

Celeste Souza Rodrigues^I

Mark Drew Crosland
Guimarães^{II}

Cibele Comini César^{III}

Missed opportunities for congenital syphilis and HIV perinatal transmission prevention

Oportunidades perdidas na prevenção da sífilis congênita e da transmissão vertical do HIV

ABSTRACT

OBJECTIVE: To estimate the prevalence of missed opportunities for congenital syphilis and HIV prevention in pregnant women who had access to prenatal care and to assess factors associated to non-testing of these infections.

METHODS: Cross-sectional study comprising a randomly selected sample of 2,145 puerperal women who were admitted in maternity hospitals for delivery or curettage and had attended at least one prenatal care visit, in Brazil between 1999 and 2000. No syphilis and/or anti-HIV testing during pregnancy was a marker for missed prevention opportunity. Women who were not tested for either or both were compared to those who had at least one syphilis and one anti-HIV testing performed during pregnancy (reference category). The prevalence of missed prevention opportunity was estimated for each category with 95% confidence intervals. Factors independently associated with missed prevention opportunity were assessed through multinomial logistic regression.

RESULTS: The prevalence of missed prevention opportunity for syphilis or anti-HIV was 41.2% and 56.0%, respectively. The multivariate analysis showed that race/skin color (non-white), schooling (<8 years), marital status (single), income (<3 monthly minimum wages), having sex during pregnancy, history of syphilis prior to the current pregnancy, number of prenatal care visits (<6), and last prenatal visit before the third trimester of gestation were associated with an increased risk of missed prevention opportunity. A negative association with missed prevention opportunity was found between marital status (single), prenatal care site (hospital) and first prenatal visit in the third trimester of gestation.

CONCLUSIONS: High rates of non-tested women indicate failures in preventive and control actions for HIV infection and congenital syphilis. Pregnant women have been discontinuing prenatal care at an early stage and are failing to undergo prenatal screening for HIV and syphilis.

DESCRIPTORS: Syphilis, Congenital, prevention & control. HIV Infections, prevention & control. Disease Transmission, Vertical, prevention & control. Prenatal Care. Cross-Sectional Studies. Missed Prevention Opportunity.

^I Gerência de Vigilância em Saúde e Informação. Secretaria Municipal de Saúde de Belo Horizonte. Belo Horizonte, MG, Brasil

^{II} Departamento de Medicina Preventiva e Social. Faculdade de Medicina. Universidade Federal de Minas Gerais (UFMG). Belo Horizonte, MG, Brasil

^{III} Departamento de Estatística. Instituto de Ciências Exatas. UFMG. Belo Horizonte, MG, Brasil

Correspondence:

Celeste de Souza Rodrigues
Av. Afonso Pena 2336, 4º andar
Gerência de Vigilância em Saúde e Informação
30130-007 Belo Horizonte, MG, Brasil
E-mail: celestestr@uol.com.br

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RESUMO

OBJETIVO: Estimar a prevalência de oportunidade perdida de prevenção a sífilis e HIV entre gestantes que tiveram acesso ao pré-natal e fatores associados a não-testagem para esses agravos.

MÉTODOS: Estudo transversal com amostra aleatória de 2.145 puérperas do Brasil, 1999 e 2000 admitidas em maternidades para parto ou curetagem e que haviam realizado pelo menos uma consulta de pré-natal. A não-realização de exame de teste para sífilis e/ou anti-HIV durante a gravidez foi usada como marcador para oportunidade perdida de prevenção. Mulheres que realizaram apenas exame de sífilis ou apenas o anti-HIV, ou não realizaram nenhum, foram comparadas àquelas que realizaram os dois (categoria de referência). A prevalência de oportunidade perdida de prevenção foi estimada para cada categoria, com intervalo de confiança de 95%. Os fatores associados com oportunidade perdida de prevenção foram analisados por meio de regressão logística multinomial.

RESULTADOS: A prevalência de oportunidade perdida de prevenção para a realização do teste de sífilis ou anti-HIV foi de 41,2% e 56,0%, respectivamente. A análise multivariada indicou que raça/cor (não branca), escolaridade (≤ 8 anos de estudo), estado civil (solteira), renda <3 salários mínimos, relação sexual durante a gravidez, relato de não ter tido sífilis anterior à gravidez atual, realização de seis ou mais consultas de pré-natal e a realização da última visita antes do terceiro trimestre de gravidez estavam associados a maior risco de ter oportunidade perdida de prevenção. Observou-se uma associação negativa entre estado civil (solteira), local de realização do pré-natal (hospital) e a realização da primeira consulta de pré-natal no terceiro trimestre com oportunidade perdida de prevenção.

