

Health surveillance at the SUS: development, effects and perspectives

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Abstract *This article analyses the process of construction of Health Surveillance in Brazil concerning the political, historical and organizational context of this component of the Unified Health System (UHS), by means of its historical view and presentation of the advances, limits, setbacks and perspectives. Throughout trajectory of Health Surveillance, its objects of study and intervention have been expanded, strengthening the integration among the different areas of surveillance, increasing its capacity for prediction and intervention. It evolved from surveillance of people, to surveillance of diseases and now to surveillance of health risks, promoting greater articulation of HS professionals with agents of endemics and Family Health Teams. The first National Health Surveillance Conference, in February 2018, provided opportunities for discussion and formulation of proposals aimed at strengthening HS, expanding its scope of actions with a view to achieving a comprehensive care model. Adequate and audacious alternatives are necessary so that there are no setbacks in the financing modalities in order to maintain and expand the advances achieved in the field of Health Surveillance in Brazil.*

Key words *Health surveillance, Public health surveillance, Unified Health System, Brazil*

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Introduction

Under current Brazilian legislation, health surveillance (HS) is defined as a continuous and systematic process of collecting, consolidating, analyzing and disseminating data regarding health-related events; its goal is the planning and implementation of public policy measures for the protection of the health of the population, the prevention and control of health risks and diseases, as well as the promotion of health¹. This concept reflects the proposals of the Brazilian Health Reform (RSB) movement. The latter was intended to transform the health care model in the 1970s and 1980s, when principles and guidelines were developed to influence changes in the field of HS, incorporating many different qualifications (medical, sanitary, epidemiological, environmental, public health, etc.) that have been re-signified in a rich and often heated debate, which has not always been consensual.

Alongside the struggle to create a quality health care system which was intended to be public and universal², it was also proposed to establish a decentralized model with an emphasis on the important role to be played at the local level, especially with regard to health surveillance and the control of diseases and epidemiological risks. This article analyzes the process of the development of HS in Brazil, addressing the political and organizational context of this component of the SUS through an historical overview and a discussion of the relevant progress, limitations, setbacks and perspectives.

Historical evolution of health surveillance

Diseases and epidemics have shaped society ever since humans started to domesticate plants and animals; this accumulated energy and created conditions suitable for the formation of cities. For centuries, communicable diseases and malnutrition maintained an average human life expectancy of thirty years³. From the fourteenth century to the mid-nineteenth century, due to the destabilization and impact of plague and other epidemic diseases, as well as limitations regarding technology and knowledge, isolation and quarantine were the main measures adopted in relation to public health. These measures were originally introduced at the ports in Venice and played an important role in the commercial expansion and flow of people, goods and merchandise. Between the nineteenth and twentieth centuries, one became to understand the etiology of diseases through scientific and technological develop-

ment, especially in relation to agent detection, epidemiological cycles and the prevention and control of diseases through vaccines and vector-based measures³. These technologies directly influenced public health actions and practices, which expanded and began to be organized through health campaigns. This model was modified, particularly through the definitions of surveillance proposed in the 1960s by Alexander Langmuir⁴ and Karel Raska⁵, which influenced and shaped the organizational principles of the Epidemiological Surveillance Unit (ESU). The latter was created in 1968 at the 21st World Health Conference, which was convened by the World Health Organization (WHO). Guided by the ESU/WHO, countries began to reorganize surveillance and the control activities of communicable diseases, taking into account proposals issued by the WHO.

Construction of Surveillance in Brazil

In Brazil, from the period of colonization to the 1930s, the Surveillance did not have significant institutional organization and was centralized in large urban centers, despite the efforts of professionals such as Oswaldo Cruz, Carlos Chagas, Vital Brazil, Emilio Ribas, among others. The National Health Conference (CNS) was instituted in 1937 within the scope of the Brazilian Ministry of Health as part of health reorganization. However, it was only in 1941 that the first CNS took place, with the aim of improving health conditions in Brazil and re-organizing state health services⁶.

The National Epidemiological Surveillance System (SNVE) was created in Brazil in 1975 and was limited to a small list of mandatory notifiable diseases⁷. Until that moment, public health interventions to control communicable diseases were the responsibility of organizations under the umbrella of the Federal Government (National Department of Rural Endemic Diseases/DNERU, Campaign Against Smallpox, Campaign against Tuberculosis, Campaign against Leprosy, etc.), which developed activities in the form of health campaigns. With the implementation of the SNVE, part of the responsibilities for surveillance and the control of these diseases was passed on to the State Health Secretariats (SES), structured as special programs such as the National Immunization Program (PNI), which established a pyramidal model that kept the local level without resources and without a protagonism in the process of solving local health problems. However, so-called endemic diseases (schistosomiasis, Chagas disease, malaria, trachoma, etc.) came un-

der the responsibility of the Superintendence of Campaigns (SUCAM), an agency under the direct administration of the Ministry of Health. Thus, the formulation, coordination and performance of the prevention and control of communicable diseases were carried out according to the logic of vertical programs^{7,8}.

