Antenatal Screening and Maternal and Congenital Syphilis at Ga-Rankuwa Hospital

— UM Hallbauer, HH Crewe-Brown, JB Ellis, MF Mahomed, GS Fehrsen

Dr UM Hallbauer,
MB BCh, MPraxMed, DCH
Donald Fraser Hospital,
PO Vhufuli,
VENDA, 0971

HH Crewe-Brown
MBBCH, DCH, FF Path (SA) DTM&H

JB Ellis
MBBCH

MF Mahomed
Dip Med Lab Tech (Clin Path, Micro & Immun), FSMLT (SA)

GS Fehrsen
BA, MBCHB, MFGP (SA)

Curriculum vitae

Dr Ute Hallbauer qualified in 1982 at Wits and has worked in several academic hospitals in various disciplines. She completed the MPraxMed at Medunsa in 1987 and the research presented here was part of her MPraxMed requirements. Ute is currently working as a medical officer in the Donald Fraser Hospital in rural Venda, and is a keen hiker enjoying nature in unspoilt remote areas.

Summary

The quality of antenatal screening for syphilis was analysed and syphilis serology was carried out on mothers and their babies at the time of delivery at Ga-Rankuwa Hospital, over a period of six weeks. Four hundred and eighty four (484) of 567 (85%) mothers had received some form of antenatal care at a clinic, a hospital or from a general practitioner. Antenatal blood specimens for syphilis serology had been taken from 380/484, (78,5%) of the women but only 278/484 (57,4%) had results available at delivery. Of these, thirty five (35) women, (12,5%) had reactive serology, but only 3/35, (8,6%) received full therapy and 16/35, (46%) received partial therapy, mainly in the third trimester. Serological tests for syphilis on mothers at delivery were reactive in 94 of 567, (16,6%). Of the 469 newborns studied, there were 3 cases (0,6%) of congenital syphilis, 7 (1,5%) stillbirths associated with maternal syphillis and 66, (14,1%) babies who were assessed as having serology compatible with syphilis, although apparently asymptomatic. Recommendations are made for antenatal screening for syphilis and treatment of RPR reactive patients.

S Afr Fam Pract 1991; 12: 460-6

KEYWORDS:
Syphilis; Pregnancy; Syphilis, Serodiagnosis.

Introduction

Congenital syphilis is a common diagnosis in the Department of Paediatrics at Ga-Rankuwa Hospital. Of 6 267 admissions, 174 cases of syphilis (2,8%) were diagnosed clinically and/or serologically during 1987 in neonates and infants under 3 months of age. A descriptive study was thus undertaken to assess the effectiveness of antenatal screening for syphilis in the area, and to provide an estimate of the incidence of maternal and congenital (neonatal) syphilis.

Antenatal care is provided at the Ga-Rankuwa Hospital and its referring clinics by doctors and midwives and by private general practitioners (GPs). High risk mothers receiving antenatal care outside the hospital, are referred to Ga-Rankuwa Hospital for delivery and bring referral letters or their clinic antenatal notes with them. The clinics are controlled by one of four different authorities. The Soshanguve clinic is under the jurisdiction of Ga-Rankuwa Hospital which, at the time of the study, was administered by the Department of National Health and Population Development. The Pretoria and Brits clinics are run by midwives employed by the town councils.

The Odi District clinics in Bophuthatswana are run by the Bophuthatswana Department of Health and Welfare. The fact that all clinics, except in Soshanguve, are outside the jurisdiction of Ga-Rankuwa Hospital, complicates planning and coordinating of the service. The clinics are situated at distances of 2 to 50 kilometres from the Hospital.

Patients and Methods

Over a six week period from May to July 1987, 567 mothers who delivered at the hospital (Monday to Friday) were included in the study. This represented about 50% of the health care service deliveries in the area for that period. The following

... Antenatal Screening for Syphilis

data was obtained from the mothers and their antenatal case notes: maternal age; clinic attendance; the approximate gestational age at antenatal booking; taking and date of the serology specimen and result availability at delivery. (Patients at Ga-Rankuwa Hospital, Soshanguve clinic and Pretoria City Council clinic were routinely screened antenatally with the RPR test and, if positive, the TPHA and FTA-ABS tests were carried out. Bophuthatswana and Brits clinics only utilised the unquantitated RPR test. Repeat serology was not routinely carried out in the third trimester). The details of therapy were also obtained where possible. The effectiveness of treatment could not be assessed because of a generally poor record system and difficulties in patient follow-up.

