EVALUATION OF THE FLU SYNDROME SENTINEL SYSTEM IN FORTALEZA – CE

AVALIAÇÃO DA VIGILÂNCIA SENTINELA DE SÍNDROME GRIPAL EM FORTALEZA –

EVALUACIÓN DEL SISTEMA CENTINELA DEL SÍNDROME GRIPE EN FORTALEZA – CE

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ABSTRACT
Objective: Evaluating the Influenza Syndrome Surveillance System in the Fortaleza city – Ceará state, from 2021 to 2023. **Method:** Epidemiological study on the Influenza Syndrome Sentinel Surveillance System based on a descriptive study with a retrospective approach considering the CDC guidelines for assessing data quality and representativeness. **Results:** Data analysis showed variations in sample collection in sentinel units, with unsatisfactory performance and a drop in targets from 2022 onwards. Data quality and consistency were classified 'Excellent'. Fortaleza obtained a satisfactory classification in terms of the proportion of sentinel units. Teams must be continuously trained to ensure quality in respiratory virus surveillance. **Conclusion:** Sentinel surveillance is essential for monitoring respiratory diseases and identifying circulating viruses, and its success depends on improving data quality and the representativeness of sentinel units.
Keywords: *Sentinel surveillance; Respiratory tract disease; CDC.*

RESUMO
Objetivo: Avaliar o Sistema de Vigilância das Síndromes Gripais no município de Fortaleza - Ceará no período de 2021 a 2023. **Método:** Estudo epidemiológico sobre o Sistema de Vigilância Sentinela da Síndrome Gripal a partir de estudo descritivo com abordagem retrospectiva considerando as diretrizes do CDC para avaliação dos atributos qualidade de dados e representatividade. **Resultados:** A análise dos dados mostrou variações na de coleta de amostras nas unidades sentinelas, com desempenho insatisfatório e queda nas metas a partir de 2022. A qualidade e consistência dos dados apresentaram classificação "Excelente". Fortaleza obteve avaliação satisfatória quanto à proporção de unidades sentinelas. A capacitação das equipes deve ser contínua, de modo a garantir a qualidade na vigilância dos vírus respiratórios. **Conclusão:** A Vigilância Sentinela é essencial no monitoramento de doenças respiratórias e na identificação de vírus circulantes e o seu sucesso dependente do aprimoramento da qualidade dos dados e a (da) representatividade das unidades sentinelas.
Descritores: *Vigilância de evento sentinela; Doenças respiratórias; CDC*.

RESUMEN
Objetivo: Evaluar el Sistema de Vigilancia del Síndrome de Gripe en la ciudad y Fortaleza - Ceará en el período de 2021 a 2023. **Método:** Estudio epidemiológico del Sistema de Vigilancia Centinela del Síndrome de Gripe basado en un estudio descriptivo con enfoque retrospectivo considerando las directrices del CDC para evaluar los atributos de calidad y representatividad de los datos. **Resultados:** El análisis de los datos mostró variaciones en la recolección de muestras en las unidades centinela, con desempeño insatisfactorio y caída de las metas a partir de 2022. La calidad y consistencia de los datos fueron calificadas como "Excelente". Fortaleza obtuvo una evaluación satisfactoria en cuanto a la proporción de unidades centinela. La capacitación de los equipos debe ser contínua, asegurando la calidad en la vigilancia de virus respiratorios. **Conclusión:** La Vigilancia Centinela es esencial para monitorear enfermedades respiratorias e identificar virus circulantes y su éxito depende de mejorar la calidad de los datos y la representatividad de las unidades centinela.
Descriptores: *Vigilância de guardiã; Enfermidades respiratórias; CDC.*

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INTRODUCTION

The Flu is a contagious respiratory infection caused by variants of Influenza virus belonging to the family of *Orthomyxoviridae,* affecting nose, throat and lungs causing from mild symptoms to severe respiratory problems, and death. The spread of influenza virus is seasonal amongst the North (mild temperature regions) and South (tropical and equatorial temperature regions) hemisphere in winter season [1]. The Years 2019 to 2020 there were accounting of 3.311.831 million clinical samples of individuals with respiratory disease diagnosed as FLU, another 19% (614.907) as Influenza , and 37% (229.639) as Influenza B subtypes A-H1N1(23% - 86.778), A-H3N2 (17% - 63.779), and other respiratory virus (4% - 132.473)[2].

