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The challenges of the Family Health Strategy in the incidence of congenital syphilis in Pernambuco, Brazil, between 2009 to 2018

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ABSTRACT

Introduction: Syphilis is a health problem and an issue for maternal and child health. **Objective:** To analyze the incidence of congenital syphilis (CS) and its relationship with the Family Health Strategy (FHS) in the state of Pernambuco, between 2009-2018. **Methods:** Observational analytical retrospective study with secondary data provided by the Brazilian National Notifiable Diseases System of the Ministry of Health on syphilis infection during pregnancy, congenital syphilis, and FHS coverage information, made available on the e-Gestor AB platform, between 2009-2018. Microsoft Office Excel, JASP 0.14.1.0 and Statistical Package for the Social Sciences 25 programs, and Shapiro-Wilk test, Spearman, and Chi-Squared test were used for the organization and analysis of sociodemographic and clinical variables. **Results:** 11,519 cases of CS were reported in Pernambuco between 2009-2018, with a 12% increase in the FHS coverage rate in the state and 376% growth in the detection rate of CS per thousand live births in the analyzed period. Of the maternal sociodemographic characteristics, there was a higher occurrence of infection in women aged 20 to 29 years (52.76%), black (77.53), and incomplete elementary school or no education (49.56%). In 90.29% of the cases, recent congenital syphilis was identified as the final diagnosis. The analysis also revealed that the greater the FHS coverage in the state, the greater the amount of inadequately performed treatments. **Conclusion:** The analysis of CS cases related to the FHS point to weaknesses in the control and proper treatment of the disease, especially in Black women with low education.

Keywords: syphilis, congenital; Family Health Strategy; prenatal care; Epidemiology.

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INTRODUCTION

Syphilis is a sexually transmitted infection (STI) exclusive to humans, caused by the spirochete Treponema pallidum[1]. When present in untreated or inadequately treated pregnant women, it can be transmitted to the fetus through the transplacental route[1], receiving the denomination of congenital syphilis (CS), which has been compulsorily reported in Brazil since 1986[2]. This disease may lead to abortion, stillbirth, or neonatal sepsis, in addition to sequelae in the central nervous system,

reticuloendothelial, hematological, musculoskeletal systems, and organs such as kidneys, eyes, and lungs[3]. Congenital syphilis persists as a serious public health problem, causing social, health, and economic damage[4].

In Brazil, in the year 2018 alone, 26,219 cases of CS were notified (incidence rate of 9.0/1,000 live births), a growth of about 6% compared to the previous year, in which 24,666 cases of the disease were registered[5]. Of the total number of records, 7,877 (30%) were from the Northeast region, with Pernambuco being the state with the highest number of reported occurrences, followed by Bahia (n=1,517) and Ceará (n=1,350)[5]. In 2018, there were also 241 deaths from congenital syphilis, making a mortality rate of 8.2/per 100,000 live births[5].

The CS is inserted as a preventable perinatal cause, since, unlike other infections, it can be controlled through early diagnosis and effective gestational treatment; for this reason, it is characterized as a "sentinel event", and its control falls under the scope of prenatal care quality, justifying the need for monitoring and evaluation of this action in the different levels of complexity[6].

In this context, primary care plays a key role in the early capture of pregnant women, in the provision of tests as recommended by national protocols for maternal and child health, and in ensuring timely and appropriate treatment for syphilis, with reception and recognition of the needs of each woman[7].

The Family Health Strategy (FHS), the primary health care model, represents the reorganization of the population's access to health services and is a fundamental health care point for prenatal care since it provides comprehensive health care and encourages pregnant women to adhere to the prenatal care program[8].

The correct approach to STIs, both for pregnant women and their sexual partners, associated with the population's lack of knowledge about the medium and long-term impacts of the development of gestational and congenital syphilis, represent challenges for managers and health professionals in Primary Care[9].

Thus, this study aims to analyze the incidence of congenital syphilis (CS) and its relationship with the Family Health Strategy (FHS) in the state of Pernambuco, Brazil, between 2009-2018.