Prior to the creation of the SUS, the Integrated Health Actions (IHA) strategy was implemented, followed by the Unified and Decentralized Health System (SUDS)⁸, which made possible the development of experiences such as occurred in the Bahia State Health Secretariat⁸. The latter sought to begin to transform the vertical surveillance model to a decentralized model as was proposed in the RSB document, which had been partially inscribed in Chapter 200 of the Federal Constitution of 1988 and was incorporated in Law No. 8080 of 1990⁹.

Development of a new surveillance model for the SUS

After the promulgation of Law No. 8080, the National Health Foundation (Funasa) was created in 1991¹⁰. This organization had two unique organs in its structure, one of which was the National Epidemiology Center (CENEPI), which focused on a notion that arose in 1980s, i.e. that the health system should have an area of epidemiological intelligence, separated from the areas of disease control and prevention, with the competence to promote and circulate the use of epidemiology throughout all areas of the SUS in order to support the formulation and implementation of policies, as well as establishing guidelines to direct the organization of the SUS network. The Department of Operations (DEOPE) had the responsibility of the coordination of disease prevention and control in conjunction with the SES, SMS and Regional Directorates of Funasa^{11,12}.

However, from the beginning it was established that in order to reorganize the SNVE from the perspective of the SUS, i.e. a universal surveillance system based at the local level, the aforementioned dichotomy needed to be overcome from the central level to the local level. Consequently, throughout the 1990s strategies were adopted to enable links between different managers and actors, which were still strongly influenced by established practices that defended the continuation of the existing pyramidal model^{11,12}. Many initiatives were implemented, both within Funasa and also by states and municipalities; these were mainly instigated by managers and/or governors who supported the implementation of the

SUS. Of particular note was the encouragement to found the State Epidemiology Centers (with representations from the area of epidemiological surveillance of the SES, SMS and the Regional Directorates of Funasa). The latter continued to carry out the control of endemic diseases, which had previously been the responsibility of SUCAM. These centers were intended to establish agreements and develop directives and executive plans that favored the transfer of surveillance and disease control activities to municipalities; to approach the Brazilian scientific community in order to establish partnerships to train professionals in the health services network, especially in the use of epidemiological methodology; and to improve and develop epidemiological information systems, with the municipality of residence designated as the information unit¹³.

This initial movement, which was fundamental in establishing the basis for the current level of HS in the SUS, culminated in a large national meeting that involved leading experts in the field of epidemiology from the three spheres of government, professionals from the health services network with recognized knowledge in the area, epidemiologists from academic institutions, and others. Using the basic documents as a starting point, the final report of this seminar¹³ established the main guidelines for the construction of the National System of Epidemiological Surveillance in the SUS, which was intended to be decentralized and comprehensive, i.e. not limited to communicable diseases, whilst at the same time not devaluing this component of traditional public health. The suggested strategy was to establish links with the National Council of State Secretaries of Health (Conass) and the National Council of Municipal Health Secretaries (Conasems) to construct an intergovernmental strategy involving the three SUS management spheres in order to rapidly decentralize the prevention and control of diseases already existent in Brazil, ensuring that there was no interruption in actions or possible damage to the health of the population, as well as expanding the scope of HS activities. The idea was to reduce the fragmentation of surveillance activities, which were largely organized in the form of special programs in the SES and the regional directorates of Funasa, and to construct a new surveillance. It was also proposed to integrate the health care network, particularly primary health care, in order to provide greater connectivity and better quality for the system.

The aforementioned seminar also approved the re-definition of the attributes and structure of Cenepe, whose objective was to extend the scope

of action of the latter. To this end, three units were created (Epidemiological Surveillance; the Information and Health Situation Surveillance Unit; and the Support Unit for Epidemiological Development within the SUS). These were designed to contribute to the decentralization process and to expand beyond simply controlling communicable diseases, including the development of policies and action plans to reduce risks from other health problems such as chronic non-communicable diseases, violence, workers' health, etc.¹³. In 1994, the First Interagency Commission on Epidemiology was established¹⁴, which gave rise to the current Working Group on Health Surveillance (GTVS), which advises the Tripartite Interagency Committee (CIT).