Surveillance Sentinel (SS) is a strategic model to monitor and to collect data for? surveillance etiologic agents with importance to public health, morbidity, and mortality. The information collected can be applied to population levels with serious risk of developing severe clinical conditions to a disease determinate[3,4]. As a surveillance model, it developed the Flu Syndrome Sentinel Surveillance (FSSS), with response to the monitoring of the circulation and detection of the virus, epidemiologic overview of the respiratory virus, and depoliticization of information timely to plan the actions for decision-taking.[5]

The beginning of pandemic of SARS-CoV-2, and the declaration of the covid-19 community transmission in 2020, the Surveillance Secretary in Health of Health Minister performed the adaptation to FSSS system, caused by spread new coronavirus, influenza, and other respiratory virus together[6]. Until 43ªth epidemiologic week in 2023, the FSSS identified 23596 viruses whereby 77 virus types were not identified. Among the virus identified, 96% (22652) were other viruses, with 9% (2038) where the identification was not possible, 54% (12232) were identified as SARS-CoV-2, and 37 % (8382) Rhinovirus. Influenza virus represented 4% (944), whereby 71% (670) Influenza A did not have a? subtype, 14% (132) Influenza B, 15% (142) other subtypes to Influenza. Between the epidemiologic weeks number 38 and 41, 5345 cases of severe acute respiratory syndrome were registered (SARS), related to 60% (3207) SARS-CoV-2, 20% (1069) Rhinovirus, 7% (374) Respiratory Syncytial Virus (RSV). And 13% (695) to another virus, demonstrated that SARS-CoV-2 was frequently spread in the population[7].

FSSS system in the city of Fortaleza is formed with two important aspects. First, the strategic importance in the monitoring, preparation, and answer to public health events caused by pathogens (influenza, SARS-CoV2, syncytial respiratory virus), with important impact to population, and other health services[8]. Second, the importance of sharing the experience with other health secretaries, assuming the knowledge changes, good practice in surveillance areas, and control of flu syndromes.

Considering the importance of information of the FSSS in managing a public health event, it is essential to ensure quality, precision, and confidence data to fund strategic decisions, and to direct resources with adequate form, aiming to protect the health of populations efficiently. For that, the study presents a search to evaluate the flu syndrome surveillance system in Fortaleza city – CE.

METHODOLOGY

Epidemiologic study is an evaluation of Sentinel Surveillance System of Flu syndrome in Fortaleza city as of descriptive study with a retrospective approach considering the CDC (Center for Disease Control and Prevention) according to U*pdated Guidelines for Evaluating Public Health Surveillance* (2001)[9] to evaluation of qualitative attributes of quality data (completeness and consistence), and quantitative attribute to representativeness.

Secondary data of the Information System to Flu Epidemiologic Surveillance (SIVEP – Flu) was used, with information of cases of flu syndrome collected in Sentinel Unity in Fortaleza city in the years 2021 to 2023. Data collected of notification registers in SIVEP-FLU system supplied by Health Municipal Secretary of Fortaleza in *Data Base File* (DBF) format, not nominal, and National Register Health Institution(CNES).

The research respected the ethical principles according to Resolution of the National Health Council nº 466, on December 12th, 2012, after presented in Ethical and Research Committee of Ceará State University – UECE, approved by nº 6594786, and Ethical Presentation Certificate nº 71322123.7.0000.5534, on December 27th, 2024.

The data was organized in Microsoft Excel® sheet version 18.0, and analyzed considering the qualitative attributes of data quality, and quantitative attributes of representativeness (*Centers for Disease Control and Prevention*, 2001)[9] using Epi Info™ statistical software version 7.1.

DATA QUALITY

Data completeness was analyzed by evaluation of mandatory variables of notification files, considering the ignored fields, empty spaces or others as incomplete data. For that, it was established the Romero e Cunha 's method (2006)[10], with evaluative parameters to analyze the data quality attributes (Board 1).

It was considered the variables with most importance for the SS observed in the notification form: filled date, sentinel unity, health national card, filled field to CPF number, traditional community or traditional population member, foreigner, country, city, gender, first symptoms date, received vaccine to covid-19, and collect date.