CONCLUSÕES: Altas percentagens de gestantes não testadas apontam falhas na prevenção e controle da infecção pelo HIV e da sífilis congênita pelos serviços de saúde. As gestantes continuam interrompendo o cuidado pré-natal precocemente e não conseguindo realizar os procedimentos de triagem para HIV e sífilis.

DESCRIPTORIOS: Sífilis Congênita, prevenção e controle. Infecções por HIV, prevenção e controle. Transmissão Vertical de Doença, prevenção e controle. Cuidado Pré-Natal. Estudos Transversais. Oportunidade Perdida de Prevenção.

INTRODUCTION

Infectious diseases transmitted from mother to child during pregnancy and during labor are still an important and preventable cause of morbimortality among newborns. Maternal syphilis may result in fetal and neonatal death, fetal hydropsy, intrauterine growth retardation, as well as preterm infants.^{5,9} It is estimated that 40% of pregnancies in women with non-treated primary or secondary syphilis evolve into fetal loss or neonatal death.⁴ In recent years, an increase in syphilis prevalence in developing and industrialized countries has been seen, especially primary and secondary syphilis in childbearing women, with a consequent increase in the rate of neonatal syphilis.^{2,16}

In 1993, the Brazilian Ministry of Health developed a plan for the elimination of congenital syphilis in accordance with proposals formulated by the World Health Organization and the Pan American Health Organization. The goal was to achieve an incidence rate equal to or lower than 1 case/1,000 newborns.^a Despite easy and inexpensive diagnosis and treatment, syphilis prevalence was still between 3.5 and 4.0% in 1999 according to the Brazilian Ministry of Health.^a In addition, a national multicenter study carried out in 2000 among puerperal women admitted for labor or curettage in public maternities showed a syphilis seroprevalence of 1.7% and a strong association with not being tested for HIV and syphilis.¹⁰

^a Ministério da Saúde Projeto de eliminação da sífilis congênita. [citado 2005 mar 15]. Disponível em: <http://www.aids.gov.br/assistencia/documentos/referenciais>

HIV vertical transmission is still of public health concern, although it has decreased in several countries. Current recommendations for the prevention of vertical transmission include HIV testing during pregnancy and labor, and for those HIV-positive, the use of combined antiretroviral drugs during pregnancy and the use of zidovudine during labor and by the newborn.^{1,a} Despite universal availability of HIV testing, including rapid tests, and prophylactic medication in Brazil, children are still getting infected. Data from the Brazilian National STD/AIDS Program show that HIV vertical transmission accounted for 83.6% of AIDS cases among children under 13 years of age between 1983 and 2004. In 2004, the number of reported new cases was still of concern (n=450).^b In addition, a surveillance study based on sentinel maternities with parturient women conducted in the five regions of Brazil showed an HIV infection prevalence of 0.6%.^c

It is well known that an elevated proportion of congenital syphilis cases and HIV perinatal transmission is found among women who had low prenatal care attendance, which suggests that full opportunities for maternal infection diagnosis and treatment may be potentially lost.¹¹ A study by Warner et al¹⁸ (2001) shows that each syphilis case in pregnant women should be considered as a potential case of HIV infection and, at the same time, as a potential opportunity for prevention through counseling. Peters et al⁷ (2003) concluded that prenatal care and anti-HIV testing prior to delivery are the greatest opportunities for prevention of HIV vertical transmission. The actions developed for the prevention of both, HIV vertical transmission and congenital syphilis, are thus strongly similar and related to adequate prenatal and delivery assistance.

In 2000 the Brazilian Ministry of Health launched a large national program which aimed at guaranteeing improved quality of care to women and children during pregnancy, delivery and puerperium. It included allocating financial resources to towns and maternity wards and specific recommendations for HIV and syphilis prevention such as HIV and syphilis testing and treatment.¹³

Despite Brazilian government investment in this area and the availability of prevention and treatment actions, there is limited knowledge to what extent women who have access to prenatal care are indeed receiving adequate attention, including counseling, the recommended number of visits, and specifically the opportunity for HIV and syphilis testing.

