

Preventing perinatal group B streptococcal infection: the jury is still out

Should Australia follow the US decision to base prophylaxis on results of maternal screening?

EVER SINCE GROUP B streptococcus (GBS) emerged as the commonest cause of perinatal sepsis in the late 1970s, there has been controversy about prevention strategies. A few hospitals in Australia were among the first in the world to introduce routine antenatal screening for GBS carriage and intrapartum antibiotic prophylaxis for carriers.¹ This approach was later vindicated by randomised controlled trials in selected carriers² and the demonstration of lower rates of sepsis after intrapartum prophylaxis compared with historical rates.³ However, problems remain. Group B streptococcus is a normal vaginal commensal in healthy women, but colonisation is often intermittent, and rates of colonisation can vary from 18% to 27%, depending on the detection method.⁴ Moreover, vaginal carriage is a very crude predictor of perinatal sepsis, with fewer than 1% of the infants of carriers affected (1–2/1000 overall) without intervention.^{1,5}

In 1996, the Centers for Disease Control and Prevention (CDC) in the United States published consensus guidelines for selecting women for intrapartum antibiotic prophylaxis using either of two alternative strategies. One strategy was based on maternal GBS carriage, and the other on clinical risk factors — preterm labour (< 37 weeks' gestation), prolonged rupture of membranes (> 18 hours) or intrapartum fever (> 38°C).⁶ The rationale for the latter strategy was that, before widespread use of intrapartum antibiotics, one or more of these risk factors was found in up to 80% of mothers of infants with GBS sepsis.^{1,7} Gradual implementation of these consensus guidelines in the US was associated with a fall in the incidence of perinatal GBS sepsis from 1.7/1000 in 1992 to 0.5/1000 in 1999.⁸ In Australia, there was also a decrease in the incidence of perinatal GBS sepsis, from 1.2/1000 in 1991–1993, when three of nine neonatal units surveyed had prevention strategies in place, to 0.5/1000 in 1995–1997, when all 11 units surveyed had prevention strategies.⁵ A recent review concluded that there is evidence, albeit from relatively poor-quality trials, that intrapartum prophylaxis reduces the incidence of neonatal sepsis, but not deaths.⁹

Despite this evidence, concern continues about excessive use of intrapartum antibiotics. There have been several reports that their increasing use is associated with an increased proportion of cases of neonatal sepsis caused by penicillin-resistant bacteria.^{10,11} Although it is sometimes difficult to prove, there is considerable empirical evidence that increased antibiotic use generally leads to increasing bacterial resistance. It is plausible that exposure to antibiotics *in utero* might delay colonisation of the infant gut with penicillin-sensitive anaerobes and allow penicillin-resistant facultative bacteria — many of which are potential pathogens — to become established.

Recently, the CDC published revised guidelines, recommending a single strategy for prevention based on universal

prenatal screening for vaginal or rectal GBS colonisation.¹² The recommendation was based on a retrospective cohort study, which showed that perinatal GBS sepsis was significantly less frequent in infants of women given intrapartum antibiotics on the basis of documented GBS screening results (0.33/1000 births) than in infants of women managed on the basis of risk factors (0.59/1000 births; relative risk, 0.48; 95% CI, 0.37–0.63).¹³ This result is not surprising. A risk factor-based protocol cannot, by definition, prevent sepsis in infants whose mothers have no risk factors. On the other hand, the proportion of cases prevented by a protocol based on GBS colonisation depends on the sensitivity of the screening method, effectiveness of prophylaxis and compliance with the protocol.^{4,14}

What *was* surprising in the CDC study was that the anticipated overall rate of intrapartum antibiotic use was similar for both prevention strategies (31% and 29%).¹³ In contrast, we showed that in Australia a strategy based on risk factors would lead to significantly less use of intrapartum antibiotics (18%–20% of women) than a strategy based on antenatal screening at 35–37 weeks' gestation (35%).⁴ This difference is apparently due to a higher incidence of risk factors in the US compared with Australia, and failure to account for women given intrapartum antibiotics during preterm labour before results of screening are available. They suggest that obstetricians in Australia should not immediately discard the option of a risk-based strategy.