METHODS

This is a retrospective analytical observational study, with descriptive and analytical components, conducted in August 2020 by collecting data provided by the Ministry of Health's Information System for Notifiable Diseases (SINAN) regarding syphilis infection during pregnancy and congenital syphilis (CS) in the state of Pernambuco, between the years 2009 and 2018. Information regarding the coverage of the Family Health Strategy (FHS) in the state, extracted from the Health Information System for Primary Care (SISAB), managed by the Ministry of Health through the Secretariat of Primary Health Care, was also analyzed.

The state of Pernambuco corresponds to 98,067.881 km² of Brazilian territory and has an estimated population of 9,616,621 people. The average Human Development Index (HDI) equals 0,673[10].

The study population was composed of n=11,519 CS cases registered in the health information systems (HIS). We selected the variables consistent with the objective of the article and based on other published studies on the subject. The data extracted for analysis were aggregated and, due to SIS limitations, these did not present updated information on the 12 health regions of the state of Pernambuco.

The maternal sociodemographic variables analyzed were the age range of pregnant women in cases of congenital syphilis; education; race/color. The clinical variables, namely, were final diagnosis; completion of prenatal care; time of diagnosis of maternal syphilis; and treatment regimen.

The information was tabulated and the incidence coefficient of congenital syphilis per thousand live births and the rate ratio of the ESF coverage was calculated. The data relating to the rate of coverage of the ESF in Pernambuco were crossed with the incidence coefficient of congenital syphilis and the coverage of the ESF with the treatment regimen of gestational syphilis in cases of CS.

Data were systematized and stored by Microsoft Office Excel, version 2013. To check normality, the JASP 0.14.1.0 software was used to apply the Shapiro-Wilk normality test to the "treatment" variable and Spearman's test to analyze the other categorical variables. The Statistical Package for the Social Sciences 25 (SPSS) software was used to perform the Pearson correlation coefficient test and to calculate the simple linear regression coefficient. For these analyses, a significance level of <0.05% was assumed, considering $r \geq 0.100$ (there is no significant correlation between the variables); $0.050 \leq r < 0.100$ (there is a weak correlation between the variables); $0.010 \leq r < 0.050$ (there is a significant correlation between the variables); $0.001 \leq r < 0.010$ (there is a highly significant correlation between the variables); $p < 0.001$ (there is an extremely significant correlation between the variables).

According to Resolutions #466/12 and #580/18, of the Brazilian National Health Council (CNS), the submission to the Ethics Committee on Research with Human Beings (CEP) is waived because it is the use of secondary data from the public domain available in health information systems.

RESULTS

Between 2009 and 2018, n=11,519 cases of congenital syphilis (CS) were reported in the state of Pernambuco, with an increasing trend in the number of notifications, from 433 (3.76%) cases in the year 2009 to 2,004 (17.4%) cases in 2018, and an increase in the detection rate of CS per thousand live births was also observed

in the analyzed period, with the incidence coefficient of the disease in 2018, 4.76 times higher than the rate in 2009 (Table 1).

In the analyzed period, there was also a 12% growth in the coverage rate of the Family Health Strategy (FHS) in the state of Pernambuco, according to the data presented in Table 1.

The association between FHS coverage and the incidence rate of congenital syphilis, presented in Figure 1, showed an extraordinarily strong positive and directly proportional correlation between the variables analyzed.

Observing the maternal sociodemographic characteristics of the cases of congenital syphilis reported in the state of Pernambuco between the years 2009 and 2018, Table 2 shows that most women (52.76%) are between 20 and 29 years old. However, it was also found a significant percentage of pregnant women in the age group of 10 to 19 years, representing 24.74% of the total.

Almost half of these women (49.56%) have low - 1st to 8th grades (incomplete - or no education illiterate) and are mostly black [black and brown] (77.53%)[11]. Regarding clinical characteristics, 90.24% had recent CS as the final diagnosis.

Table 3 shows the clinical history of pregnant women in congenital syphilis notifications. It was found that n=8,742 women (75.89%) had prenatal care and n=4,509 (39.14%) were diagnosed during this period. However, in 44.66% (n=5,144) of the cases, the disease was only identified at the time of delivery or the curettage.