In this perspective, the present study aimed at determining the prevalence of pregnant women who missed prevention opportunities during prenatal care and to assess factors associated to non-testing to these infections.

METHODS

This cross-sectional study is part of a larger national multicenter study, which was developed in 1999 and 2000^d with the support of the National STD/AIDS Program and the Brazilian Ministry of Health Maternal and Child Health Program. A random probability sample of pregnant women was selected proportionally to the number of deliveries estimated per state and by the number of maternities in each one of 24 states. The detailed methodology has been previously published.¹⁰

Briefly, 3,233 pregnant women admitted for labor or curettage were randomly selected upon admission to the maternity ward according to a pre-defined schedule. An interview and blood collection for syphilis diagnosis were carried out after delivery or curettage. Sociodemographic, behavioral and obstetric data were obtained by structured interview. Data from current hospitalization and prenatal care were also obtained from medical charts to complete the database. For the analysis, only those women who had had at least one prenatal care visit were included, yielding a final sample size of 2,145 pregnant women. Venereal Disease Research Laboratories (VDRL) test and anti-HIV testing during the current pregnancy was used as a marker for the assessment of missed prevention opportunities. Women tested for HIV only, syphilis only (VDRL) or neither of them was compared to those tested for both (reference category).

The prevalence of missed prevention opportunities for VDRL and anti-HIV testing was defined as:

- VDRL: the number of pregnant women who had not been VDRL tested during pregnancy divided by the total of pregnant women in the sample;
- anti-HIV: the number of pregnant women who had not been anti-HIV tested during prenatal care divided by the total of pregnant women in the sample.

A descriptive analysis was performed and differences in proportions were assessed by chi-square test. Significance level was set at 0.05. The magnitude and the independent effect between selected variables and missed prevention opportunities were estimated through odds

^a Ministério da Saúde. Coordenação Nacional DST/AIDS. Projeto Nascer-Maternidades. Brasília; 2002.

^b Ministério da Saúde. Programa Nacional de DST/AIDS. Boletim Epidemiológico AIDST. 2004;1(1).

^c Ministério da Saúde. Programa Nacional de DST/AIDS. Soroprevalência por grupo e corte. Estudo Sentinela Brasil, 1997-2000 [citado 2005 mar 15]. Disponível em: <http://www.aids.gov.br/final/dados/resultados>

^d Guimarães MDC. Estudo de soroprevalência de sífilis em puérperas: um estudo multicêntrico nacional. Ministério da Saúde; 2000. (Relatório técnico final)

ratios (OR) with 95% confidence interval obtained from multinomial logistic regression. This method allows for OR estimation considering a dependent variable with more than two categories. Each category was compared to the reference category in a single process³ as follows: 1. pregnant women who reported anti-HIV testing only; 2. those who reported VDRL testing only; and 3. those who reported not being tested by either test. Each category was compared to those women who reported being tested by both tests during prenatal care. The criterion for initiating multivariate modeling was the presence of association between variables and the dependent variable at p -value <0.20 in the univariate analysis. Only those variables showing statistical significance of less than 0.05 remained in the final model.

Informed consent was obtained from all women participating in the study and the research project was approved by Research Ethics Committee of *Universidade Federal de Minas Gerais*.

RESULTS

Both tests were performed in 32.1% ($n=688$) of 2,145 women, 26.9% ($n=576$) were tested for VDRL only and 12.0% ($n=258$) for anti-HIV only; 29.0% ($n=623$) had not been tested during the current prenatal care. The overall prevalence of missed prevention opportunities for each test was 41.2% (95% CI: 31.4%;50.6%) for VDRL and 56.0% (95% CI: 46.3%;65.7%) for anti-HIV.

Sociodemographic variables showed high proportions of non-white (64%), with ≤ 8 years of schooling (72%), single (59%), homemaker (60%), with monthly income <3 monthly minimum wages (45%) and age ≤ 23 years old (54%). Sexual initiation was at an early age (mean=17.1 years old), while 41% had their first pregnancy at age <18 years and 69% were ≥ 18 years old at first delivery, 91% had at least one sexual intercourse during pregnancy and only 2% reported previous syphilis infection. Most women (58%) attended prenatal care at a health care center. Yet 20% had less than four prenatal visits and 37% had a late prenatal care start, i.e., after the first trimester of gestation. Among women who had started prenatal care after the first trimester, 38% had one to three prenatal visits. For 9% of the women, the last prenatal visit occurred before the third trimester of pregnancy, 73% of which had one to three visits.

