Analysis of congenital syphilis notifications in a university hospital in the city of Niterói from 2016 to 2020

Análise das notificações de sífilis congênita em um hospital universitário na cidade de Niterói de 2016 a 2020

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ABSTRACT

Introduction: The elimination of congenital syphilis is a challenge in the field of public health worldwide. The failure of previous global plans forces authorities to rethink detection and control strategies, with compulsory notification being an important tool for obtaining data. **Objective:** To analyze the notifications of congenital syphilis made by Departamento de Vigilância Epidemiológica do Hospital Universitário Antônio Pedro (Department of Epidemiological Surveillance at Antônio Pedro University Hospital), between January 2016 and August 2020. **Methods:** Retrospective, descriptive, and quantitative study of data from congenital syphilis notification forms in Hospital Universitário Antônio Pedro from January 2016 to August 2020. In the descriptive analysis of categorical variables, absolute and relative frequencies were used; for numerical measures, central tendency and dispersion measures were used. Spearman correlation, Mann-Whitney test and Fisher's exact test were performed in the R software (version 4.0.3). Hills' criteria for causality were also considered. **Results:** Of the 67 forms examined, two were excluded due to duplication, and 48 variables were analyzed. No form was completely filled out, and some data were missing on more than 90% of them. According to maternal data, patients were mostly from Niterói (60%), had an average age of 23.09 years, and were brown (32.31%), while 13.85% did not finish 5th to 8th grade and 80% had prenatal care, but less than half had appropriate treatment indicated. As for the children: 55.38% were female, 40% brown, with an average age of 90.98 days. The great majority (72.31%) of them were born at Hospital Universitário Antônio Pedro, and not being born at this hospital was significant when it came to being asymptomatic (69.23%, p=0.001); the most frequent symptom was jaundice. **Conclusion:** Improvement in the follow-up and investigation of the reported cases can significantly decrease this high percentage of missing information, improving the quality of the data. The vast majority of patients underwent prenatal care, and therefore, they were avoidable cases, since the maternal diagnosis in the peripartum period occurs when the chance for vertical transmission has already occurred and caused consequences for the child's life.

Keywords: syphilis, congenital; epidemiologic surveillance services; public health.

RESUMO

Introdução: A eliminação da sífilis congênita é um desafio para a saúde pública mundial. A falha de planos de controle anteriores força as autoridades a repensar as estratégias, sendo a notificação compulsória ferramenta importante na obtenção de dados. **Objetivo:** Analisar as notificações de sífilis congênita pelo Departamento de Vigilância Epidemiológica do Hospital Universitário Antônio Pedro no período entre janeiro de 2016 e agosto de 2020. **Métodos:** Estudo retrospectivo, descritivo e quantitativo. Na análise descritiva das variáveis categóricas, foram utilizadas as frequências absolutas e relativas; já para numéricas, foram utilizadas as medidas tendência central e dispersão. Foram feitos correlação de Spearman, teste de Mann-Whitney e teste exato de Fisher com o software R (versão 4.0.3). Foram considerados os critérios de Hills para causalidade. **Resultados:** Das 67 fichas examinadas, duas foram excluídas por duplicidade. Foram analisadas 48 variáveis. Nenhuma ficha estava completamente preenchida, e alguns dados estavam ausentes em mais de 90%. De acordo com os dados maternos, 60% das pacientes são de Niterói, com idade de 23,09 anos em média, pardas (32,31%), 13,85% não terminou os estudos da 5^a a 8^a série e 80% fez pré-natal, porém menos da metade teve tratamento adequado indicado. Quanto às crianças, 55,38% eram do sexo feminino, 40% pardas, com idade média de 90,98 dias; 72,31% nasceram no Hospital Universitário Antônio Pedro. Quanto às que não nasceram nesse hospital, o local de nascimento foi significativo para que fossem assintomáticas (69,23%, p=0,001); já o sintoma mais comum foi a icterícia. **Conclusão:** A melhora do seguimento e investigação dos casos notificados pode diminuir significativamente essa alta porcentagem de informações ausentes, melhorando a qualidade da informação. A maioria das gestantes fez acompanhamento pré-natal e, portanto, trata-se de caso evitável, já que o diagnóstico materno no período periparto acontece quando a chance de transmissão vertical já ocorreu e já há consequências para a criança.