Only 57,4% of mothers who had received antenatal care, had serology results available at delivery

At delivery 567 maternal blood specimens were tested for syphilis. It was possible to study 469 neonates born of these mothers. Neonatal cord blood specimens were taken on live births and a repeat venous blood specimen was taken from each baby whose cord blood was positive for syphilis.[1]

All babies had blood taken within 48 hours of birth. The mothers all gave verbal consent and provided home or contact addresses for follow-up purposes.

All sera obtained were screened and quantitated, when positive, using the Dade rapid plasma reagin (RPR) card test. (Biokit Laboratories, Barcelona, Spain).[2]

The *Treponema pallidum* haemagglutination assay (TPHA), (Wellcome Diagnostics, England) was also carried out in all cases. Sera which were positive in either or both of these tests were then tested using the fluorescent treponemal antibody absorption (FTA-ABS) test (Wellcome Diagnostics).[3]

The 1988 Guidelines for the Prevention and Control of Congenital Syphilis of the Centres for Disease Control (CDC), Atlanta, USA,[4] were used to assist in the interpretation of results. At that time the CDC regarded the specific IgM tests as still experimental. (Table I)

Table II: Providers of antenatal care for mothers delivering at Ga-Rankuwa Hospital (n = 567)

	No	Percentage
Ga-Rankuwa Hospital	89	15,7
Soshanguve Clinic	87	15,3
Brits Clinic	10	1,8
Pretoria City Council	12	2,1
Distant Clinics/hospitals	28	4,9
Odi District Clinics	230	40,6
General practitioners	27	4,8
Unknown	1	0,2
Unbooked	83	14,6

Results

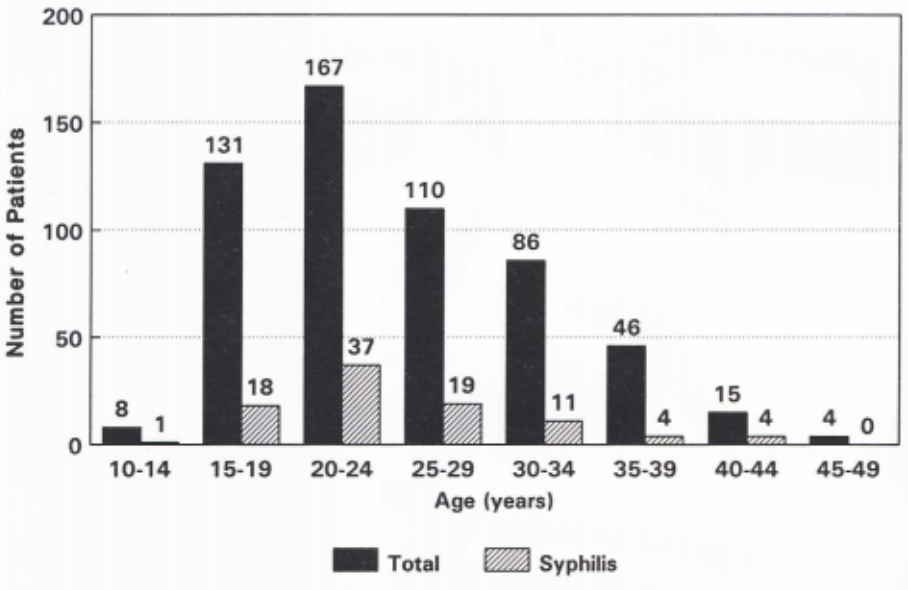
Ga-Rankuwa Hospital and Soshanguve clinic (both supervised by hospital doctors) provided antenatal care for 31% of mothers (Table II), while 14 Odi district

Table I: Practical Interpretation of serological results at birth

RPR	TPHA	FTA-ABS	Mother	Baby
-	-	-	No disease	No disease
-	+	+	Previous* infection	Transferred antibodies
+	+	+	Reactive	Compatible with syphilis
+	+	+	Disease unlikely if mother fully treated	Disease unlikely if mother fully treated
+	-	-	False positive	No disease

\+ = Positive result
\- = Negative result
* = Theoretically these results can be found in the first few days on reinfection or with late latent untreated people.

