








Decrease in compulsory notifications registered by the Brazilian National Hospital Epidemiological Surveillance Network during the COVID-19 pandemic: a descriptive study, 2017-2020

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ABSTRACT

Objective: To describe compulsorily notifiable diseases, health conditions and public health events (DAEs as per the Brazilian acronym) registered by the National Hospital Epidemiological Surveillance Network (RENAVEH as per the Brazilian acronym), before and during the COVID-19 pandemic. **Methods:** This was a descriptive ecological study using records held on the Notifiable Health Conditions Information System (SINAN as per the Brazilian acronym) between Epidemiological Week (EW) 1 of 2017 (January 1st, 2017) and 52 of 2020 (December 26, 2020). **Results:** Between 2017 and 2020, RENAVEH notified 1,258,455 DAE form records, with only 225,081 (17.9%) notifications in 2020, representing a decrease of 146,340 records compared to 2019. The temporal analysis showed a decrease per EW of more than 1,000 notified records with effect from EW 12. **Conclusion:** There was a decrease in compulsorily notifiable DAEs registered by RENAVEH in Brazil taking the period analyzed as a whole, in particular in 2020.

Keywords: COVID-19; Disease Notification; Epidemiology, Descriptive; Health Information Systems; Health Services Research.

INTRODUCTION

Hospital epidemiological surveillance plays an extremely important role since the product of its work provides health service managers with essential and concise elements to support decision making when facing public health emergencies in Brazil.¹⁻⁴ The National Hospital Epidemiological Surveillance Subsystem set up Hospital Epidemiology Hubs to achieve the objectives expected of hospital epidemiological surveillance.^{5,6} The Hubs centers are articulating operational units which identify and monitor specific situations and thus ensure continuous monitoring of the local epidemiological situation, including subtle changes in the population's morbidity and mortality profile.^{1,6}

The Hospital Epidemiology Hubs linked to the Ministry of Health comprise the National Hospital Epidemiological Surveillance Network (*Rede Nacional de Vigilância Epidemiológica Hospitalar* - RENAVEH) the main objective of which is to detect, monitor and provide an immediate response to potential public health emergencies within the hospital context.⁶⁻⁹ The notifications of Diseases, Health Conditions and Public Health Events (*Doenças, Agravos e Eventos de Saúde Pública* - DAEs) recorded by RENAVEH in recent years accounted on average for 8% of overall notifications recorded in Brazil.¹⁰

The COVID-19 pandemic, as declared by the World Health Organization (WHO) in March 2020, has exposed healthcare workers to constant stress and has overburdened healthcare systems at all levels of care, especially hospitals, in every country in the world.¹¹⁻¹⁵

Both health care teams and health surveillance teams have been affected by the high demand for insalubrious work, in addition to the physical, mental and social strain faced by these professionals.¹⁶⁻¹⁸

Considering the relevance and importance of the work done by hospital epidemiological surveillance in formulating strategies, within the scope of public health policies, it is essential to evaluate the consequences of the pandemic

Study contribution	
Main results	In 2020, there were 146,340 notifications of diseases, conditions and public health events fewer than those recorded in 2019, with a greater reduction as of Epidemiological week 12, 2020.
Implications for services	The potential relationship between the COVID-19 pandemic and the decrease in notifications at the National Hospital Epidemiological Surveillance Network was reinforced by the results, which may reflect the changes that the pandemic has brought into health services.
Perspectives	It is suggested that discussions should be promoted on the profile of the registry of notifiable diseases in hospital units, during the pandemic period, as well as on contributions of hospital epidemiological surveillance to the Brazilian National Health System (SUS)

for the hospital epidemiological surveillance service in Brazil.

The objective of this study was to describe compulsorily notifiable DAEs registered by the RENAVEH, before and during the COVID-19 pandemic in Brazil.

METHODS

We conducted a descriptive ecological study of compulsory DAEs notifications recorded in Brazil by the Hospital Epidemiology Hubs linked to RENAVEH. The network is composed of 238 Hospital Epidemiology Hubs, distributed over 145 municipalities of the country's 27 Federative Units.¹⁹

We analyzed the notifications made between Epidemiological Week (EW) 1 of 2017 (January 1st, 2017) and EW 52 of 2020 (December 26, 2020). The pre-pandemic period refers to notifications made until WE 11 of 2020; while pandemic period begins with effect from EW 12 of the same year.¹²

The data used in this research were retrieved from the Notifiable Health Conditions Information System (*Sistema de Informação de Agravos de Notificação - SINAN*) and refer to the period from 2017 to 2020. The anonymous secondary data were authorized for use by the Health Ministry's Health Surveillance Secretariat on February 27, 2021 and were retrieved and made available on February 30 of the same year.

We analyzed the following variables: notification number (NU_NOTIFIC); year of notification (NU_ANO); EW of notification (SEM_NOT); and health condition notified (ID_AGRAVO).

