Cogitare Enfermagem

ORIGINAL ARTICLE

ANALYSIS OF THE CHIKUNGUNYA FEVER EPIDEMIOLOGICAL SURVEILLANCE SYSTEM IN THE STATE OF PARÁ

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ABSTRACT
Objective: To analyze the Notifiable Diseases Information System regarding the acceptability, punctuality and quality of Chikungunya Fever data in Pará, 2015-2017.
Method: An epidemiological study with the analysis of 17,148 cases of Chikungunya fever obtained from the Notifiable Diseases Information System in the state of Pará between 2015 and 2017.
Results: The system showed punctuality in data acquisition and delay to produce the information; its acceptability among the municipalities ranged from 22.92 to 65.28%; there was a discrepancy in completeness among the mandatory and essential variables; with >1% duplicity and improved validity.
Conclusion: The deficiencies and weaknesses identified in the System can be minimized by reviewing the work process. The study provides reflection on the need for appropriate and quality registration for decision making.

DESCRIPTORS: Health Information Systems; Data reliability; Chikungunya fever; Public Health Surveillance; Public Health Nursing.

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ANÁLISE DO SISTEMA DE VIGILÂNCIA EPIDEMIOLÓGICA DA FEBRE DE CHIKUNGUNYA NO ESTADO DO PARÁ

RESUMO

Objetivo: analisar o Sistema de Informação de Agravos de Notificação quanto à aceitabilidade, pontualidade e qualidade dos dados da Febre de Chikungunya no Pará, 2015-2017.

Método: estudo epidemiológico, com análise de 17.148 casos da febre de Chikungunya obtidos no Sistema de Informação de Agravos de Notificação, no estado do Pará entre 2015 e 2017.

Resultados: o sistema demonstrou pontualidade na obtenção de dados e atraso para produção da informação; sua aceitabilidade entre os municípios variou de 22,92 a 65,28%; houve discrepância da completitude entre as variáveis obrigatórias e essenciais; com duplicidade >1% e melhora da validade.

Conclusão: as deficiências e fragilidades identificadas no Sistema poderão ser minimizadas com a revisão do processo de trabalho. O estudo propicia reflexão sobre a necessidade de registro oportuno e de qualidade para tomada de decisão.

DESCRITORES: Sistemas de Informação em Saúde; Confiabilidade dos Dados; Febre de Chikungunya; Vigilância em Saúde Pública; Enfermagem em Saúde Pública.

ANÁLISIS DEL SISTEMA DE VIGILANCIA EPIDEMIOLÓGICA DE LA FIEBRE DE CHIKUNGUNYA EN EL ESTADO DE PARÁ

RESUMEN

Objetivo: analizar el Sistema de Información de Agravios de Notificación acerca de la aceptabilidad, puntualidad y calidad de los datos sobre la Fiebre de Chikungunya en Pará, 2015-2017.

Método: estudio epidemiológico, con análisis de 17.148 casos da la fiebre de Chikungunya que se obtuvieron en el Sistema de Información de Agravios de Notificación, en estado de Pará entre 2015 y 2017.

Resultados: el sistema mostró puntualidad en la obtención de datos y atraso para producción de la información; su aceptabilidad entre los municipios ha variado de 22,92 a 65,28%; hubo discrepancia de la completitud entre las variables obligatorias y esenciales; con duplicidad >1% y mejora de la validad.

Conclusión: las deficiencias y fragilidades que se identificaron en el Sistema pueden minimizar la revisión del proceso de trabajo. El estudio posibilita reflexionar acerca de la necesidad de registro y de calidad para toma de decisión.

DESCRIPTORES: Sistemas de Información en Salud; Confiabilidad de los Datos; Fiebre de Chikungunya; Vigilancia en Salud Pública; Enfermería en Salud Pública.