The consistency of data was analyzed by percentage of inconsistent data according to Romero e Cunha (2006)[10] in the Board 1. The variables selected were in relationship between filled data of notification form versus notification date; pregnant versus male gender; closing date versus birth date.

Board 1: The strategy to analyze attributes of the Flu Syndrome Sentinel Surveillance System in Fortaleza – Ceará in the period from 2021 to 2023.

ATTRIBUTE	ELEMENT	INDICATOR	EVALUATION PARAMETER	CLASSIFICATION OR EVALUATION
Data Quality	Completeness	Percentage filled field except "9-ignored" in notifications form insert system data	**Romero & Cunha, 2006** Incomplete Excellent (≥ 5%) Good (5 a 10%) Regular (11 a 20%) Poor (21 a 50%) Poorer (> 50%)	According to the range of punctuation to the parameters
	Consistency	Validity indicator (consistency): Percentage notification cases with minimum inconsistency between data intervals	**Romero & Cunha, 2006** Excellent (< 5%), Good (5 a 10%), Regular (11 a 20%), Poor (21 a 50%) Poorer (>50%).	
Representativeness		Proportion between case numbers collected of residents for Sentinel Unity, and the total collected samples.	Satisfactory (≥80%) Regular (51% - 79%) Insatisfactory (≤50%)	According to the range punctuation to the parameters
		Proportion Sentinel units for 500,000 inhabitants.	Satisfactory (≥99%) Insatisfactory (≤99%)	

Source: Made by author.

REPRESENTATIVENESS

The representativeness was analyzed by system capacity to describe with accuracy the occurrence of flu syndrome cases for respiratory viruses going around in Fortaleza city for a long time, and the distribution on the population for person and place. It will be considered representative if the surveillance system is able to describe the behavior of respiratory viruses in flu syndrome cases.

Some variables were used as the notification form as gender, age, detection of etiologic agent, home district, and date that the symptoms began (epidemiologic week), so that the classification can be contemplated in person, time, and place.

RESULTS

The data analyzed for the SIVEP-Flu, from the year 2021 to 2023, demonstrates rate variations in filled related obligatory information to the different sentinel units. Although the filled field 4 to sentinel unity being obligatory, it's possible to observe 100% (5939) the registers were evaluated; only a register does not belong to Fortaleza city, however, to analyze the target and attributes every register was considered.

On table 1, the data represents the relationship between the sentinel unities with the annual target for 240 samples collected for unit (5 samples per week) in 2021, 480 samples (10 samples per week) in 2022, and 960 samples (20 samples per week) in 2023, including UAPS (Primary Health Attention Unit), Children hospital, and UPA (Service Prompt Unity). Anyone unity reached the annual target for the period evaluated, but 4 units were approximated to reach the target as HIAS with 93,33% (224 samples collected) in 2021, UAPS Carlos Ribeiro with 9,63% (435 samples collected) in 2022, and SOPAI with 82,19% (789 samples collected) in 2023.

Table 1: Quantitative of samples collected for Flu Syndrome according to Sentinel Unity in Fortaleza, in the period from 2021 to 2023.

SIVEP FLU	Period and % determination of samples collected					
Name of Sentinel Unit	*2021** *(target 240)*		*2022*** *(target 480)*		*2023**** *(target 960)*	
	n	*%*	*n*	*%*	*n*	*%*
UAPS Carlos Ribeiro	34	14,17	435	90,63	651	67,81
UAPS José Paracampos	0	0,00	65	13,54	685	71,35
UAPS Dom Aloisio Lorscheider	0	0,00	62	12,92	543	56,56
SOPAI Hospital Infantil	20	8,33	280	58,33	789	82,19
UAPS Anastácio Magalhães	0	0,00	101	21,04	675	70,31
UAPS Aida Santos	0	0,00	104	21,67	467	48,65
UAPS Melo Jaborandi	0	0,00	58	12,08	383	39,90
HIAS Hospital Infantil Albert Sabin	224	93,33	223	46,46	125	13,02
UPA Praia Do Futuro	0	0,00	4	0,83	10	1,04
Total samples with % target per year	278	28,96 Insatisfatório	1332	30,74 Insatisfatório	4328	50,09 Regular

Fonte: SIVEP Gripe. Total samples n=5939. * 2021 is refering to the 4 Sentinel Unit. The number of samples collected had a variation for a long year has been considerate * 5 samples per week, ** 10 samples per week, and e *** 20 samples per week (current model).