Table 1 shows the distribution of subjects according to the tests performed and sociodemographic, behavioral and prenatal care variables, which showed association at $p \leq 0.20$. Missing one or both tests during the current pregnancy was statistically associated ($p < 0.05$) with race (non-white), lower schooling (≤ 8 years), marital status (single), occupation (homemaker), lower monthly family income (<3 monthly minimum wages) and younger age. Similarly, younger women at first delivery and those with less than seven prenatal visits missed one or both tests. It is of concern that women

tested for VDRL (15%) or anti-HIV only (23%) and women who had not been tested for either test (33%) had less than four prenatal visits. In addition, both late prenatal care start and early discontinuation (last prenatal visit before third trimester) of prenatal care were higher among women who had not been tested by either test (42% and 16%, respectively).

The multivariate analysis (Table 2) showed that not being tested for VDRL and anti-HIV was positively and significantly associated with race (non-white), lower schooling (≤ 8 years) and monthly family income, no previous syphilis infection, fewer number of prenatal visits and early discontinuation of care. A dose-response trend was seen for family income, number of prenatal visits and time of the last visit. Not being tested for VDRL and anti-HIV was also negatively associated with receiving prenatal care at the hospital where delivery occurred. Independent positive and significant associations with not being anti-HIV tested were found for lower schooling (≤ 8 years), being single, having sex during pregnancy and having the last prenatal visit in the second trimester. Testing for VDRL was positively and significantly associated with race (non-white), monthly family income and number of prenatal visits, and was negatively associated with marital status (single) and time of the first prenatal visit (third trimester). The p -values of Pearson's chi-square test for all three individual logistic regressions were not significant, indicating good overall fit of the model³

DISCUSSION

The proportion of pregnant women tested for VDRL and anti-HIV during their prenatal care visits was low, with a consequent high prevalence of missed prevention opportunities (41.2% and 56.0%, respectively). This finding corroborates another study conducted by the Brazilian Ministry of Health which also showed a low rate (52.0%) of parturients being tested for HIV and learning of their results during the same prenatal care.¹⁵ Schrag et al¹² (2003) have found a high proportion of women being tested for syphilis but a rather smaller proportion of HIV testing during prenatal care in the United States from 1998 to 1999. Warner et al¹⁸ (2001) have also found 60.0% of missed prevention opportunities for diagnosis and treatment of syphilis during pregnancy in Atlanta (US) from 1990 to 1993. The high prevalence of missed prevention opportunities found in the present study indicates a gap in the adoption of prevention measures and proper intervention by the health services. The failure to diagnose and treat syphilis early in the pregnancy may lead to fetal loss, premature delivery and congenital syphilis, many times asymptomatic and non-diagnosed.^{5,9} Similarly, early HIV infection diagnosis with the use of antiretroviral drugs during pregnancy and labor and the use of zidovudine by the newborn may reduce the rates of vertical transmission to less than 2%.¹

Table 1. Distribution of subjects according to the tests performed during prenatal care and selected variables. Brazil, 2000. n=2,145