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INTRODUCTION

The Chikungunya Virus (CHIKV) was isolated in the 1950s in Tanzania and neglected for five decades until it triggered outbreaks in the early 21st century. In this context, attention was drawn to the variation in viral behavior, sometimes due to its adaptation to different vectors, sometimes due to the diversity of new atypical manifestations reported[1], which has caused concern, given the great diversity of potential vectors in Brazil and the difficulty of sanitary authorities to deal with arboviruses[2].

In Brazil, the virus was introduced in 2014 and is an arbovirus that deserves attention from public health authorities and researchers for its potential for incapacitation due to the chronic phase that mostly affects the active population (20-60 years old)[1,3]. Chikungunya fever is marked by three phases: acute or feverish, until the 14th symptomatic day, subacute from day 15 to day 90, and chronic when the symptoms persist for more than ninety days and may last for years. The presence of high fever is a characteristic symptom of the acute phase, while intense polyarthralgia is present in the three phases, which often causes severe joint injuries leading to deficiencies[4].

Although the virus was recognized in Brazil in 2014, the obligation to register Chikungunya fever occurred in 2016 when it became part of the National List of Compulsory Notification (*Lista Nacional de Notificação Compulsória*, LNNC)[5], which feeds the Notifiable Diseases Information System (*Sistema de Informação de Agravos de Notificação*, SINAN), and aims to describe the epidemiological reality of the country in general[6]. The SINAN is the only system used for Chikungunya fever surveillance throughout the country.

Through the Epidemiological Bulletin, the Ministry of Health (MoH)[7],reported that in 2018, until Epidemiological Week (EW) No. 34, 22 deaths from Chikungunya fever were confirmed in laboratory. Throughout 2017, 186 deaths were confirmed and. in 2016, 204 deaths were confirmed. However, it is evidenced by the Pan American Health Organization (PAHO)[8] that the number of deaths caused by the disease in the country in 2017 is the highest recorded in the Americas.

Given that "no system can provide better quality information than the data that feeds it"[9:252] and CHIKV's severity potential, the SINAN's evaluation is essential, especially for the attributes that influence its data and their quality, such as acceptability, data quality and representativeness[10-11].

The implementation of the SINAN in the 90s represented an immeasurable gain for epidemiological surveillance. However, this process happened in an irregular way, without the institution of instruments for its evaluation[12-13], making it vulnerable, since the evaluation must be systemic, that is, occur in all life cycles of the Health Information Systems (*Sistemas de Informação em Saúde*, SIS). Despite this situation, the SINAN represents an important source of data for the epidemiological surveillance system.

In this study, the evaluation of the SINAN's data regarding an emerging arbovirus in the national scenario, where other arboviruses present atypical behavior, such as cases of microcephaly associated with Zika virus[1,14], is important to support public policy planning in health in a timely manner.

Given this scenario, this research aimed to analyze the SINAN regarding its attributes of acceptability, punctuality and data quality, from the occurrence of Chikungunya fever in the state of Pará.

METHOD

A descriptive epidemiological study with a quantitative approach, conducted with

17,148 suspected or confirmed cases of Chikungunya fever in the state of Pará. The SINAN database obtained from the State Health Department of Public Health (*Secretaria de Estado de Saúde Pública*, SESPA) was used.

Records of suspected or confirmed cases of Chikungunya from the 144 municipalities in Pará, from January 2015 to December 2017, were included in the study. The choice for the period was due to the fact that, in September 2014 the MoH recognized the native infection and determined the start of data collection on the fever. The records of patients in transit, that is, non-residents in the state of Pará, were excluded due to the possible difficulty in providing data when attending the health service. The cases in transit totaled 34, 11 in 2015, 15 in 2016 and 8 in 2017.

The variables studied correspond to the records of the specific grievance notification form, structurally composed of 71 variables. Of these, 15 were excluded from the analysis because they were exclusive to dengue and 9 variables were not provided because they were directly identification of the patients (patient name; SUS card number; mother's name; street; number; complement; reference point; zip code; phone number).