Evaluative parameters for data completeness demonstrated in 2021 that only HIAS reached the satisfactory level, but the performance of sentinel units during the years presents downfall, as UPA Praia do Futuro had collected decrease for 3 years, with 1,04% the target concluded in 2023, involved the data quality results, reflecting by completeness and consistency of notifications, a critical point to improve in the surveillance system.

Demographic data relative to obligatory variables such as gender, country and number of traditional populations, demonstrates better data completeness with average 99,72% gender, 100% country, and 96,29% member to traditional population, classified as EXCELLENT. It's important to highlight that the country variable has such as a categoric filled parameter if a foreigner doesn't inform the current situation, his situation passes to be Brazilian resident to inform the CEP code. Foreigner and CPF variables reach POORER classification by data completeness with 26,17% and 31,33% respectively. It was observed in 2021 and 2022 that the field didn't have a filled obligatory (Table 2). However, the parameters "YES" to the CPF field began without data in 2021 and 2022, because it was not an obligatory variable, but reached the completeness with 72,38% in 2023, and 90,32% in 2024. A gender variable presented in the male and female field of classification such as "EXCELLENT".

Table 2: Completeness percentage to demographic information variables of SIVEP-Flu referring Flu Syndrome Sentinel Surveillance in Fortaleza, in period 2021 to 2023.

Obligatory varable SIVEP Flu	*Period and % determination to Completeness*						
Demographic Identification	*2021* n=278*	*%*	*2022** n=1332*	*%*	*2023*** n=4329*	*%*	*Classification*
CPF							
YES	0	0,00	0	0,00	3139	72,51	
NO	0	0,00	0	0,00	259	5,98	Poorer
(empty)	278	100	1332	100	931	21,51	
Gender							
Male	138	49,64	533	40,02	1608	37,14	
Female	138	49,64	798	59,91	2719	62,81	Excellent
Ignored	2	0,72	1	0,08	2	0,05	
Country							
Brazil	278	100	1332	100	4329	100	Excellent
Foreigner							
1 YES	0	0,00	0	0,00	11	0,25	
2 NO	0	0,00	0	0,00	4058	93,74	Poorer
(empty)	278	100	1332	100	260	6,01	
Member of traditional							

population							
1 YES	0	0,00	1	0,08	1	0,02	
2 NO	247	88,85	1331	99,92	4328	99,98	Excellent
(empty)	31	11,15	0	0,00	0	0,00	

Fonte: SIVEP Flu 2021-2023. Made by author. The number of samples collected varied for a long year. * 5 samples per week, ** 10 samples per week, e *** 20 samples per week, (current model). Classify by percentage average inside temporal clipping 2021 to 2023. 1 case belongs to another city.

Pregnant variable refers the gestational age of woman at the notification moment. In 2021 anyone pregnant was registered a long quarter (1º, 2º e 3º), soon, 18,35% of registers indicated "NO" was indicative that was not pregnant, however, the "NOT APLICABLE" field was selected (81,29%) indicate male individuals or as well as pregnant was not fertile age. In 2023 had percentual difference in registers of pregnant: 0,49% in 1º quarter, 0,83% in 2º quarter, and 0,51% in 3º quarter, has been 49,02% were indicative this individual was not pregnant, 46,85% was classified such as "not apply", and 2,31% registered such as ignored, suggesting that the pregnant variable was empty or didn't fill correctly (Table 3)

Table 3: Completeness percentage to obligatory variables of SIVEP-Flu referent Flu Syndrome Sentinel Surveillance in Fortaleza, in period 2021 to 2023.

Obligatory variable SIVEP Flu	*Period e % Completeness determination*						*Classification*
	2021* n=278	*%*	*2022** n=1332*	*%*	*2023*** n=4329*	*%*	
Pregnant							
1° quarter	0	0,00	2	0,15	21	0,49	
2º quarter	0	0,00	8	0,60	36	0,83	
3º quarter	0	0,00	5	0,38	22	0,51	
Ignored Gestational age	0	0,00	1	0,08	0	0,00	Excellent
No	51	18,35	567	42,56	2122	49,02	
Not apply	226	81,29	745	55,93	2028	46,85	
Ignored	1	0,36	4	0,30	100	2,30	
COVID-19 vaccine							
Yes	0	0	0	0	0	0	
No	0	0	0	0	0	0	Poorer
Ignored	3	1,08	61	4,58	71	1,64	
(empty)	275	98,92	1271	95,42	258	5,96	