Using computational tools, Cenepi constructed new epidemiological information systems that were based on municipalities. Thus, epidemiologically-based systems, such as the Live Birth Information System (SINASC) and the Notifiable Health Problems Information System (SINAN), were created and the Mortality Information System (SIM) was also improved. Through agreements with universities and other public institutions, training was provided for health professionals from all over the country. The content of the courses was related to the field of surveillance, such as epidemiology focused on health services; the use of software for epidemiological analysis; the implementation and management of new epidemiological information systems within the SES and SMS; epidemiological surveillance; and the analysis of health situations.

Many difficulties were faced during the 1990s, particularly due to the following issues: a) the modality of transfer of resources for epidemiological actions in the service network, which were financed through bureaucratic agreements between Funasa, the SES and the SMS; these had pre-established deadlines, which often resulted in interrupted actions and activities that should have been continuous; b) long delays in the transfer of Funasa's responsibilities and services to the SES and SMS^{11,12}, as established by legislation⁹ and the Brazilian Constitution. In spite of these obstacles, many improvements were made regarding the conformity and performance of the SNVE, in the dissemination of the use of epidemiology in health services, and, particularly, in improving some health indicators of the Brazilian population.

Thus, the surveillance component in the SUS gradually improved in terms of its performance and came to be recognized by international organizations as a successful example to be con-

sidered by other countries. This was possible because after the inception of Cenepi as the central coordinating body of the SNVE, a joint working culture was established that was intended to build a system network that was interconnected and transversal. An important feature in this regard was the participation of academic epidemiologists, in particular the Epidemiology Commission of the Brazilian Association of Public Health (Abrasco)¹⁵. The results of this can be seen in the construction, computerization and availability of large national epidemiological databases (SIM, SINASC, SINAN etc.), which stimulated the production of more disaggregated and close to reality epidemiological analyses of the health situation; the creation of the National Network of Health Information (RNIS) and the Inter-Agency Network of Health Information (RIPSA); the broad training of human resources in various modalities (updating, specialization and professional Master degree); and the support for research that was strategically useful for the SUS, the results of which were incorporated in some public policies and interventions¹⁵.

National Health Surveillance System

The roles played by Cenepi, Conass and Conasems were essential in the decentralization of epidemiological actions. This culminated in an exhaustive negotiation process in the Tripartite Interagency Committee (CIT), which led to the passing of Ordinance No. 1399/99 by the Ministry of Health. This ordinance established the following: the attributions of each sphere of government in the area of epidemiology and the definition of the system of funding for states and municipalities in accordance with the Financial Ceiling of Epidemiology and Disease Control (TFECD); and the minimum surveillance and disease control actions to be developed by these SUS management levels, which were to be articulated within the Integrated and Negotiated Programming of Epidemiology and Disease Control (PPI-ECD)¹⁶. This modality transferred the responsibilities and competencies related to the development of epidemiological actions to Brazilian states and municipalities, after the latter proved that they had the minimum requirements (technical and operational) to obtain certification for the management of epidemiological actions and disease control. Thus, the process of decentralization of this area of public health was consolidated, guaranteeing the continuity of the actions that had already been developed, although the amount of the resources designated to this component of the SUS were, and still are, in-

sufficient for the volume of demand on the three spheres of the SUS.

In 2003, the current Secretariat of Health Surveillance (SVS)¹⁷ was created within the direct administration in the Ministry of Health (MS), which incorporated activities that had been developed by Cenepi and Deope within the sectional organ of indirect administration (Funasa). This restructuring of the MS undoubtedly reflected the recognition of the importance of the area of surveillance and disease control, marking the beginning of a new period in this area of health. The SVS added to the achievements of Cenepi, continuing, consolidating and materializing several proposals that had not yet been implemented. Thus, greater administrative and financial autonomy was established at the federal level, which made it possible to improve mechanisms and criteria for the transfer of resources to the states and municipalities, as well as strengthening the integration of HS with educational and research institutions, among other achievements.

As a means of improving the detection of diseases, "Epidemiological Surveillance in Hospitals" was established in 2004 through the creation of the Hospital Epidemiology Centers. The objective of the latter is to detect, notify and investigate diseases in a timely manner, as well as adopting adequate preventive measures to control diseases that represent a risk to public health. The entry point of such diseases within the health system is often hospitals, even if they are not a reference in terms of infectious diseases¹⁸.

In the 2006 Pact for Health document, the SNVE was renamed as the National Health Surveillance System (SNVS). This was considered to be more appropriate because the scope of this system went beyond that of traditional epidemiological surveillance. Currently, the SNVS operates via the SES and SMS throughout the Brazilian territory in an articulated and hierarchical manner, and, when necessary, with the technical and operational support of the SVS.