Thus, 47 variables were analyzed, totaling 68 fields: 41 mandatory fields; 18 essential fields; and 9 fields without characteristics defined in the SINAN Net dictionary.

For data organization and analysis, EXCEL version 2016 was selected, which allowed for the tabulation of the bank, for the calculation of absolute and relative frequencies and also for univariate analysis according to the pre-established attributes selected from the methodology of the Centers for Disease Control and Prevention[10], namely:

I. The acceptability (or coverage) that reflects the willingness of people and health organizations to participate in the SIS[10,15]. Thus, the individual and/or negative notification rate of the municipalities was analyzed through the [5] Notification municipality variable.

II. The punctuality (or opportunity) that concerns the speed of travel among the stages of a surveillance system[10]. Thus, the time interval in days was calculated between the [7] date of first symptoms variable and the [3] date of case notification, and between the [7] date of the first symptoms and the date of entry of the form, an internal variable of the SINAN.

III. The quality of the data that reflects the set of: integrality (or completeness) of the responses in the system record variables[10], non-duplication of these responses within the scope of SIS[15], and their validity (or consistency). Thus, for integrality evaluation, the percentage of the fields completed as 'unknown' OR left 'blank' in the form was calculated; for duplicity evaluation, the repetition of the notification number was measured (the duplicity dimension is most often evaluated from the [16] name of the mother variable; however, this variable was not assigned by the SESPA) and, after identification, it was compared to other registry variables; finally, for validity analysis, the following variables were listed: date of the first symptoms; age; date of investigation; clinical data; hospitalization; classification; confirmation criteria; clinical presentation and evolution of the case, in which the presence of invalid data in its fillings was verified.

For judging the results, frequency distribution was chosen because it is appropriate for continuous quantitative data presentation, using the following ratio scale: excellent – equal to or greater than 90.00% –; regular – from 89.99% to 70.00%–; and bad – less than 70.00%[16]. Regarding duplicity and validity, a percentage of up to 5.00% was considered acceptable[17].

The study obtained authorization for using the database by the SESPA and approval under opinion No. 2,615,023 of the Research Ethics Committee of the Undergraduate Nursing Course/UEPA.

RESULTS

Of the records entered in the study (n=17,148), 145 were duplicates, corresponding to 0.85%, distributed as follows: three (0.47%) in 2015; 45 (0.97%) in 2016; and 97 (0.82%) in 2017. Such percentages are considered acceptable for the evaluated system[17].

Among the 144 municipalities in Pará that reported cases of Chikungunya fever to the SINAN, 33 (22.92%) were in 2015, 92 (63.89%) in 2016, and 94 (65.28%) in 2017, configuring the system acceptability attribute as poor (less than 70%)[16] according to the established parameters. Regarding the type of notification, all study records were individually reported, with no negative notification by the municipalities.

Regarding the punctuality attribute, it was found that the interval between the symptom onset date reported by the patients and the case notification date at the Health Unit occurred within 10 days of illness, with a frequency of 445 (70.08%) cases in 2015, 3,375 (73.50%) cases in 2016 and 9,466 (80.38%) in 2017. Of the total studied, 8,874 (50.00%) presented a median corresponding to notification/detection up to three days after the onset of the first symptoms, and the mean value was nine days (Table 1).

Table 1 – Interval in days between the onset of symptoms, reporting and typing of Chikungunya fever cases in the Notifiable Diseases Information System, 2015-2017. Belém, PA, Brazil, 2018