Data tabulation and analysis were performed using Microsoft Excel version 2010. The following formula was used to calculate simple proportions:

$$\text{Sample size/total value} \times 100$$

(for each variable)

The following formula was used when analyzing means, for each mean between all the study variables, by year and EW:

$$Me = \frac{x_1 + x_2 + x_3 \dots}{n}$$

The following formula was used to calculate variation:

$$\text{Variation} = \left[\frac{\text{Final Value of NU_NOTIFIC} - \text{Initial Values of NU_NOTIFIC}}{\text{Initial Value of NU_NOTIFIC}} \right]$$

Variations were shown in dark grey when there was an increase, and in light grey when there was a decrease.

As the study used public information, with no possibility of cases being identified, the research project did not need to be submitted for analysis and approval by a Research Ethics Committee.

RESULTS

In the period between EW 1 of 2017 and EW 52 of 2020, the Hospital Epidemiology Hubs linked to RENAVEH recorded 1,258,455 DAEs forms in Brazil: 327,793 (26.0%) in 2017; 334,160 (26.6%) in 2018; 371,421 (29.5%) in 2019; and 225,081 (17.9%) in 2020. More than 60 health conditions were reported each year, with domestic violence, sexual and/or other violence, venomous animal accidents and dengue being most reported in the period analyzed (Table 1).

The mean number of notifications in the pre-pandemic period was 344,458 per year, this being

Table 1 – Frequency of International Statistical Classification of Diseases and Related Health Problems codes (ICD), absolute and relative number of records, mean number of notifications, difference and percentage variation in the number of diseases, health conditions and public health events by year, National Hospital Epidemiological Surveillance Network, Brazil, 2017-2020

Year	ICD ^a – DAEs ^b	Notifications recorded				
		No.	%	Mean per year ^c	Difference	Variation (%)
2017	61	327,793	26.0		–	–
2018	63	334,160	26.6	344,458	6,367	2.0
2019	65	371,421	29.5		37,261	11.0
2020	66	225,081	17.9	225,081	-146,340	-39.0
Total	–	1,258,455	100.00	314,614	–	–

a) ICD: International Statistical Classification of Diseases and Related Health Problems; b) DAEs: Diseases, Health Conditions and Public Health Events; c) The mean refers to the number of records in the period.

119,377 records more than the total number of notifications recorded in the pandemic year 2020 (Table 1). The difference in the total number of DAEs notifications made between 2017 and 2018 was 6,367 records, representing a 2.0% increase. Between 2018 and 2019 the difference was 37,261 records, representing an 11.0% increase. Between 2019 and 2020, the difference was 146,340 records, representing a 39.0% decrease (Table 1).

When analyzing by EW the behavior of the time series of DAEs notifications recorded between 2017 and 2020, we found that the weekly notifications made by RENAVEH were predominantly greater than 5,000. In 2020, the same behavior was found between EW 2 and EW 11. However, from EW 12 on, there was a decrease in the epidemiological curve, showing a linear pattern of approximately 4,000 DAEs notifications until EW 52 (Figure 1).

Regarding the variation of notifications made in the period from 2017 to 2020, it was not possible to identify a pattern in notification behavior between the months of the same year, nor between the months of the analyzed years (Box 1).

When analyzing variation in DAEs notification, a decrease in the monthly mean was found in all the years studied: -0.001 in 2017; -0.010 in 2018; -0.007 in 2019; and -0.078 in 2020. It is noteworthy that the highest mean monthly decrease was recorded in 2020 (Box 1).

DISCUSSION

The results of this study showed a change in the profile of the notifications made by RENAVEH, characterized by a marked difference in the number of notifications between the pre-pandemic period (2017-2019) and during the pandemic (2020).

The hypothesis of association between the pandemic and the decrease in the notifications made by the Network was reinforced by there being 1,000 fewer records per EW with effect from when the WHO declared the SARS-CoV2 pandemic in EW 12 of 2020.¹² This reduction may be due to the negative repercussions of the pandemic on health services, especially high complexity services,^{20,21} which began prioritizing