In the correlation tests between the treatment regimen of pregnant women in cases of congenital syphilis and the coverage rate of the Family Health Strategy in Pernambuco, it was found that the greater this coverage, the greater the number of treatments that are inadequately performed (Pearson's correlation = 0.718 or strong positive) in the period studied. Conversely, in a moderate negative correlation (Pearson correlation = -0.603), the higher the FHS coverage rate, the fewer the number of treatments that are performed (Figure 2). It also stands out, in an extraordinarily

Table 1: Incidence coefficients (per 1,000 live births) of congenital syphilis and coverage of the Family Health Strategy, Pernambuco, Brazil, 2009 to 2018.

	Incidence coefficient of congenital syphilis per thousand live births				Family Health Strategy Coverage	
Year	N	N-SC	CI	RT	%	RT
2009	141,815	433	3.0	4.76	68.43	1.12
2018	138,317	2,004	14.3		77.06	

N: Absolute value of live births; N-SC: Absolute value of live births with congenital syphilis; CI: Incidence coefficient; RT: Ratio of rates; %: percentage.

Sources: SINAN; MS/Secretaria de Atenção Primária à Saúde.

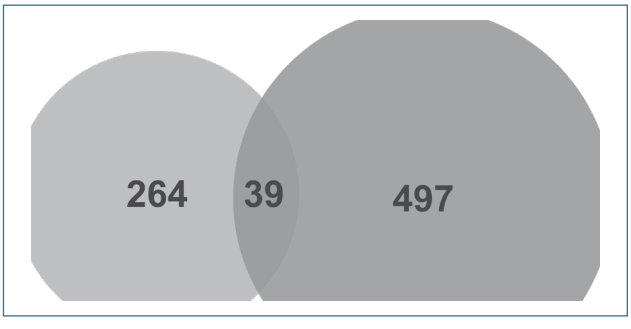

Figure 1: Correlation between Family Health Strategy coverage and incidence rate (per 1,000 live births) of congenital syphilis. Pernambuco, Brazil, 2009-2018.

Table 2: Cases of congenital syphilis according to maternal epidemiological characteristics and neonatal clinical characteristics. Pernambuco, Brazil, 2009 to 2018.

Variables	N (11,519)	% (100)
Maternal Age		
10 to 14 years old	113	0.98
15 to 19 years old	2,737	23.76
20 to 29 years old	6,077	52.76
30 to 39 years old	2,042	17.73
40 years or older	225	1.95
Ignored	325	2.82
Maternal Education		
Illiterate	172	1.49
1st to 4th grade incomplete	1,338	11.62
4th grade complete	581	5.04
5th to 8th grade incomplete	3,618	31.41
Elementary School complete	689	5.98
High school incomplete	1,149	9.97
High school complete	1,509	13.10
College degree incomplete	71	0.62
College degree complete	53	0.46
Not applicable	35	0.30
Ignored	2,304	20.01
Maternal Race/Color		
White	1,194	10.37
Black	8,930	77.53
Yellow	53	0.46
Indigenous	18	0.16
Ignored	1,324	11.48
Final Diagnosis		
Recent SC	10,401	90.29
Late CS	35	0.3
Syphilis abortion	473	4.11
Stillbirth due to syphilis	610	5.3

N: congenital syphilis cases; %: percentage; CS: congenital syphilis.

Source: SINAN.

Table 3: Characterization of congenital syphilis cases according to prenatal care and time of diagnosis of maternal syphilis. Pernambuco, Brazil, 2009 to 2018.

Variables	N (11,519)	% (100)
Realization of prenatal care		
Yes	8,742	75.89
No	1,521	13.21
Ignored	1,256	10.90
Timing of maternal syphilis diagnosis		
During prenatal care	4,509	39.14
At the time of delivery/cure	5,144	44.66
After delivery	1,085	9.42
Not performed	71	0.62
Ignored	710	6.16

N: congenital syphilis cases; %: percentage.

Source: SINAN.