Interval (in days)	2015 (n=635)		2016 (n=4.592)		2017 (n=11.776)	
	n	%	N	%	n	%
Interval between symptoms onset date and case notification date[1]						
≤ 10 day(s)	445	70,08	3.375	73,5	9.466	80,38
10 —| 20 days	117	18,43	455	9,91	987	8,38
20 —| 30 days	33	5,2	218	4,75	430	3,65
30 —| 40 days	15	2,36	156	3,4	273	2,32
40 —| 50 days	6	0,94	84	1,83	131	1,11
50 —| 100 days	10	1,57	180	3,92	220	1,87
100 —| 200 days	2	0,31	36	0,78	56	0,48
> 200 days	2	0,31	13	0,28	39	0,33
TOTAL	630	99,21	4.517	98,37	11.602	98,52
Interval between symptoms onset date and record typing date[2]						
≤10 day(s)	199	31,34	693	15,09	1.946	16,53
10 —| 20 days	253	39,84	935	20,36	2.376	20,18
20 —| 30 days	50	7,87	641	13,96	1.552	13,18
30 —| 40 days	31	4,88	419	9,12	1.054	8,95
40 —| 50 days	21	3,31	312	6,79	1.017	8,64
50 —| 100 days	39	6,14	828	18,03	2.298	19,51
100 —| 200 days	11	1,73	569	12,39	843	7,16
> 200 days	26	4,09	120	2,61	516	4,38
TOTAL	630	99,21	4.517	98,37	11.602	98,52

Source: Own elaboration with data from the SINAN, 2018.

Notes: [1]In order to calculate punctuality, the inconsistent data on the following variables were excluded: date of the first symptoms; date of notification of the case and date of entry of the form.

Still in the punctuality attribute, it was identified that the time elapsed between the onset of symptoms, reported by the patients, and the date of the data entry for insertion in the SINAN predominated between 10 and 20 days, distributed as follows: 253 (39.84%) in 2015; 935 (20.36%) in 2016; and 2,376 (20.18%) in 2017. Important frequencies of data insertion in the SINAN were identified after 50 days from the onset of symptoms, with 14 (11.96%) cases in 2015, 229 (33.03%) in 2016, and 315 (31.05%) in 2017. From the total studied, the interval between the onset of symptoms and the date of the record presented a median of 29 days and a mean of 49.85 days (Table 1).

The integrality results revealed that the mean of mandatory fields completed in 2015 (81.66%) and in 2016 (88.22%) was regular, that is, between 89.99% and 70.00%. Completeness increased over the years studied, being excellent in 2017 (95.12%), given that the result was above 90.00%. The mandatory variables of the form blocks: general data; individual reporting and residency data, maintained excellent levels of completeness over the three years. Unlike the mandatory variables of the investigation blocks, clinical data and conclusion showed poor completeness in some variables (Table 2).

Table 2 – Absolute and relative frequency of the mandatory variables with incompleteness in the Chikungunya fever records of the Notifiable Diseases Information System, 2015-2017. Belém, PA, Brazil, 2018

BF[1]	Name of the variable	2015		2016		2017	
		n	%	N	%	n	%
Mandatory variables							
INo	Date of birth	635	100	4.563	99,37	11.628	98,74
	Sex	635	100	4.592	100	11.774	99,98
	Pregnant	608	95,75	4.501	98,02	10.937	92,88
RD	State	631	99,37	4.591	100	11.775	99,99
	Municipality of residence	631	99,37	4.591	100	11.775	99,99
IN	Date of investigation	444	69,92	3.578	77,92	10.915	92,69
LC	Clinical signs	37	5,83	3.183	69,32	10.915	92,69
	Pre-existing diseases	37	5,83	3.183	69,32	10.915	92,69
CO	Classification	490	77,17	2.917	63,52	10.194	86,57
	Confir./drop criterion	418	65,83	2.798	60,93	10.233	86,9
	Clinical presentation	2	0,31	1.798	39,16	7.978	67,75
	Closing date	490	77,17	2.913	63,44	9.629	81,77
TOTAL		635	81,66	4.592	88,22	11.776	95,12

Source: Own elaboration with data from the SINAN, 2018.

Notes: [1] Total of the relative frequency of the integrality of all the mandatory variables. The table shows only those that showed incompleteness in the years studied.