Variable	Anti-HIV and VDRL (n=688) n (%)	VDRL only (n=576) n (%)	Anti-HIV only (n=258)	Neither (n=623) n (%)	χ^2	p-value
Race						
White	309 (46)	181 (31)	105 (41)	178 (28)	46.26	0.000
Non-white	379 (54)	395 (69)	153 (59)	445 (72)		
Schooling (years)						
>8	260 (38)	172 (30)	65 (25)	110 (18)	69.01	0.000
≤8	428 (62)	404 (70)	193 (75)	513 (82)		
Marital status						
Other	271 (39)	312 (54)	74 (29)	218 (35)	67.97	0.000
Single	416 (61)	263 (46)	184 (71)	405 (65)		
Occupation						
Homemaker	373 (54)	363 (63)	163 (63)	397 (64)	16.25	0.001
Other	315 (46)	213 (37)	95 (37)	226 (36)		
Family income (MMW*)						
>3	463 (67)	294 (51)	158 (61)	260 (42)	123.72	0.000
1–2	183 (27)	231 (40)	79 (31)	239 (39)		
< 1	42 (6)	51 (9)	21 (8)	124 (19)		
Age (years)						
>23	346 (50)	261 (45)	112 (43)	257 (41)	11.37	0.009
≤23	342 (50)	315 (55)	146 (57)	366 (59)		
Age at first delivery (years)						
>18	505 (74)	400 (70)	182 (71)	390 (63)	19.22	0.003
15–17	163 (24)	149 (26)	66 (24)	197 (32)		
<14	17 (2)	24 (4)	10 (5)	30 (5)		
Sex during pregnancy						
No	63 (9)	40 (7)	15 (6)	64 (10)	7.39	0.060
Yes	625 (91)	534 (93)	242 (94)	554 (90)		
Previous syphilis infection						
Yes	21 (3)	14 (2)	5 (2)	7 (1)	6.23	0.100
No	665 (97)	556 (98)	250 (98)	607 (99)		
Prenatal care site						
Health center	362 (53)	333 (58)	135 (53)	410 (66)	39.35	0.000
Hospital of delivery	136 (20)	95 (17)	50 (19)	60 (10)		
Other	187 (27)	145 (25)	72 (28)	149 (24)		
Number of prenatal visits						
≥7	304 (45)	196 (34)	88 (34)	139 (22)	121.25	0.000
4–6	287 (42)	292 (51)	112 (43)	274 (45)		
1–3	90 (13)	85 (15)	58 (23)	201 (33)		
Time of first prenatal visit						
1st trimester	444 (65)	370 (64)	156 (61)	358 (58)	24.12	0.000
2nd trimester	208 (31)	189 (33)	89 (35)	209 (34)		
3rd trimester	28 (4)	15 (3)	11 (4)	50 (8)		
Time of last prenatal visit						
3rd trimester	648 (95)	539 (94)	224 (88)	516 (84)	56.44	0.000
2nd trimester	31 (4)	34 (6)	27 (10)	80 (13)		
1st trimester	5 (1)	2 (0)	5 (2)	18 (3)		

* One monthly minimum wage (MMW) = US\$ 76.02
 VDRL: Venereal Disease Research Laboratories test

Table 2. Multivariate analysis of missing one or both tests during prenatal care. Brazil, 2000.

Variable	Test performed*		
	VDRL OR (95% CI)	Anti-HIV OR (95% CI)	Neither OR (95% CI)
Race			
White	1.0	1.0	1.0
Non-white	1.70 (1.32;2.17)	1.05 (0.77;1.42)	1.71 (1.33;2.21)
Schooling (years)			
>8	1.0	1.0	1.0
≤8	1.13 (0.86;1.47)	1.71 (1.20;2.44)	1.84 (1.38;2.47)
Marital status			
Other	1.0	1.0	1.0
Single	0.47 (0.38;0.62)	1.60 (1.15;2.22)	0.99 (0.77;1.28)
Family income (MW**)			
≥3	1.0	1.0	1.0
1–2	1.69 (1.30;2.21)	1.01 (0.72;1.42)	1.69 (1.28;2.21)
<1	1.71 (1.07;2.71)	1.05 (0.58;1.89)	3.44 (2.27;5.22)
Sex during pregnancy			
No	1.0	1.0	1.0
Yes	1.33 (0.86;2.06)	1.85 (1.02;3.38)	1.16 (0.76;1.76)
Previous syphilis infection			
Yes	1.0	1.0	1.0
No	1.42 (0.68;2.97)	2.29 (0.82;6.38)	4.53 (1.80;11.42)
Number of prenatal visits			
≥7	1.0	1.0	1.0
4–6	1.57 (1.19;2.06)	1.22 (0.85;1.75)	1.81 (1.35;2.44)
1–3	1.82 (1.13;2.92)	1.55 (0.87;2.78)	3.19 (2.01;5.04)
Prenatal care sit			
Health care center	1.0	1.0	1.0
Hospital of delivery	0.75 (0.54;1.03)	1.08 (0.72;1.60)	0.41 (0.28;0.60)
Other	0.92 (0.70;1.22)	1.12 (0.79;1.60)	0.82 (0.61;1.09)
Time of first prenatal visit			
1st trimester	1.0	1.0	1.0
2nd trimester	0.80 (0.60;1.07)	1.02 (0.70;1.47)	0.77 (0.57;1.03)
3rd trimester	0.35 (0.16;0.75)	0.73 (0.31;1.73)	0.85 (0.45;1.58)
Time of last prenatal visit			
3rd trimester	1.0	1.0	1.0
2nd trimester	0.93 (0.51;1.67)	2.31 (1.22;4.37)	1.94 (1.14;3.27)
1st trimester	0.54 (0.09;3.27)	3.53 (0.81;15.42)	4.43 (1.26;15.49)