Palavras-chave: sífilis congênita; serviços de vigilância epidemiológica; saúde pública.

INTRODUCTION

Syphilis is a disease with historical roots concurrent with the beginning of human civilization. This is one of the reasons why it is still often described as a disease of the past, which is incompatible with world reality: there are about 6 million new cases annually[1], and the Brazilian data presented by the Ministry of Health (MS) indicate that in 2019, 238,172 cases of syphilis were reported, accounting for the total sum of the notifications of acquired syphilis, syphilis in pregnant women and congenital syphilis[2].

One of the many faces of the disease is congenital syphilis (CS), defined by the transmission of the disease from mother to child; therefore, this type of disease is one of the most harmful and has serious consequences.

However, CS also has one of the greatest opportunities for prevention compared to other syphilitic conditions, through the diagnosis

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and treatment of pregnant women. Even so, CS cases continue to increase, which justifies an assessment of the current epidemic picture[2].

It is important to note that, considering the most recent data from DataSUS between 2017 and 2018, cases of congenital syphilis in the municipality of Niterói have increased alarmingly. In 2017, only one case had been confirmed; in 2018, there were 41 cases. Taking into account the confirmed cases by notification region according to diagnosis year, out of a total of 23,935 cases, 10,175 (42.5%) occurred in the Southeast and 7,030 (29.3%) in the Northeast. In general terms, the numbers of confirmed cases according to the diagnosis year in Brazil were 678 in 2016, 24,623 in 2017 and 23,935 in 2018. Such data are worrisome and demonstrate a public health problem, taking into account that the opportunities and campaigns to raise awareness and prevention are increasingly present in the Health System[3].

Each individual born with CS has a great impact on the costs for public health in Brazil. A study carried out in the state of Ceará showed that the average length of stay for each child with CS was 34.4 days, and that from January 2012 to December 2017, there were 24,553 hospital admissions for infectious and parasitic diseases in children younger than one old in Ceará. Over a six-year period, the sum of resources paid by SUS for the hospitalization of children with CS was equivalent to US$ 927,726.84 dollars and R$ 2,430,808.90. The final cost was US$ 234.73 per child[4].

OBJECTIVE

To analyze CS notifications between January 2016 and August 2020, filed at the Department of Epidemiological Surveillance of the Hospital Universitário Antônio Pedro (HUAP), located in the municipality of Niterói, in the state of Rio de Janeiro, Brazil.

METHODS

This was a retrospective, descriptive and quantitative study, seeking to quantify the cases reported as CS at HUAP from 2016 to 2020.

First, a literature search was performed to consult national and international publications in the Scientific Electronic Library Online (SciELO) and U.S. National Library of Medicine (PubMed) databases, including materials published between 2000 and 2020.

We then collected data through documentary research, based on consultations of notification forms filed in the epidemiological surveillance sector of HUAP. Variables selected from the items included in the CS compulsory notification form were tabulated and the data were statistically analyzed using the R Statistic software (version 4.0.3).

In the descriptive analysis of categorical variables, absolute and relative frequencies were used. Measures of central tendency and dispersion were used to describe the numerical variables.

To search for comparisons that favor disease elimination policies, Spearman's correlation was used, which is a limited measure between -1 and 1. The closer the coefficient is to -1, the greater the negative correlation, and by how much the closer the coefficient is to 1, the greater the positive correlation[5,6].

For critical causality analysis, the criteria of Hills and the theory of John L. Mackie[7,8] were used.

As this was a study involving human beings, the current work was submitted and approved by the ethics committee.

RESULTS

Data from 65 CS notification forms were used, with 48 variables comprising the table to be analyzed.