Fig. 1: Age distribution of mothers
(n = 567)



clinics in Bophuthatswana provided care for 40,6%. Nearly 5% received care from GPs in the area. Only 14,6% of women who delivered at the hospital had not had any antenatal care. The mean age was 25 years, the range 12 - 48 years. (Fig 1). Approximately 30% of mothers were under 21 years and 54% under 25 years of age.

In the group of 484 patients who received antenatal care, blood was taken in 380 (78,5%). No blood was obtained from 34 (7%), and in 70 (14,5%) it was not known if blood had been taken (no record, or patient could not remember).

Of mothers who had attended Ga-Rankuwa Hospital, syphilis results were available in 76,4% at delivery; of those who had attended Soshanguve clinic, 82,8% had results. Between 50 - 60% of mothers who attended district clinics had available results. Only one (of 28) patients who had been seeing a GP said blood was taken, but details were not available. All patients said they had seen a GP more than once. Overall, only 278 (57,4%) of the mothers who had received antenatal care had results available at delivery.

60% of those mothers with syphilis were younger than 25 years

Twenty four percent (24%) of mothers booked before 25 weeks gestation (Table III). Even in this group, 18% had no serological results available at delivery. The percentage of women without results rose progressively, the later the booking occurred during pregnancy. Of those who booked after 36 weeks, 48% had no available results.

According to their antenatal records, 35 patients (12,5%) had antenatal results indicating serology reactive for syphilis. Of these, only 3 (8,6%) were fully treated with 3 weekly injections of 2,4 mu of benzathine penicillin each (or full alternative treatment), 16 (46%) were partially treated and 16 (46%) received no treatment. An additional 9 were

Table III: Time of booking and availability of syphilis results

Gestational Age at Booking	Mothers Who Booked (%)	No Results at delivery (% of those with no results)
≤ 24 weeks	107 (23,5%)	19 (17,8%)
25 - 28 weeks	79 (17,3%)	28 (35,4%)
29 - 32 weeks	82 (18,0%)	26 (31,7%)
33 - 36 weeks	47 (10,3%)	19 (40,4%)
> 36 weeks	46 (10,1%)	22 (47,8%)
Unknown	95 (21,0%)	74 (77,9%)
Total	456	188 (41,2%)

labelled by doctors or midwives antenatally as having active disease (RPR-ve, TPHA+ve, FTA-ABS+ve) and were given partial or full therapy. The time of treatment was often not recorded in patients' records. Based on the time of booking and allowing for delays in obtaining and reacting upon serological results, treatment was assessed as having been given in the third trimester in most cases. In five patients treatment was commenced 3 weeks or less before delivery.

Blood was obtained at delivery from 567 mothers (Table IV). Based on serology, 16,6% were assessed as being reactive for syphilis. Fifty two (52) of 94 (55%) had RPR titres of ≥ 1:8. Of mothers who were unbooked or attended GPs, 19,4% were reactive at delivery. Of the 94 mothers, only 3 (3,2%) had received full therapy antenatally and 16 (17%) partial therapy. The former 3 were treated late antenatally and could not confidently be placed in the "disease unlikely" category (Table I). There were only four likely false positive RPR reactions (0,7%) in this study.

Table IV: Serology at delivery: Mothers (n = 567)

Reactive serology for syphilis	94 (16,6%)
Previous infection	104 (18,3%)
No exposure to syphilis	369 (65,1%)

Figure 1 indicates that 60% of those with syphilis were younger than 25 years, the highest incidence being in the 20 - 24 year age group.

Table V shows that 2,1% (10/469) of babies born were considered to be affected by syphilis (stillborn or clinical congenital syphilis). During the study period only 3 babies were obviously clinically affected. Seven of 26 still-births were associated with maternal syphilis but unfortunately were not examined to confirm this impression. A further 14% (66/469) had results compatible with syphilis but were apparently asymptomatic. Radiology of long bones and CSF investigations were not carried out on asymptomatic babies with positive serology. Their serological results however warranted treatment. In this group were 3 mothers who were fully treated late antenatally. Thus, 14,7% of live births had serologically reactive syphilis results.