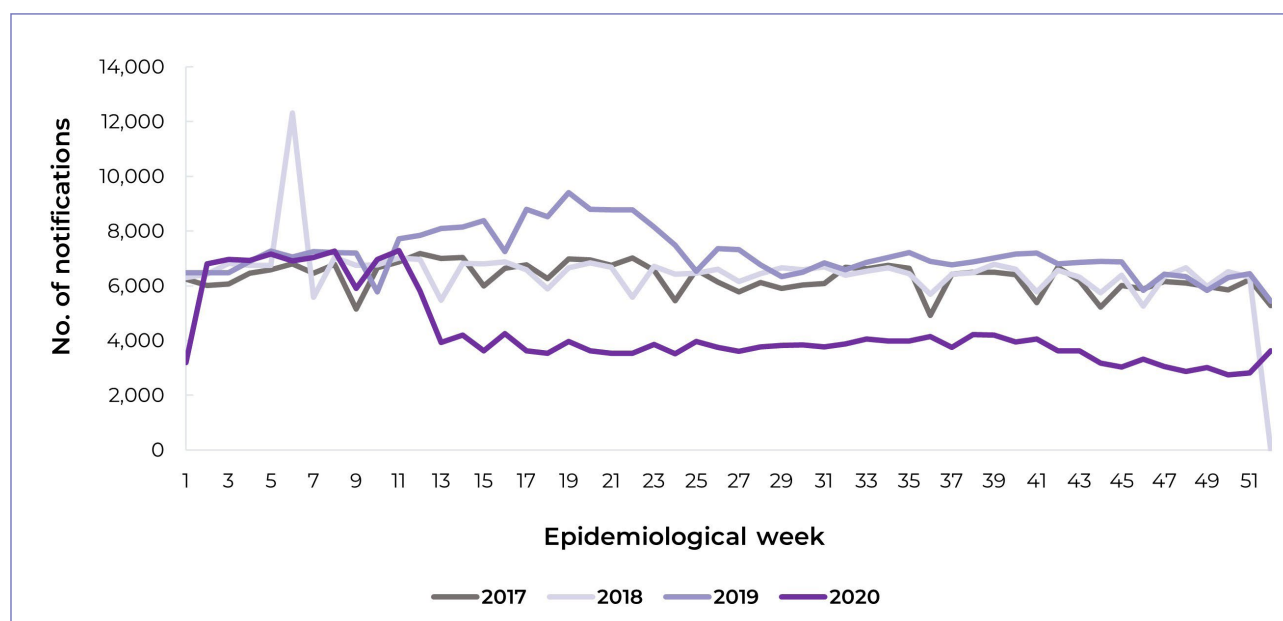


Figure 1 – Number of notifications of diseases, health conditions and public health events recorded by the hospital epidemiology hubs, National Hospital Epidemiological Surveillance Network, Brazil, 2017-2020

Box 1 – Monthly variation in notification of diseases, health conditions and public health events by the Hospital Epidemiology Hubs integrating the National Hospital Epidemiological Surveillance Network, Brazil, 2017-2020^a

Months	Year			
	2017	2018	2019	2020
January and February	-0.089	-0.107	-0.043	-0.096
February and March	0.245	0.089	0.095	-0.062
March and April	-0.122	-0.005	-0.152	-0.353
April and May	-0.136	0.019	0.091	-0.077
May and June	-0.132	-0.063	-0.225	0.067
June and July	-0.042	0.060	0.002	0.024
July and August	0.156	0.013	-0.016	0.023
August and September	-0.138	-0.106	-0.017	0.019
September and October	0.074	0.104	0.050	-0.095
October and November	-0.084	-0.104	-0.137	-0.183
November and December	-0.017	-0.011	-0.034	-0.122
Annual mean	-0.001	-0.010	-0.007	-0.078

a) Variations shown in dark colors are increases and those shown in light colors are decreases.

care provision to people with COVID-19, in often overcrowded facilities, with scarce resources, and with health professionals on the verge of physical and psychological exhaustion.^{13,16,22} At the same time, the population's fear of contracting SARS-CoV2 infection in health care services and, as a consequence, difficulties in maintaining the epidemiological surveillance system active, may have contributed to the reduction in notifications.

The COVID-19 social distancing measures adopted in Brazil may have influenced the epidemiological scenario of other communicable diseases.²³⁻²⁷ Studies conducted in Brazil have analyzed the potential impact of the COVID-19 pandemic on dengue control actions and found that there has probably been underreporting of dengue cases, influenced by dengue control program activities being compromised and inaccessibility to care services due to the pandemic.^{28,29} Another study showed that in Brazil, from January to August 2020, there was a 23% and 14% increase in dengue hospitalization and mortality rates, respectively, confirming the underreporting hypothesis.³⁰

Regarding interpretation of data from this study, the discussion needs to take into consideration the geographical context in which the RENAVEH network operates. The Hospital Epidemiology Hubs linked to the network are distributed over only 2.6% (145) of the country's municipalities, and it is possible that the results of this study do not reflect the reality of all Brazilian municipalities. Another point to consider is that the findings of this study are limited to the three years prior to the pandemic, so that it is not possible to make comparisons taking previous periods into account. It is also important to point out that the sharp drop in notifications in EW 52 of 2018 is probably not related to notification failures but rather to data recording problems in the database we consulted.

We conclude that there was a decrease of approximately 150,000 compulsory notifications of DAEs made by the RENAVEH in 2020. This reduction in the number of notifications may be related to the repercussions of the COVID-19 pandemic on Brazil's health system.

It is therefore important that, in addition to actions aimed at controlling the pandemic, the epidemiological surveillance of other diseases in health services be strengthened, and it is

necessary to ensure that measures for health promotion, prevention and recovery be developed alongside measures for responding to the COVID-19 pandemic.

AUTHORS' CONTRIBUTIONS

Sallas J, Elidio GA, Costacurta GF and Frank CHM contributed equally to the concept of the study, data analysis and interpretation and drafting the manuscript. Rohlfs DB, Pacheco FC and Guilhem DB contributed by providing guidance on all stages of the study and reviewing the manuscript. All the authors have reviewed and approved the final version of the manuscript and are responsible for all aspects thereof.

CONFLICTS OF INTEREST

The authors declare they have no conflicts of interest.

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