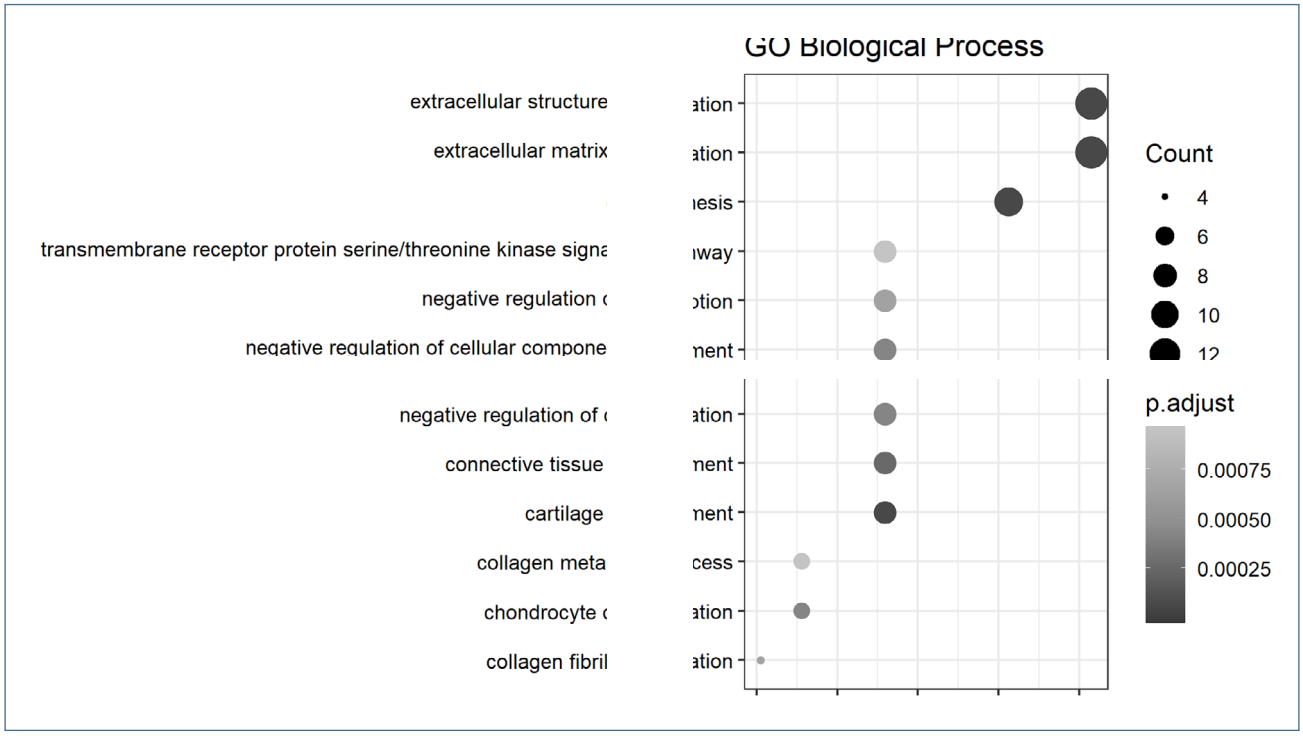

Figure 2: Correlation between the treatment scheme for syphilis in pregnant women in cases of congenital syphilis and the coverage of the Family Health Strategy. Pernambuco, Brazil, 2009 to 2018.

strong negative correlation (Pearson correlation = -0.903) that the greater the coverage of the FHS, the lower the number of pregnant women who do not undergo treatment.

DISCUSSION

In the historical series from 2009 to 2018, an increase in the number of congenital syphilis (CS) cases in Pernambuco was observed, revealing that the disease is still a health problem in the state, requiring interventions aimed at promoting its control and elimination[12].

Studies suggest that the increase in CS cases in Pernambuco and Brazil as a whole is due to the scenario of acquired syphilis and, consequently, gestational syphilis (GS) in the Brazilian population in general since these numbers have also been increasing[13].

Data present in the "Epidemiological Bulletin of Syphilis - 2019" point out that, in the country, there was an increase in the detection rate of syphilis in pregnancy, from 17.2 cases of syphilis in pregnant women per 1,000 live births (LB) in 2017 to 21.4 cases of SG per 1,000 LB in 2018[5].

Regarding the incidence coefficient of congenital syphilis in Pernambuco in 2018, it was found that it remained almost 29 times higher than the target proposed by the World Health Organization (WHO) in 2010 and adopted by the Brazilian Ministry of Health, with the commitment to reduce the incidence of this grievance to 0.5 cases per 1,000 live births[14]. This increase may be the result of both the actual increase in the number of cases and improvements in their notification and investigation, plus the consequent tracking of congenital syphilis[12].