Only four had all the essential fields filled in (form number, date of notification, newborn's name and date of birth). None were completely filled out.

The percentage of non-completion of some items exceeded 90% (highest 93.85%), and some answers would not apply or what was ignored was not marked; other answers, however, would depend on the follow-up of the case.

Table 1 shows the number of cases per year. The year with the most cases (26.15%) was 2016.

From the maternal categorical variables collected, the following results stand out.

As for the municipality of residence, 60% of the patients lived in Niterói, 16% from São Gonçalo and 10.78% from other municipalities in the region; for about 4.62% of them, this information was not available. Residents of the urban area totaled 81.54%.

Regarding maternal education, 58.46% of the records did not contain this information, and the maximum level of education most reported was from the 5th to the 8th grade of elementary school (former high school or elementary school) incomplete.

Data referring to prenatal care showed that 80% of them performed such monitoring, mainly in the city of Niterói (61.54%), and 26.15% did it at the HUAP itself. Comparatively, 72.31% were diagnosed with syphilis during prenatal care, but 10.77% were diagnoses at birth and two of them only after.

This diagnosis seemed to be made more commonly by the non-treponemal test (reactive in 69.23%) than by the treponemal test (not performed in 58.46%).

Among the patients, 26 (40%) were between 19 and 25 years old; 32.31% were described as brown. The predominant profession was "housewife", with 26.15% (40% of data were not filled out in this regard).

The notification children were predominantly female (55.38%) and brown (40%, but with 20% missing information) and were born at the HUAP.

Its diagnosis, also mostly guided by a positive non-treponemal test (70.77%) with information about the treponemal test not given, was found in 23.08%, but it was not available in 40% of the records. The non-treponemal CSF test was non-reactive in 60% of those performed.

The segment for ascending titration was ignored or not performed in 80% of the notifications. Only one record reported radiological alterations, but screening was not performed in 15.38%.

Table 1 – Annual distribution of notifications (collection from the year 2020, until the month of August).

Year of notification	Absolute value of congenital syphilis cases	Percentage equivalent to the absolute value of congenital syphilis cases (%)
2016	17	26.15
2017	12	18.46
2018	13	20.00
2019	15	23.08
2020	8	12.31

Source: Congenital syphilis notification forms from Epidemiological Surveillance of the Antônio Pedro University Hospital.

Regarding the children who were treated, the predominant regimen was crystalline penicillin G, 100,000 to 150,000 IU/kg/day for 10 days.

The test to check whether there was a difference between the place of prenatal care (HUAP or another unit) and the titers of mothers and children showed that there was no significant difference (p<0.05) in any of the two titers (p=0.968 and 0.111, respectively).

The same was true for categorical maternal variables and place of prenatal care; however, in the case of the categorical variables of the children, there was a significant difference between the place of birth and the performance of a non-treponemal CSF test (p=0.006) and regarding the performance of radiological screening (p=0.031).

There was also statistical significance in relation to place of birth and place of clinical diagnosis (p=0.001) and clinical diagnosis (p=0.022).

There was no significant difference between the place of prenatal care and the categorical variables of the mothers.

DISCUSSION

The data presented must be read from the perspective that preventable diseases such as CS almost always reflect issues related to access to and use of health services, affecting primarily, but not exclusively, the most disadvantaged population[8].

In Brazil, in the last five years, a continuous increase in the number of syphilis cases in pregnant women, CS and acquired syphilis has been observed. This increase can be attributed, in part, to the increase in testing numbers, due to the spread of rapid tests, but also to the decrease in the use of condoms and the reduction in the administration of penicillin in primary care, due to the worldwide shortage of penicillin, among others[9].

The Antônio Pedro University Hospital (HUAP) is a high-complexity referral center for the city, state and federal scope, as it is linked to the Universidade Federal Fluminense. Therefore, even with the majority living in Niterói, the reported data ended up being a reflection of primary care in that region, given the fact that, in the case of a child notified at birth or from childcare, the opportunity to prevent disease in prenatal care had been lost. For this same reason, the incidence of CS is also considered a marker of perinatal care and the incidence and prevalence of syphilis in women of childbearing age[10-12].