[2] Final classification: Excellent: over 90% Regular: from 89,99% to 70% Bad: below 70%

(1) BF=Blocks of the Form. INo=Individual Notification. RD=Residence Data. IN=Investigation. LD=Laboratory Data. HO=Hospitalization. CO=Conclusion.

The completeness of the non-mandatory/essential fields increased over the years studied in the series; however, according to the parameters used for the judgment, it

remained poor – below 70.00% – throughout the time series: 19.10% (2015); 32.62% (2016) and 40.84% (2017). It is noteworthy that, unlike the other variables, the number of unfilled fields increased over the years in the race/skin color (92.60% in 2015; 89.72% in 2017) and education (74.95% in 2015; 61.82% in 2016; 54.71% in 2017) variables (Table 3).

Table 3 – Absolute and relative frequency of non-mandatory variables with incompleteness in the Chikungunya fever records of the Notifiable Diseases Information System, 2015-2017. Belém, PA, Brazil, 2018

BF[1]	Name of the variable	2015		2016		2017	
		n	%	N	%	n	%
Variáveis de preenchimento não obrigatório/essenciais							
NI	Race/Skin color	588	92,6	4.407	95,97	10.565	89,72
	Schooling	474	74,65	2.839	61,82	6.443	54,71
DR	District	0	0	0	0	0	0
	Neighborhood	233	36,69	4.040	87,98	11.022	93,6
	Geo field 1	0	0	0	0	12	0,1
	Geo field 2	0	0	0	0	9	0,08
	Urban	607	95,59	4.445	96,8	11.500	97,66
IN	Occupation	6	0,94	1.189	25,8	4.261	36,1
DL	Collection date (S1)	26	4,09	1.292	28,14	3.141	26,67
	Collection date (S2)	0	0	2	0,04	25	0,21
	PRNT exam	0	0	80	1,74	100	0,85
HO	Has hospitalization occurred?	31	4,88	2.036	44,34	6.965	59,15
CO	Any autochthonous case in the municipalities?	26	4,09	1.294	28,18	6.412	54,45
	State	20	3,15	1.213	26,42	6.270	53,24
	Country	22	3,46	1.212	26,39	6.271	53,25
	Municipality	17	2,68	1.209	26,33	6.259	53,15
	District	0	0	4	0,09	1	0,01
	Neighborhood	1	0,16	743	16,18	3.026	25,7
	Case evolution	253	39,84	2.451	53,38	9.086	77,16
TOTAL		635	19,1	4.592	32,62	11.776	40,84

Source: Own elaboration with data from the SINAN, 2018.

Notes: [1] Total of the relative frequency of the integrality of all the mandatory variables. The table shows only those that showed incompleteness in the years studied.

[2] Final classification: Excellent: over 90% Regular: from 89,99% to 70% Bad: below 70%

(1) BF=Blocks of the Form. INo=Individual Notification. RD=Residence Data. IN=Investigation. LD=Laboratory Data. HO=Hospitalization. CO=Conclusion.

Regarding the consistency attribute, the variables were almost entirely excellent, except for the date of the first symptoms variable, which remained inconsistent <1.00%

in the time series, and for the classification variable, which presented 71.34% (n=453) of inconsistency in 2015 and 10.24% (n=470) in 2016, and in the following year there were no inconsistent data in the variable.

DISCUSSION

The results show low acceptability of the system in the municipalities of Pará, below 70.00%; therefore, it is considered poor according to the established parameters[16]. The frequency of 50 municipalities without case records and without negative notification is noteworthy, and this is a measure recommended by the SINAN Manual of Rules and Routines, which should be used to show/evaluate the system surveillance, which might have been caused by failures in its implementation in certain regions/municipalities of the state[18-20].

Among the notifying municipalities, the system can be considered as punctual, since half of the cases were notified within three days after the onset of the symptoms[21]; however, after notified, half of the cases took 26 days to be entered, longer than the national mean for dengue, identified in another study[21] and, throughout the series studied, more than 10.00% of the records had this typing time extended to over 100 days.