Fonte: SIVEP Gripe 2021-2023. Update in 01/09/2024. N=5938

In 2021, the "COVID-19 VACCINE" variable was with 98,92% empty registers, without any information about the vaccine, suggesting that when a variable is not obligatory cause a lack in data filled. Only 1,08% registers were classified such as "ignored", demonstrate the variable was available but was not filled correctly, such as observed in 2022 with 95,42% empty fields. There was in 2023 a significant

improvement in filled the "covid-19 vaccine" variable, with 5,96% empty fields, and 1,64% registers such as "ignored".

Consistency represents the level of variables are relationship with understanding and not contradictory data. The selected variables presented classification such as "EXCELENTE", having minimum contradictions, and not involved the data quality of Sentinel Surveillance, demonstrating the importance to have a professional to management and current the results to each sentinel unity. Soon, the data consistency was classified as satisfactory (Table 4).

Table 4: Consistency percentage to variables of SIVEP-Flu referent Flu Syndrome Sentinel Surveillance in Fortaleza, in period 2021 to 2023.

Variables	Consistency						
Data intervals	2021	%	2022	%	2023	%	Evaluation
	n=278		n=1332		n=4329		
Collect date above the date of symptoms begin.	0	0,0000	0	0,0000	0	0,000	Excellent
Closure date anterior the filled date	14	5,0360	4	0,3003	1	0,1163	Good/ Excellent
Filled date equal the birh date	0	0,0000	0	0,0000	0	0,0000	Excellent
Male gender							
Pregnant	0	0,0000	0	0,0000	0	0,0000	Excellent

Fonte: SIVEP-Flu 2021-2023. Update in 01/09/2024. N=5938

DISCUSSION

Sentinel Surveillance works with weekly information of available sentinel unities according to the collect number standard in technical notes and guiding documents of Health Minister. There was a increase in collected samples of Flu Syndrome, in conformity with the pact by sentinel unities to collect and send samples[11]. There was an expansion of the sentinel units in Federation States, such as was observed in Bahia (Salvador), Paraíba (João Pessoa, Campina Grande, and Monteiro) States in 2023[12,13].

The completeness indicator of notification sheets to sentinel units is a consistency reflection of the surveillance system. In Fortaleza, observed a variation in the sample rates for a long year analyzed, demonstrating the improvement in the surveillance model, as well as reflecting about the attributes of data quality evaluation, therefore, comply the proposal about the evaluation of a surveillance system in public health with efficient and effective response[14].

Data consistency demonstrates variation in criteria of symptoms validation, suggesting a potential of surveillance effective impact causes inadequate identification of symptoms can generate failures in traceability of viral infections. Romero e Cunha (2006)[10] highlights that consistency data are essential to effective surveillance, facilitating the earlier identification of outbreak, and the implementation of adequate control measures.

It's a highlight point in literature[15] the necessity of an expansion of sentinel unity numbers as well as the distribution of equitable to sample collect points, demonstrating the coverage of sentinel unities are fundamental to ensure a greater representation of population, and improvement of detection and of monitoring respiratory diseases. Fortaleza contemplates a representative amount of the sentinel units, but it would be necessary to restructure to collect target, monitoring and quality data.

CONCLUSION

Sentinel surveillance plays a fundamental role in monitoring respiratory diseases, and identification of spread viruses, though, its success depends on maintenance with continuous improvement of their attributes, such as, data quality, representativeness of sentinel units, and fast adaptation to change in epidemiologic scenarios.

To data quality, the data completeness has variation on classification according to obligations variable filled. The results of data consistency percentage performed with date intervals have variations between Excellent and Good.

In relation to the representativeness, Fortaleza city attended the evaluation parameters such as satisfactory proportion of sentinel units for each 500.000 inhabitants, since they have nine sentinel units. However, the representativeness is regular to proportion between the collected case numbers of residents for sentinel unity and the total samples collected.

It's fundamental that health authorities keep efforts in sentinel surveillance to mitigate the impact of respiratory viruses in public health. As well as releasing continuous training of teams to ensure the consistency of the notification sheet filled and develop the expansion of technologic sources to facilitate the collecting and analyzing data.

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