Table VI: Outcome of pregnancy in mothers with reactive serological results

Babies	No
Clinical congenital syphilis	3 (3,7%)
Stillbirth, probably syphilis	7 (8,5%)
Serology compatible with syphilis (asymptomatic)	66 (80,5%)
No disease, transferred antibodies (maternal past syphilis)	2 (2,4%)
No disease, negative serology	4 (4,9%)
Total	82*

* No blood was obtained from 12 babies

Of babies born to syphilic mothers, 10 (12,2%) were affected at birth including 3 with clinical congenital syphilis (Table VI). Thus, 84,1% (69/82) of babies born to mothers with reactive serology warranted antibiotic treatment.

Table VII indicates the RPR titres in 68 mothers and babies with positive serology. Sixty two percent (62%) of mothers and 41% of their babies had RPR titres of ≥ 1:8. Maternal RPR titres ranged from 1:2 - 1:512 and infant titres from 1:2 - 1:64. Of the 68 babies, 3 had a higher RPR titre than the respective mother, 21 the

Table V: Status and serology at delivery: Babies (n = 469)

Clinical congenital syphilis	3 (0,6%)
Stillbirth, reactive mother	7 (1,5%)
Serology compatible with syphilis (asymptomatic)	66 (14,1%)
No disease, transferred antibodies (maternal past syphilis)	60 (12,8%)
Stillbirth, no maternal syphilis	19 (4,1%)
No disease, negative serology	314 (67,0%)

Table VII: RPR serology in mother and baby pairs with positive TPHA and FTA-ABS tests

	RPR		
	≤ 1:4 No (%)	≥ 1:8 No (%)	Total
Mothers	26 (38)	42 (62)	68
Babies	40 (59)	28 (41)	68*

* One of 3 babies with clinical congenital syphilis died before blood could be taken

same titre, 22 a RPR titre one dilution lower and 22 more than one dilution lower than the respective mother.

Discussion

A large percentage (85%) of women in our study attended a clinic or doctor for antenatal care. Many had no serological results available at term. Return of results to the clinics often takes a long time (approximately 3 weeks). Distribution is via a central collection point after despatch from the laboratory which prolongs the period before results are received and increases the chances of results getting lost. In addition, clinics run out of tubes at times and blood may only be taken at a later visit. These difficulties are compounded when patient attendance is late during pregnancy or inadequate. Blood specimens may not be taken at all. Similar problems have also been reported in a study carried out in Zambia.[5] The situation has improved since this study was carried out, and several GPs in the area now routinely test antenatal patients for syphilis.

Health workers should make a greater effort to take blood specimens early, get serological results back as soon as possible and ensure that they are appropriately recorded in patient files. Our study showed that availability of results was influenced by late booking, but even in patients who booked early (≤ 24 weeks), several had no results. Similar problems were encountered by Venter *et al* (1989), who also found that some mothers did not return for results antenatally, and that documentation of results was inadequate.[6]

Another problem that became apparent in this study is ignorance of some medical and nursing staff of the interpretation of results and inappropriate reaction to results. Unsatisfactory treatment and incomplete treatment of mothers has also been reported in studies on the Witwatersrand[6], in Durban[7] and in Zambia.[8]

Availability of antenatal results did not appear to influence the incidence of syphilis as detected by serology at delivery, since there was no significant difference between the percentage of reactive patients in the two groups in which antenatal results were either known or not known prior to delivery.

84% of babies born to mothers with reactive serology, warranted antibiotic treatment

Inadequacy and lateness of therapy during the third trimester, allows insufficient time for the RPR titre to fall significantly or revert to negative on testing at delivery. RPR positivity in the third trimester may also represent an early infection. Mothers incubating syphilis may have seronegative infants that are still at risk of developing syphilis in the first two months.[9]

The high incidence of syphilis in the under 25 year age group should be considered in health and sex education.