This time lapse compromises the quick/immediate surveillance actions, in addition to making the identification of outbreaks difficult, since it is an arbovirus[4]. Moreover, it may cause discredit to weekly/monthly epidemiological bulletins, and may lead to the risk of disguising the onset of outbreaks or even the recognition of the introduction of new diseases in the territory[17,19].

Such a scenario should have its cause/origin investigated, in order to identify the motivation for the delay in typing, and may be attributed to the following: insufficient qualified professional, structural deficiencies or organizational and operational aspects that need to be implemented, and even lack of proper control of the records, as other studies have pointed out[17,18,20].

Regarding duplicity, the number of duplicate cases remained acceptable, being <1.00% throughout the study period, with an episode of two triplicate cases in 2017. It should be noted that this database is under the supervision of the SESPA, and was consolidated by the Municipal Health Departments and the Regional Health Centers, and that the SINAN offers the double registration tool, which is mandatory at all levels prior to forwarding to the higher level[13]. The professionals' lack of knowledge about the basic instruments of the system may have led to the occurrence of duplicity[22].

Regarding the integrality of the data, a significant discrepancy visualized from the stratification of the mandatory and non-mandatory variables was identified. The integrality of the mandatory variables was over 80.00% throughout the temporal cohort, reaching excellent completeness levels in 2017, unlike a study that evaluated the dengue system in Brazil[21]. Concerning the non-mandatory variables, the same behavior is observed; however, the relative frequency (%) of completeness is classified as poor throughout the period[23].

There was inconsistency in the filling of the following variables: date of the first symptoms, which remained <1.00% throughout the period, and also in the classification variable, which presented inconsistent data in 2015 and 2016. The difference in integrality between mandatory and essential variables, as well as the low validity of the classification variable, may be justified by the modification of the Individual Research Form that occurred early in 2015. On this occasion, the content of Chikungunya fever was introduced in the dengue notification form, without proper planning for the implementation of such instrument or the necessary guidance for the professionals responsible for its completion[22,24].

Irregular filling of the records for various reasons, delayed data entry, difficulty in

user identification, which can lead to duplicate records, and even structural problems, such as the lack of computers, were evidenced by similar studies as facts that compromise the quality of information[17-18,21-22,24].

The Ministry of Health[12] ratifies the need for evaluation of the system in order to identify notification forms with unfilled fields, incongruent records, and duplicate information, among others. However, it does not share analysis results that can support strategies to improve the System[15], nor its reports or assessment instruments, being absent from the need to create a clear evaluation method that provides replicable instruments[9,25-26].

The limitations of this study are related to the use of secondary data, which may contain typing errors and omissions in notification sheet fields, as well as underreporting of cases. The analysis was limited to the attributes of acceptability, punctuality and data quality (dimensions of: integrality, non-duplicity and validity) of the System.

CONCLUSION

The evaluation of the SIS data enabled the identification of deficiencies and weaknesses in the system, which could be minimized by reviewing the work process in the service network, so that data can be entered immediately upon suspicion of the Chikungunya fever case. Therefore, it is necessary to systematically offer training to keep health teams up to date on the notification instruments, as well as to provide consultation in the SINAN evaluations, and to standardize the instruments used for evaluation.

Another important aspect to be highlighted in this area of information generation is the need for connectivity in health facilities for the immediate typing of notification forms and timely transfer of data, thus speeding up and qualifying health surveillance. It is necessary to review the current model of centralization of the typing of records with a single professional, in the headquarters of the municipal health departments, delaying the feeding of the system.

It is concluded that information with low accuracy may compromise health surveillance and even cause waste of resources by subsidizing a wrong decision making. In order avoid this, it is essential to reflect on health information so that it is seen as a product, and the data generated in the health services as its raw material.

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