* Each category was compared to women who had both tests (anti-HIV and VDRL) performed during prenatal care

** One monthly minimum wage (MMW) = U\$ 76.02

VDRL: Venereal Disease Research Laboratories test

Sociodemographic variables associated to not being tested or being tested for VDRL or anti-HIV only indicate greater social vulnerability of the population studied: single women with low schooling and income. These factors may be markers of poor access to health services and testing. Such findings are consonant with other studies carried out in Brazil and in the United States, which also show low schooling as a predictor of congenital syphilis and HIV perinatal infection.^{15,17}

The proportion of pregnant women who had a late start of their prenatal care (37%) and the proportion who had less than four prenatal visits (20%) should be of concern. Piaggio et al⁸ (1998), in a multicenter study from 1994 to 1995, have found large differences of percentage across sites of women initiating prenatal care in the first trimester, from 18% in Argentina up to almost 80% in Cuba. The Demographic and Health Surveys (DHS) conducted in 1999 and supported by the United States

Agency for International Development (USAID) have found that at least 50% of women reported four or more prenatal care visits in 33 of 45 countries.¹⁹

The increased risk found between not being tested and early discontinuation of prenatal care may be explained by the smaller number of visits and the lack of immediate test request in the first visit. The Brazilian Ministry of Health currently recommends that VDRL and anti-HIV testing should be carried out in the first prenatal visit, regardless of when it begins.¹¹ These findings show the importance of better organization of health care services. In addition, the importance of expanding access, stimulating early access and the establishment of a satisfactory bond between pregnant women and prenatal care providers have been shown to positively impact on the reduction of congenital syphilis and HIV vertical transmission.^{12,17}

The negative association found between receiving prenatal care at the hospital where delivery occurred and not being tested may indicate that prenatal screening is facilitated in settings where laboratory infrastructure is better and more easily accessible. In many primary care settings serological tests are not performed locally, but rather in distant and centralized facilities, causing patients to miss appointments or fail to return for their test results, which can, in turn, result in treatment being delayed or missed.⁶

The increased risk found between no previous history of syphilis and not being tested for VDRL during the current pregnancy may indicate a biased perception of less vulnerability by health professionals, and consequently, a smaller number of test requests during prenatal care. This is corroborated by a study carried out in Bolivia

which indicated that prenatal care physicians usually did not request syphilis testing when they believed pregnant women did not have any risk behavior for sexually transmitted infections.¹⁴

The study results indicate serious failures in prevention actions for HIV infection and congenital syphilis control. Pregnant women are still having a late start and early discontinuation of their prenatal care, thus reducing the likelihood of taking appropriate diagnostic and treatment actions. Investments made and the efforts developed at the three governmental levels for the reduction of HIV vertical transmission and syphilis control, especially congenital syphilis, may not have been as effective. Considering that all pregnant women in the present study had access to at least one prenatal care visit, improving the organization of these services are necessary in order to increase effectiveness of syphilis and HIV control programs. Reach-out programs at the community level should be promoted, in particular among underprivileged populations. Early recruitment and the establishment of adequate bonds with prenatal care providers should also be emphasized. It is also necessary to develop strategies for health professionals in order to assure the minimum number of tests required by the Brazilian Ministry of Health. In addition, timely and adequate treatment for those tested positive for syphilis and prophylaxis for those tested positive for HIV and their exposed children should be of extreme concern and priority. Such actions, which are known to have a positive impact on the reduction of congenital syphilis and HIV infection prevalence, should be immediately sought, implemented and evaluated at all levels of care, from primary – where most women seek prenatal care – to tertiary – where women are referred to for delivery and curettage.

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