Study showed eroneous interpretation of results leading to inappropriate management

The incidence of maternal syphilis in this study of 16,6%, based on serological tests at delivery, is similar to that in other studies.[10] In 1985 a rate of 7,6% was reported in Cape Town,[11] approximately 11% in Durban[7] and 20% in Bloemfontein.[12] At Baragwanath Hospital 16,2% of women had positive RPR tests[13] and in a previous study at Ga-Rankuwa Hospital in 1982, 18,4% had positive RPR and FTA-ABS tests.[14] Figures from other southern African studies are also high: 12 - 18% has been recorded in Zambia[15] and 4,5 - 14,6% in Mozambique.[16]

It is noteworthy that 35% of mothers in our study had had exposure to syphilis at some time since 18,3% had serology compatible with past infection and 16,6% with present infection. This accords with a Zambian study in which 29% of mothers of live-born babies had evidence of present or past infection.[5]

About 14,7% of all live births were assessed as being serologically compatible with syphilis, the majority

being asymptomatic at birth. Babies with RPR titres ≤ 1:4 were also considered since one clinically syphilitic baby had an RPR titre of 1:4. In this case the maternal RPR titre was 1:64; thus an infant RPR titre equal to or greater than that of the respective mother was not a reliable guide in predicting which baby was likely to be clinically affected. In assessing our results, we

"Antenatal care should begin with a serological test for syphilis, and end with a serological test for syphilis"

consider that we overdiagnosed syphilis in asymptomatic babies, especially since we saw only 26 patients with congenital syphilis in the post-neonatal period in 1987, an incidence of 0,5% of all post-neonatal (age 1 - 3 months) paediatric admissions. A study among black primary school children in Bloemfontein showed that 2% had positive tests for syphilis (RPR+ve, TPHA+ve, FTA-ABS+ve).[12]

At least 12,7% of babies in our study were considered to have transferred antibodies - representing approximately two thirds of those whose mothers had evidence of past infections. The true figure for transferred antibodies was not possible to assess but was obviously higher than given, since RPR reactivity in babies with positive specific tests may often only represent the passive transfer of maternal antibodies.

Positive serological tests in babies were found in 6,5% of consecutive deliveries in Lusaka, but only 0,9% (7,2% of serological positives) had clinical features of syphilis.[17] Larson and Larson report that about 20% of babies that are serologically active at birth, develop clinical syphilis later.[18] The number of children that develop signs of congenital syphilis at a later stage is probably reduced by postnatal exposure to penicillins for other infections. We attempted to follow-up every mother and baby at the address given to us at delivery. Unfortunately only a small number could be found and no further comment on our figures is therefore possible.

Estimates of the proportion of babies with evidence of infection who are born to syphilitic mothers vary greatly.[19,20] In Durban 46,8% had serological evidence of active infection (however, this was based on only 27% of babies born to syphilitic mothers.[21] At Baragwanath hospital 26% of offspring of mothers with RPR titres ≥ 1:8 were affected (symptoms of congenital syphilis, stillbirth or abortion).[6] Schulz *et al*

Any patient with a reactive RPR test should be treated

suggest that there is a 33% chance that an untreated mother will deliver a live infant with syphilis.[10] From our study we found that 69 of 82 (84%) of babies born to serologically active mothers, had results that warranted penicillin treatment. Especially if follow-up is poor, any baby with a positive RPR test, regardless of the titre, should be treated.[17]

During the period of study there were 7 stillbirths (of 26) likely to be caused by syphilis - 26% which were preventable. In Maputo, Mozambique, 8,5%[16] and in Zambia 42% of stillbirths[8] were reported to be caused by syphilis.

Recommendations

Although routine antenatal testing for syphilis and treatment will not in itself eliminate the disease[1], more attention must be paid to this aspect of antenatal care.[22,23] "Antenatal care should begin with a serological test for syphilis and end with a serological test for syphilis."[1] Meticulous records

When treating infected women, remember their partners!

should be kept of serological results and therapy. RPR tests must be available on a daily basis at all obstetric units wherever possible. This is necessary if there is a large turnover of obstetric patients, most of whom are discharged within 24 - 48 hours of delivery. Patient-retained records would be of help in identifying mothers (and babies) who need to be tested. Midwives at peripheral clinics should also follow this practice. Every baby born to a syphilitic mother must be tested and/or treated. When results show serology compatible with syphilis, the benefits of treatment far outweigh the possible advantages of not treating. We suggest that any patient with a reactive RPR test be treated. The findings of these studies should also be conveyed to midwives and other health personnel involved in antenatal care. Partners should not be forgotten when treating infected women.

Acknowledgements

We would like to thank Miss L Grobler for excellent technical assistance and also Dr L van Heerden, Medical Superintendent, Ga-Rankuwa Hospital, for permission to publish this study.

