.
Manage inputs through effective planning of demand consumption.	Yes	Despite the existence of professionals and a computerized system, the multiplicity of unlicensed professionals has taken to a constant shortage, ruptures of stock and discontinuity of processes.
Evaluate the result.	No	Individualism among the actors, hind the evaluation of the ARV logistic chain. The contractual clauses are not well defined, complicating and interfering in its operation.

Table 1. Conceptual model versus real world and the problematic situation expressed
Source: The Authors (2021).

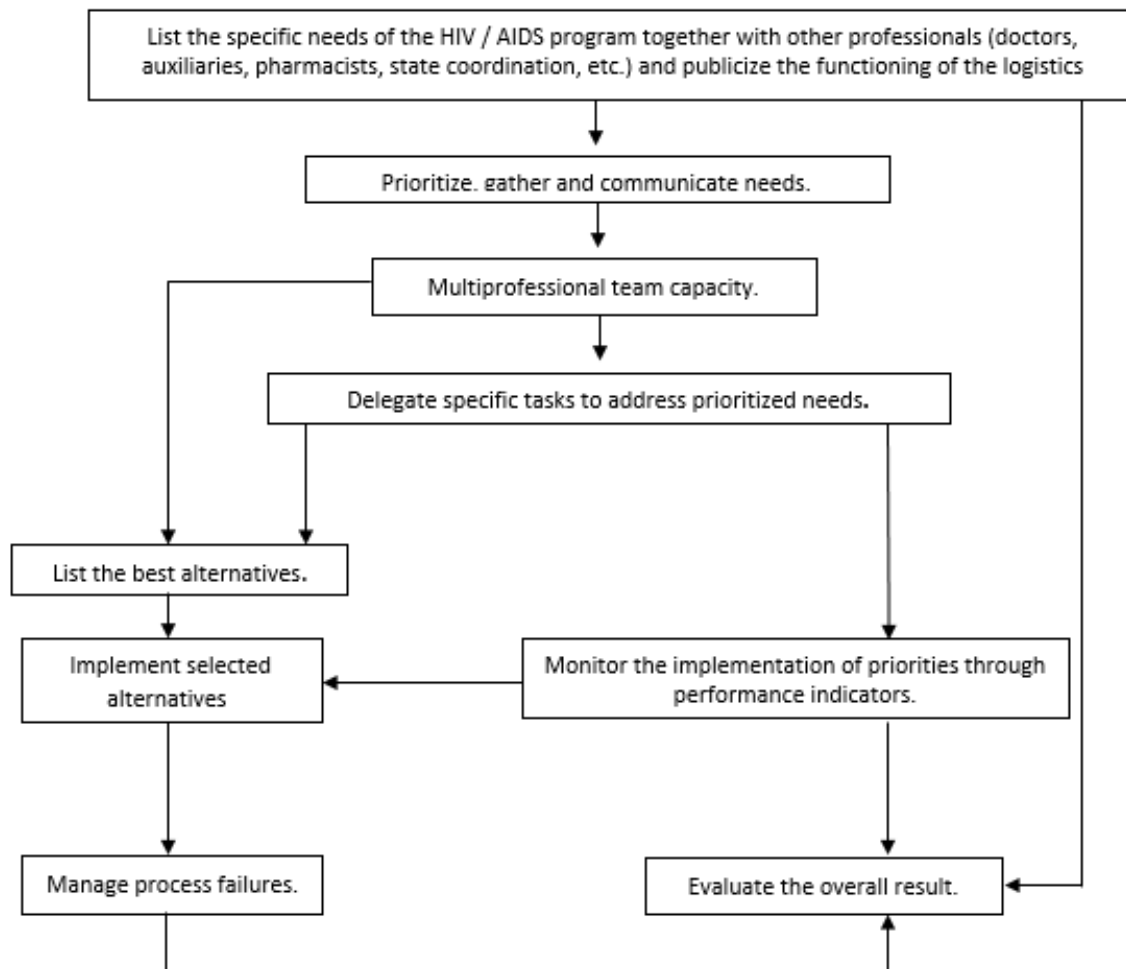


Figure 4. Systemic model of the logistics of antiretroviral drugs
Source: The Authors (2021).