Considering the expansion of the Family Health Strategy (FHS) coverage in the state during the analyzed period and the adherence to the Stork Network, it is possible that these public health initiatives have contributed to the improvement of the notification and, consequently, to the increase in the CS incidence coefficient in Pernambuco, despite not being sufficient to prevent infections in pregnancy or even to detect and treat pregnant women and their sexual partners early on, to avoid new cases of CS[15].

Regarding the sociodemographic aspects, it is clear that the social determinants of health have considerable influence on the occurrence of congenital syphilis. The predominant age group in this study ranged from 20 to 29 years, thus covering women of reproductive age. In this context, it is noteworthy that the experience of female sexuality is not always accompanied by health education measures aimed at protecting sexual practice and family planning[16].

It is also noteworthy that 24.74% of pregnant women in the CS cases are adolescents, a fact that highlights the importance of the extension of the development of prevention and health promotion actions to achieve self-care in this population group, in addition to the use of rapid tests in situations of health care services for women and their sexual partners, even if there is no relation with the motivating complaint that made them seek the health service[6].

The promotion of health campaigns highlighting interventions related to the use of condoms can act in the prevention of STIs,

congenital syphilis, and teenage pregnancy, being already recognized as an important strategic action for reducing the occurrence of cases of the disease in this population group[17].

In a similar study, when the characteristics of prenatal care in Brazilian capitals were evaluated, it was observed that this care is more likely to be inadequate for mothers under 20 years of age, non-white, and with less than 4 years of schooling, corroborating the profile found for the state of Pernambuco[18].

It is verified that almost half of the pregnant women in the cases of CS have low schooling, a fact that is related to the risk of becoming ill, since less access to education can compromise the understanding of the importance of health care, especially about the taking and implementation of preventive measures, which undermines the interruption of the chain of transmission of the disease[19].

However, it cannot be said that syphilis is a risk condition inherent to women with lower education[20], since, in the analyzed period, there was an increase in the number of cases of congenital syphilis in pregnant women with complete high school education, and in 2018, they represented 13.1% of the total. This finding corroborates a study developed in Santa Catarina, in which the occurrence of syphilis tended to increase in more educated strata, probably because this population has greater access to diagnosis and thus contributes to the increase in notifications[20].

In parallel, it was found that black women[11] constitute 77.53% of all pregnant women in the cases of congenital syphilis analyzed in this study. When compared to white women, Black pregnant women present, in general, worse indicators of quality of prenatal care and delivery[21]. In addition to presenting an average of 6 prenatal care consultations, when the national protocols for maternal and child health recommend at least 7, these women also receive less guidance on care[6,22].

A study conducted in the city of Rio Grande, Brazil, evaluated that there is a predominance of not performing serological tests for syphilis in Black women, with less than eight years of schooling, family income below one minimum wage, and who had only one to three consultations during prenatal care[23]. This analysis corroborates the aforementioned associations between schooling and race/color in the prevention of syphilis in pregnancy (GS) and, consequently, CS, even though the coverage refers to a municipality in the Southern region[24].

In the health field, experiences related to racial discrimination can contribute to the adoption of inappropriate behaviors, low adherence to treatment, and even illness, thus increasing the possibility of the occurrence of cases of congenital syphilis[21,24].

As for the final diagnosis, recent congenital syphilis was identified in 90.24% of the cases. Of the remaining notifications, 9.41% resulted in deaths (spontaneous abortions and stillborn fetuses), these events being associated with failures in the treatment of the pregnant woman and could be avoided by early diagnosis and treatment carried out appropriately[25].

The results of this study also showed that, in Pernambuco, most women performed prenatal care and, in 39.14% of cases of congenital syphilis, pregnant women had the diagnosis of syphilis made during this period. However, the occurrence of CS at such high rates points to the presence of challenges related to prenatal care[1], because the national protocols for maternal health recommend that the diagnosis of syphilis should be made in the first trimester of pregnancy and, for this to occur, it is necessary that soon after the confirmation of pregnancy prenatal care is initiated and that there is testing for the possible diagnosis of syphilis and other STIs[26].

Despite the significant percentage of diagnoses during prenatal care, most of them (44.66%) occur late, during delivery, or curettage[27]. The diagnosis at this moment enables the treatment of the mother and/or her sexual partner but is not effective in preventing vertical transmission of the infection. However, it continues to be of significant importance because it enables treatment of the newborn, thus avoiding late CS and other profound consequences of the disease, such as neurosyphilis[6].