In the sample presented, the mean age of mothers of patients with CS was 23.09 years. Comparing the current study with the study by Saraceni et al.[13], there was a standard deviation

of 6.94. The study by Saraceni et al.[13] analyzed 18,973 cases in the states of Amazonas, Ceará, Espírito Santo, Rio de Janeiro and Rio Grande do Sul and the Federal District, from 2007 to 2012.

Given the quadrupling of the syphilis incidence rate in Japan between 2012 and 2016, Kamb et al.[14] even suggested the expansion of screening, to treat cases diagnosed before pregnancy and avoid the possibility of vertical transmission.

The 1st and 3rd quartiles were 18 and 26 years old respectively; that is, 25% of the mothers were 18 years old or less, and 75% of the mothers were 26 years old or less, with values between 13 and 42 years, but with a clear concentration on younger women.

In addition to being young, we have other characteristics that can mean greater exposure and vulnerability to sexually transmitted infections (STI); one of the main ones is race/color[15], which, despite being linked to social problems with historical roots, plays a prominent role in the world medical academy at present, as major journals and medical scientific entities expressed their opinion in 2019 and 2020 on the need to understand racism as a public health problem and an important determinant of the health-disease process, all of this in view of the wide-open ethnic-racial disparity detected since the beginning of the COVID-19 pandemic in 2020[16].

There was great difficulty in measuring this problem in compulsory notification diseases due to the large deficit in filling in information, which became mandatory in the Notification Diseases Information System (SINAN) in 2017, decreasing the percentage of notifications without the information, but still maintaining many cases of ignored response. The work has 39% of information ignored, a high percentage when compared to other works, for example, Teixeira et al.[17], which considered 15% a high percentage for ignored information. It is important that other studies deepen the analysis of the associations of maternal and fetal characteristics and understand that other socioeconomic inequalities determine the high vulnerability of black women to syphilis and other STI.

The variables occupation and education have a high percentage of ignored information, which unfortunately limits the evidence already described in other works, such as that by Serafim et al.[18], which showed an incidence inversely proportional to education, even showing a temporal increase in women with less education.

A clear majority had prenatal care, leaving doubt as to the quality and protocols followed, since, given adequate care, we should not have diagnoses during or after delivery, and the fact that only 46.15% reported having been adequately treated is worrisome, so we have a worst prognosis for the child.

The mean maternal titer referring to the non-treponemal test was 31.83, with a standard deviation of 48.93. The 1st and 3rd quartiles were 8 and 32, respectively; that is, 25% of the mothers had a titer equal to or less than 8, and 75% of the mothers had a titer equal to or less than 32, with values between 2 and 256.

More than two-thirds of children (70.77%) had the non-treponemal reactive blood test, and 40% had the treponemal test ignored. Almost half of the children (44.62%) had their ascending titration ignored or not applicable, which is important for the follow-up and diagnostic confirmation.

However, more than half of the children (58.46%) had no radiological alterations; about two thirds of them (69.23%) had asymptomatic as a clinical diagnosis, and about half (50.77%) had no signs or symptoms described. More than three quarters of the children (76.92%) were alive at the time of data collection, and no deaths were described in the present sample, which may be a sign of underreporting (cause not listed on the death certificate or omission of the declaration). Confirmation requires cross-referencing analysis from other document sources and databases.

The child's mean age was 90.98 days, with a standard deviation of 200.58. The 1st and 3rd quartiles were 2.13 and 60 days respectively; that is, 25% of the children were ≤2.13 days old, and 75% of the children were ≤60 days, with values between 1 and 1,095 days. The wide range was due to the fact that not only newborns were

reported but rather seen in any sector of the unit. The child's mean titer was 21.28, with a standard deviation of 44.73. The 1st and 3rd quartiles were between 4 and 16; that is, 25% of the children had a titer equal to or less than 4, and 75% of the children had a title equal to or less than 16, with values between 2 and 256.