From 2007-2010, the SVS, through the GTVS, developed a series of actions to strengthen the SUS by means of the "More Health Program", which was the name of government plan at that time. These actions included the following: (1) the creation of a national network of Strategic Information and Response in Health Surveillance Centers (CIEVS) in all Brazilian states and municipal capitals; (2) the publication, after bipartite and tripartite agreement, of the GM/MS Ordinance No. 3,252, of December 22, 2009, which established, for the first time in a ministerial norm, the concept of HS in Brazil. The latter replaced

the certification of states and municipalities by adherence to the Pact and replaced the TFECD by the Health Surveillance Financial Ceiling (TFVS), which only had two components: namely, health surveillance and the promotion of health; and sanitary surveillance. In addition, it replaced conventional logic by management contracts with the main public suppliers, which guaranteed regular stock levels and distribution of the immunobiological and other strategic inputs for the PNI, as well as including financial incentives for the agents of endemic diseases to work with the Family Health Teams in an attempt to strengthen integrated HS actions in the territories¹⁹, through integration with primary health care.

The basic list of programs, actions and goals is agreed with the CIT. Each program has standardized norms related to prevention, control and health care actions; pre-defined information flows, in agreement with the chain of transmission of the etiological agent; and objectives (control, elimination, eradication), indicators and targets, which gives a certain uniformity to the system. Evidently, each SUS management area has autonomy in its respective areas of coverage; to include other actions or diseases in its activities depending on the health needs of the population⁷.

Among the programs carried out by the SUS, the National Immunization Program (PNI), which was established in 1973²⁰, was intended to define the Brazilian vaccination policy, aiming to control, eliminate and/or eradicate diseases that are vulnerable to safe and effective immunogens for use in populations. Initially, the vaccination schedulecalendar only included vaccines for children. Currently, the schedule includes several products to protect against more than fifteen infectious agents. In addition to the routine vaccination rooms that serve the general population, in 2004 Reference Centers for Special Immunobiologicals (CRIES) were set up to address situations such as immunocompromized patients who are associated with risks that require special immunobiologicals²¹. This extensive program, coordinated by the Ministry of Health in a shared manner with the SES and SMS, administers approximately 60,000 routine vaccination rooms in the health services network: during vaccination campaigns more than 100,000 immunogen application points are available to the population, reaching all parts of the country, including remote areas. The PNI is internationally cited as one of the largest and most advanced systems worldwide; it has resulted in several important achievements such as the eradication of the circulation of wild poliovirus, and the endemic elimination of

measles, rubella and congenital rubella syndrome. The PNI is in the process of eliminating neonatal tetanus, in addition to keeping several other immunopreventable diseases under control, such as diphtheria and accidental tetanus; reducing meningitis due to *Haemophilus influenza* and Koch's bacillus; and infections caused by *Pneumococcus* and *Meningococcus C* in children, besides other successful results²²⁻²⁴.

Health Surveillance in relation to public health emergencies

In addition to programs that are related to routine activities, HS is triggered when unusual situations occur, especially during outbreaks and epidemics that constitute Public Health Emergencies (ESP). At these times, the service network is organized in a special way to provide quick and adequate responses, aiming to protect the population and reduce damage to health.

Public Health Emergencies of National Importance (ESPIN) are situations in which the urgent use of measures to prevent, control and contain risks and damages to public health is required due to the occurrence of certain epidemiological situations, disasters and/or the lack of assistance to the population. Epidemiological situations in this context include outbreaks or epidemics that generate risk of spreading nationally; that are produced by unexpected infectious agents; that represent the re-introduction of eliminated diseases; that present high levels of severity; or that extrapolate the responsiveness of SUS state management capacity²⁵.

Until the end of the 1990s the responses to these emergencies were conducted with the human resources that were involved with surveillance and disease control programs at each level of the system where the problem was occurring. Where necessary, support was sought from other management areas. For example, when a cholera epidemic emerged in 1991 in the municipality of Tabatinga on the upper reaches of the Solimões river at the borders with Peru and Colombia, the MS needed to mobilize epidemiological professionals from several states and municipalities in Brazil to respond to that ESPIN, spending precious time to form a task force. In other words, Brazil did not have the necessary structure or organization to quickly deal with more complex and risky situations, and/or those that dealt with greater territorial coverage. The latter require the availability of diversified human, physical, technical and technological resources, which are not always under the direct responsibility of a single

sector. Databases are often overwhelmed by spontaneous demands for health services, which does not allow adequate monitoring of special epidemiological situations.