References

1. Larsen SA, Hunter EF, Beck-Sague C. The laboratory's role in the prevention and diagnosis of congenital syphilis: A review. Centers for Disease Control, Atlanta GA: 1987.
2. Perryman MW, Larsen SA, Hambie EA, et al. Evaluation of a new Rapid Plasma Reagin card test as a screening test for syphilis. J Clin Microbiol 1982; 16: 287-90.
3. Larsen SA, Hambie EA, Pettit DE, et al. Specificity, sensitivity, and reproducibility among the Fluorescent Treponemal Antibody Absorption test, the Microhaemagglutination assay for Treponema pallidum antibodies, and the Haemagglutination Treponemal test for syphilis. J Clin Microbiol 1981; 14: 441-5.
4. Centers for Disease Control. Guidelines for the prevention and control of congenital syphilis - 1988. Morbid Mortal Weekly Rep 1988; 37: S1 1-13.
5. Watts TE, Larsen SA, Brown ST. A case-control study of stillbirths at a teaching hospital in Zambia, 1979-1980: serological investigations for selected infectious agents. Bull WHO 1984; 62: 803.
6. Venter A, Pettifor JM, Exposto F da LMPP, Sefuba M. Congenital syphilis - who is at risk? S Afr Med J 1989; 76: 93-5.
7. Manning B, Moodley J, Ross SM. Syphilis in pregnant black women. S Afr Med J 1985; 67: 966-7.
8. Ratnam AV, Din SN, Hira SK et al. Syphilis in pregnant women in Zambia. Br J Vener Dis 1982; 58: 355-8.
9. Murphy FK, Palamasucon P. Congenital Syphilis. In: Holmes KK, et al eds. Sexually transmitted diseases. USA: McGraw-Hill 1984: 352-74.
10. Schulz KK, Cates W Jr, O'Mara PR. Pregnancy loss, infant death and suffering: Legacy of syphilis and gonorrhoea in Africa. Genitourin Med 1987; 63: 320-5.
11. Gonin JM. Syphilis - an appraisal of the Groote Schuur Hospital antenatal screening programme. S Afr Med J 1985; 67: 962-5.
12. Van Niekerk CH, Van Niekerk LC, Van den Ende J. Positiewe serologiese toetse vir sifilis by swart laerskool kinders van Bloemfontein. S Afr Med J 1985; 67: 90-1.
13. Venter A. Congenital syphilis. Community Paediatrics and Primary Health Care. University of Witwatersrand 1987.
14. Mahomed MF, Mokaila PP, Barron C, Crewe-Brown HH. The prozone phenomenon in syphilis serology in antenatal patients. S Afr J Sex Transm Dis 1984; 4: 29-31.
15. Ratnam AV, Chatterjee TK, Mulenga RC. Sexually transmitted diseases in pregnant women in Lusaka. Med J Zambia 1980; 14: 75-8.
16. Liljestrand J, Bergstrom S, Nieuwenhuis F, Hederstedt B. Syphilis in pregnant women in Mozambique. Genitourin Med 1985; 61: 355-8.
17. Hira SK, Bhat CJ, Ratnam AV, Chintu C, Mulenga RC. Congenital syphilis in Lusaka II: Incidence at birth and potential risk among hospital deliveries. East Afr Med J 1982; 59: 306-10.
18. Larsson Y, Larsson U. Congenital syphilis in Addis Ababa. Ethiop Med J 1970; 8: 163-72.
19. Robertson RR, Spector I. Syphilis serology among women attending an antenatal clinic. S Afr J Sex Transm Dis 1985; 5: 18-22.
20. Taber LH. Evaluation and management of syphilis in pregnant women and newborn infants (an interview) Pediatr Infect Dis 1982; 1: 224-7.
21. Naicker SN, Moodley J, van Middelkoop A, Cooper RC. Serological diagnosis of syphilis in pregnancy. S Afr Med J 1983; 63: 536-7.
22. Williams K. Screening for syphilis in pregnancy: An assessment of the costs and benefits. Community Med 1985; 7: 37-42.
23. Hira SK, Ratnam AV, Sehgal D, Bhat GJ, Chintu C, Mulenga RC. Congenital syphilis in Lusaka I: Incidence in a general nursery ward. East Afr Med J 1982; 59: 241-5.