Unstructured problem situations	Suggestions
Precarious physical infrastructure (outpatient pharmacy)	Change of physical infrastructure
The high temperature in the environment, impairing quality of service and stability of AVR drugs	Installation of an air conditioner, avoiding the dissatisfaction of professionals and loss of stability of the products
Superficial evaluation of the program using means of satisfaction research related to the logistics chain of the program.	Building and exploring potential improvement factors utilizing logistic performance indicators.
Inadequate and inaccurate information flows among employees regarding STD / AIDS program routines.	Implement protocols of work processes and internal work communication (training) among employees.
Communication fails with the logistics operator and the state coordination.	Accomplish training so that the actors share experiences, peculiarities, and difficulties.

Table 2. Process of distribution of ARVs
Source: The Authors (2021).

Unstructured problem situations	Suggestions
Analysis of insufficient monthly demand for state logistics coordination.	Develop planning strategies in inventory management, according to demand forecast.
Medications expired due to the impossibility of returning the products to the logistics operator.	Study of bidding documents to increase benefits to existing contractual clauses.

Table 2. Process of distribution of ARVs (cont.)
Source: The Authors (2021).

Stage 7: Actions to be implemented to improve the problematic situation

After Stage 6, we get many possible suggestions to solve or overcome the initial situation. The employee's commitment is necessary to reduce and eliminate operational barriers and increase service quality and processes workflow (see Table 2).

Conclusions

This paper evaluated the application of SSM by mapping and identifying the problematic situation and the operation of the distribution chain of antiretroviral drugs. For Checkland and Scholes (1990), identifying the problematic situation and the decision process are motivated by different perceptions, whether individual or collective. In the investigation of operational problems, the application of the SSM regarding the functioning of the distribution chain of antiretroviral drugs made it possible to identify and propose viable suggestions for the problematic situations presented, based on the experiences and different views of the professionals who make up the program. It also enabled the construction of a rich

figure for a better understanding of these interactions, and, from the expressed of Figure 3, a comparison was made between the conceptual model that comprises the distribution chain, with the real world, in the to elaborate proposals that overcome or eliminate the flaws exposed in the initial figurative situation.

In this study of the AIDS program, it was found that some changes (structural, operational, human resources and stock management) need to be carried out concerning the situation of interest. Several contributions could be drawn up with the results of the research: exposure of the need for structural changes in the dispensing environment, in order to ensure the individual treatment of the patients; qualification of AIDS professionals concerning humanization; training of professionals in regard to permanent inventory control and real demand analysis as needed; revision of contractual clauses regarding failure to comply with the standards that guide logistics contracts (delays in scheduling, overdue drugs and inadequate and inaccurate flow of information).

From the survey's results, several contributions could be raised: they

enabled a detailed evaluation of the logistics chain's functioning of ARV drugs, also allowing to identify the interviewees' percentage of satisfaction, for the logistic indicators selected in the survey; showed the need to manage and monitor the operation of the entire logistics chain because the professionals working in the program are not technically qualified for the role. Furthermore, strong evidence was identified that there is an immediate need efficiently to manage the stock management of ARV dispensing units. The lack of evaluation of efficient logistics in the health unit, whether at the hospital or outpatient level, prevents adequate planning of the entire chain.

We consider that dispensing of medicines to treat patients living with HIV/AIDS requires some structural changes in the dispensing environment to ensure individual treatment for users and family members the right to dignity and confidentiality. We recommend the relocation of the HIV/AIDS Program to another physical space, necessary to build a therapeutic relationship of co-responsibility, aiming to guide all aspects related to the correct use of medicines, optimizing the success of the therapy and the effectiveness of the treatment. Bearing in mind there is no private space for this specific public that can guarantee a decent service as needed, therefore generating significant discomfort.

The complexity involved in functioning the entire distribution chain of antiretroviral drugs became

evident. Therefore, there is a need to articulate pharmaceutical professionals to reduce existing logistical misalignment factors. It is also recommended:

- (I) Contract review study of the entire logistics chain to identify failures;
- (II) Scheduled maintenance routine;
- (III) Employee training;
- (IV) Implementation of a protocol of rules and routines for dispensing antiretroviral drugs and flow of information between professionals;
- (V) Measure logistics performance;
- (VI) Reapply the SSM in the researched organization, seeking the resolution of operational problems instead of a specific analysis of the parts.

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