It was only in 2000 that the Center for Rapid Response to Epidemiological Emergencies (NUREP) was set up, a unit linked to Funasa's Presidency. Together with the students of the Training Program in Epidemiology applied to SUS Services (EPISUS) and the Decision-Making Data Training Program (DDM), NUREP deals with ESPs, planning, and mobilizing the resources and coordination for necessary action^{26,27}.

After the new International Health Regulations (IHR) was approved in 2005²⁸, the Strategic Information and Response in Health Surveillance Center (CIEVS) was created within the SVS. This Center is responsible for the timely collection of reports of, and strategic information regarding to possible public health events, as well as the management and analysis of data relevant to the practice of HS in emergency situations²⁹. The intention is to improve this component of the SUS in order to prevent and to control these problems, to protect the health of the populations at risk, and to comply with the provisions of the aforementioned regulation²⁸. The SVS is the focal point of the IHR, in connection to the WHO, developing activities related to communication regarding potential public health emergencies and the relevant responses etc. In 2009 the national CIEVS network was established, which included centers in all the SES and SMS of the capitals, and in four other strategic municipalities²⁹. In addition, some SES have health professionals in their regional or other priority municipalities that operate as focal points to identify occurrences of interest to public health. A presidential decree was issued creating an Interministerial Executive Group (GEI), coordinated by the MS, which oversees the planning and performance of all government activities related to ESP.

In 2011²⁵ the criteria were established for Brazil to declare when an ESP constituted an ESPIN, similar to Public Health Emergencies of International Interest (ESP II)²⁸. The SUS National Force (FN-SUS) was also formed, establishing procedures regarding coordinated responses to ESPIN and ESP II in the three spheres of the SUS, as well as the federal structure, to support affected states. Furthermore, the circumstances in which Brazil should seek international assistance were also set out²⁵.

The structuring of the chain of response to public health emergencies and the use of the technical-scientific capacity of the SUS has made

it possible to identify critical points, to reflect on logistics and resources employed, to improve system performance, and to make opportune decisions and responses, as was observed in the H1N1 pandemic²⁹ and microcephaly/Zika congenital syndrome epidemics³⁰.

From 2007-2016 Brazil hosted several international mass events such as the Pan American Games, the Football World Cup, World Youth Journey, the Olympic and Paralympic Games, etc. The SVS/MS established strategies regarding preparation and responses together with the SES and SMS headquarters, in close communication with neighboring countries and the home countries of the participants together with the support of the Pan American Health Organization/WHO. These actions were decisive in relation to the HS of the native Brazilian population and the thousands of foreigners who visited Brazil. Based on this experience, specific regulations were established for the future management of mass events in Brazil³¹.

Conclusion

Many achievements and barriers have arisen in the course of implementing health surveillance within the SUS. Often, these barriers have hindered the changes implicit in the Brazilian Health Reform movement, i.e. the integral nature of health care, starting with the integration of health surveillance with primary health care in order to reduce the demands from medium and highly-complex services. The incorporation and the decentralization of different technologies (medicines, equipment, techniques and procedures) has been unequal between health care and health surveillance, generating a gap

in the expansion of SUS capabilities in the field of health promotion, surveillance, disease control and responses to public health emergencies. Even with the progress regarding funding transferring¹⁹, pressure from the media and the population to expand access to medium and highly-complex services – in a context of sub funding health system - means that spending on health surveillance actions is always far short of what is required. At the end of 2017 a new modality of transferring resources³² established that there are now only two budgets (costs and capital), without specifying or requiring a minimum ceiling for health surveillance actions and leaving managers responsible for the planning and financial execution of activities. This radical modification means that there is a risk that health surveillance will become sidelined in favor of hospital care, which will consume the largest percentage of the meager resources of the SUS.

Throughout the history of health surveillance, its objects of study and intervention have expanded, strengthening the integration between the different areas of surveillance and increasing its capacity for prediction and intervention. It evolved from the surveillance of people, to the surveillance of diseases, and now to the surveillance of health risks, although the desired goal of emancipatory health surveillance has still not been achieved³³. The realization of the First National Conference on Health Surveillance, which was held in 2018³⁴, was an opportunity to revise and formulate proposals to strengthen health surveillance and to expand its scope of actions aiming to reach an integrated attention model. Adequate and bold alternatives are necessary to avoid any setbacks in financing modalities, so that the advances achieved in the field of Health Surveillance in Brazil can be maintained and expanded.

Collaborations

MG Teixeira and MCN Costa produced the first version of the article; GO Penna revised the article and made additional contributions; EH Carmo and WK Oliveira made new suggestions and additions. All the authors read and reviewed the final version.

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