Regarding the treatment of pregnant women in cases of congenital syphilis, it can be seen that, as the coverage of the Family Health Strategy (FHS) has increased in the state of Pernambuco, the number of inadequately performed treatments has also increased[27].

The Family Health Strategy represents a proposal to reorganize the population's access to health services, being a fundamental health care point for prenatal care, since it stimulates the establishment and exercise of bonds between primary care professionals and pregnant women[8].

However, there is resistance by FHS professionals to meet the protocols recommended by the Ministry of Health on the therapeutic administration of benzathine penicillin for the treatment of syphilis, remembering that these clinical guidelines consider inadequate any treatment for syphilis in which another drug other than penicillin is administered[26]. The refusal to use the drug is based on possible adverse reactions and the lack of material conditions and supplies to manage cases of anaphylaxis[26]. Nevertheless, the exceptionally low incidence of this reaction would not justify the great social cost that the difficulty of access to this medication represents[28].

In a study conducted in the state of Paraná, Brazil, when quantitatively verifying the management of syphilis in Primary Care, it was observed that most professionals participating in the study (88.4%) identified as adequate and complete the treatment of syphilis in pregnancy conducted with penicillin and in which there was, concomitantly, the treatment of the pregnant woman's sexual partner. However, regarding the drug of choice, if the pregnant woman was allergic to penicillin, 37.2% of these professionals mistakenly chose Erythromycin Stearate as a substitute for the drug[29].

The penicillin shortage experienced in Brazil and the rest of the world, especially from 2014 to 2016, due to issues related to the lack of raw materials for the production of the drug by the pharmaceutical industry, may also have contributed to the growth in the number of cases in which treatment was inadequately performed[13].

However, the treatment of the sexual partner continues to be pointed out by different studies as the main element when analyzing the rate of inadequate treatment of pregnant women with syphilis. The correct prophylaxis for pregnant women prevents re-exposure to the etiologic agent of syphilis and, consequently, vertical transmission of the disease[30].

Among the issues that contribute to the maintenance of this problematic situation are the difficulties in performing serological tests by sexual partners, the fear of not being received by health professionals, and the impossibility, due to work activities, of accompanying pregnant women in prenatal consultations[31].

Solutions aimed at overcoming assistance gaps in primary health care can be found in the creation of a line of care and the active search for pregnant women by community health agents, followed by adequate prenatal care with screening for syphilis in pregnant women and their sexual partners, as well as their respective treatments[32].

The incidence of congenital syphilis in Pernambuco, in the period analyzed, showed the existence of weaknesses in prenatal care, even in the face of increased coverage of the ESF in the state.

The national protocol establishes rapid testing in the first prenatal visit to curb the development of syphilis in pregnancy and, consequently, of CS[26]. However, the analysis of the data showed that the late detection of GS, due to the late initiation of prenatal care, enables the vertical transmission of syphilis, showing gaps in the active search for pregnant women by the ESF team.

Considering that all cases of syphilis occurred in untreated or inadequately treated pregnant women, or in pregnant women who had sex with untreated partners, inadequate treatment contributes to the occurrence of CS and still constitutes a challenge to be overcome.

In this case, it is necessary to develop strategies that promote the adherence of sexual partnerships to prenatal care, stimulating them, especially, to the correct diagnosis and treatment[33].

Even considering all the methodological care, the present study has limitations, namely: 1) use of aggregate data from the state of Pernambuco; 2) a high number of variables without proper registration and/or ignored due to the limitations of the health information systems, these did not present the updated and detailed information of the 12 health regions of the state of Pernambuco; 3) use of secondary data from the health information systems, which may not correctly express the reality; 4) the quality of the information recorded in the health information systems, due to the diversity in the organizational-institutional capacity, in the scope of management and health surveillance, in the various Brazilian contexts.

The results found concerning the congenital syphilis situation in the state of Pernambuco point to healthcare challenges and require the development of novel studies, to support health planning and intensify surveillance strategies for congenital syphilis infection, ensuring universal, equal, and comprehensive access to healthcare network in the territories covered by primary care.

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