There was a significant (p=0.018) and positive (r=0.37) correlation between the mother's and child's titers; that is, the higher the titer of the mother, the greater the child's titer tended to be.

There was a significant difference (p=0.006) between the place of birth and the non-treponemal CSF test, with most children born at the HUAP having non-reactive tests; on the other hand, in children who were born in other hospitals, the test was not performed or was ignored. There was a significant difference (p=0.031) between the place of birth and the occurrence of radiological changes, with most children born at the HUAP not having radiological changes; on the other hand, in children who were born in other hospitals, the examination was not performed.

There was a significant difference (p=0.001) between place of birth and clinical diagnosis, with most children born at HUAP being asymptomatic; children born in other hospitals, on the other hand, had more symptoms, a fact that can be explained by the more frequent referral of symptomatic children from the primary care network. The same was true for the significant difference (p=0.022) between the place of birth and the presence of signs and symptoms: most children who were born at the HUAP had no symptoms, unlike those born at other units and referred to the HUAP, suggesting that children with symptoms tended to be more often referred for follow-up in high-complexity units.

Strengths

The present data survey and analysis showed the importance of epidemiological follow-up for the construction of quality notification and surveillance[19,20].

Limitations

The limitations of the present work were the impossibility of quantifying the difference between the number of cases reported in the years and also the fact that it was a retroactive study, based on documents already filled out (dependent on evaluations already carried out, which could not be checked according to MS case definitions and population rules). Such limitations can be overcome using Hills' criteria for causality to discuss the data. This was not a study that infers causality by prospective testing, but one that takes into account socio-economic and environmental factors that may increase the incidence of the disease; therefore, further CS studies are extremely important[7,8].

CONCLUSION

None of the notification forms studied contained all the information needed, demonstrating that health professionals should be better advised when filling them out. The improvement in the follow-up work of notified cases can significantly reduce this high percentage of missing information, especially with regard to the 15 children for whom there was no information regarding whether or not death occurred.

The maternal profile found was, for the most part, residents of Niterói, under 25 years old, black, occupied "at home". The vast majority had prenatal care, but less than half had adequate treatment, indicating a necessary point of improvement in the system.

The children were mostly female, black, born at HUAP, with no significant difference between the child's profile and the mother's profile.

There was a difference between the place of birth and more information regarding radiological screening (performed less in children born outside the HUAP).

There was a significant difference in terms of place of birth and the presence of symptoms, demonstrating that, in most cases, children were referred and tended to be more reported when they showed relevant signs or symptoms.

The idea is for prevention to be carried out long before this point, when vertical transmission is already established with consequences for the child's life.

Participation of each author

Andrea Menezes Gonçalves: project administration, formal analysis, conceptualization, data curation, writing.

Carolina Batista Fernandes: data collection.

Ilana Rangel Messias: data collection.

Stephanie Barcante: data collection.

Julia Sampaio de Souza Morais: data collection.

Júlia Sampaio Fernandes Camacho: data collection.

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Conflict of interests

The authors declare that there are no conflicts of interest.

REFERENCES

1. Kojima N, Klausner JD. An update on the global epidemiology of syphilis. Curr Epidemiol Rep. 2018;5(1):24-38. https://doi.org/10.1007/s40471-018-0138-z

2. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Boletim Epidemiológico Especial. Brasília: Ministério da Saúde; 2020.

3. Brasil. Ministério da Saúde. Sistema de Informação de Agravos de Notificação [Internet]. Available at: http://tabnet.datasus.gov.br/cgi/tabcgi.exe?sinannet/cnv/sifilisbr.def. Accessed on: September 21, 2021

4. Canto SVE, Araújo MAL, Almeida RLF, Cutrim BEC. Hospitalization costs for congenital syphilis in the state of Ceará. Rev Bras Saúde Matern Infant. 2021;21(1):319-26. https://doi.org/10.1590/1806-93042021000100016

5. Fisher R. A Statistical method for research workers. 14ª ed. Edinburgh: Oliver and Boyd; 1970.

6. Mann HB, Whitney DR. On a test of whether one of two random variables are stochastically larger than the other. Ann Math Stat. 1947;18(1):50-60. https://doi.org/10.1214/aoms/1177730491

7. Hill AB. The environment and disease: association or causation? Proc Royal Soc Med. 1965;58(5):295-300. https://doi.org/10.1177/003591576505800503

8.   Araújo LFSC, Dalgalarrondo P, Banzato CEM. Sobre a noção de causalidade na medicina: aproximando Austin Bradford Hill e John L. Mackie. Rev Psiquiatr Clín. 2014;41(2):56-61. https://doi.org/10.1590/0101-60830000000010

9.   Peeling RW, Mabey D, Kamb ML, Chen XS, Radolf JD, Benzaken AS. Syphilis. Nat Rev Dis Primers. 2017;3:17073. https://doi.org/10.1038/nrdp.2017.73

10. Andrade ALSS, Martelli CMT, Pinheiro ED, Santana CL, Borges FP, Zicker F. Rastreamento sorológico para doenças infecciosas em banco de sangue como indicador de morbidade populacional. Rev Saúde Pública. 1989;23(1):20-5. https://doi.org/10.1590/S0034-89101989000100004

11. Velloso LT. Prevalência de sífilis na gestação e seus desfechos: a sífilis congênita nas internações ocorridas na maternidade do Hospital de Ensino Alcides Carneiro, um Hospital do SUS, entre 2017 e 2019 [dissertation]. Niterói: Universidade Federal Fluminense; 2020.

12. Cooper JM, Michelowb IC, Wozniaka PS, Sánchez PJ. In time: the persistence of congenital syphilis in Brazil – More progress needed. Rev Paul Pediatr. 2016;34(3):251-3. https://doi.org/10.1016/j.rppede.2016.06.004

13. Saraceni V, Pereira GFM, Silveira MF, Araujo MAL, Miranda AE. Vigilância epidemiológica da transmissão vertical da sífilis: dados de seis unidades federativas no Brasil. Rev Panam Salud Publica. 2017;41:e44. https://dx.doi.org/10.26633%2FRPSP.2017.44

14. Kamb ML, Taylor MM, Ishikawa N. Rapid increases in syphilis in reproductive-aged women in japan: A warning for other countries? Sex Transm Dis. 2018;45(3):144-6. https://dx.doi.org/10.1097%2FOLQ.0000000000000792

15. Santos NJS. Mulher e negra: dupla vulnerabilidade às DST/HIV/aids. Saúde Soc. 2016;25(3):602-18. https://doi.org/10.1590/S0104-129020162627

16. Khazanchi R, Evans CT, Marcelin JR. Racism, not race, drives inequity across the COVID-19. Continuum. JAMA Netw Open. 2020;3(9):e2019933. https://doi.org/10.1001/jamanetworkopen.2020.19933

17. Teixeira MA, Santos PP, Araújo RT, Santos PN, Souza AGJ. Perfil epidemiológico e sociodemográfico das crianças infectadas por sífilis congênita. Rev Saúde Com. 2015;11(4):371-81.

18. Serafim AS, Moretti GP, Serafim GS, Niero CV, Rosa MI, Pires MMS, et al. Incidence of congenital syphilis in the South Region of Brazil. Rev Soc Bras Med Trop. 2014;47(2):13-20. https://doi.org/10.1590/0037-8682-0045-2014

19. Gomes MAA. Infecções congênitas TORCH [dissertation]. Niterói: Universidade Estadual do Rio de Janeiro; 1983.

20. Gonçalves AM. Análise das notificações de sífilis congênita em um hospital Universitário na cidade de Niterói de 2016 a 2020 [dissertation]. Niterói: Universidade Federal Fluminense; 2020.

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