Neither strategy is ideal, but either, if properly implemented, can reduce the incidence of perinatal GBS sepsis. The GBS screening strategy results in at least a third of healthy young women (and their infants) being given intravenous antibiotics during labour, at significant cost and with some risks, but can achieve a lower rate of perinatal GBS sepsis.¹³ In Australia, with a risk-based strategy, significantly fewer women and infants would receive intravenous antibiotics. Whichever strategy is chosen, the most important determinant of its effectiveness will be compliance.

Gwendolyn L Gilbert

Clinical Professor in Medicine and Infectious Diseases, University of Sydney
and Director, Centre for Infectious Diseases and Microbiology
Institute of Clinical Pathology and Medical Research
Westmead Hospital, Westmead, NSW
lyng@icpmr.wsahs.nsw.gov.au

- Gilbert GL, Garland SM. Perinatal group B streptococcal infections. *Med J Aust* 1983; 1: 566-571.
- Boyer KM, Gadzala CA, Kelly PD, Gotoff SP. Selective intrapartum chemoprophylaxis of neonatal group B streptococcal early-onset disease. III. Interruption of mother-to-infant transmission. *J Infect Dis* 1983; 148: 810-816.
- Jeffery HE, Moses LM. Eight-year outcome of universal screening and intrapartum antibiotics for maternal group B streptococcal carriers. *Pediatrics* 1998; 101: E2.
- Gilbert GL, Hewitt MC, Turner CM, Leeder SR. Epidemiology and predictive values of risk factors for neonatal group B streptococcal sepsis. *Aust N Z J Obstet Gynaecol* 2002; 42: 494-503.
- Isaacs D, Royle JA. Intrapartum antibiotics and early onset neonatal sepsis caused by group B Streptococcus and by other organisms in Australia.

- Australasian Study Group for Neonatal Infections. *Pediatr Infect Dis J* 1999; 18: 524-528.
6. Prevention of perinatal group B streptococcal disease: a public health perspective. Centers for Disease Control and Prevention. *MMWR Recomm Rep* 1996; 45 (RR-7): 1-24.
 7. Oddie S, Embleton ND. Risk factors for early onset neonatal group B streptococcal sepsis: case-control study. *BMJ* 2002; 325: 308-312.
 8. Schrag SJ, Zywicki S, Farley MM, et al. Group B streptococcal disease in the era of intrapartum antibiotic prophylaxis. *N Engl J Med* 2000; 342: 15-20.
 9. Small F. Intrapartum antibiotics for Group B streptococcal colonisation. *Cochrane Database Syst Rev* 2000; 2: CD000115.
 10. Stoll BJ, Hansen N, Fanaroff AA, et al. Changes in pathogens causing sepsis in very-low-birth-weight infants. *N Engl J Med* 2002; 347: 240-247.
 11. Towers CV, Briggs GG. Antepartum use of antibiotics and early-onset neonatal sepsis: the next 4 years. *Am J Obstet Gynecol* 2002; 187: 495-500.
 12. Prevention of perinatal group B streptococcal diseases. Centers for Disease Control and Prevention. *MMWR Recomm Rep* 2002; 51(RR-11): 1-22.
 13. Schrag SJ, Zell ER, Lynfield R, et al. A population-based comparison of strategies to prevent early-onset group B streptococcal disease in neonates. *N Engl J Med* 2002; 347: 233-239.
 14. Gilbert GL, Isaacs D, Burgess MA, et al. Prevention of neonatal group B streptococcal sepsis: is routine antenatal screening appropriate. *Aust N Z J Obstet Gynaecol* 1995; 35: 120-126. □

Whither pathology in medical education?

Academic pathology needs to be reinigorated

FOR WELL OVER A CENTURY, pathology has played a pivotal role in our understanding of disease. Its principles underpin many of our teachings in medicine and surgery, for, as Rudolf Virchow — the eminent 19th century pathologist and founder of modern pathology — so aptly observed, “Through the application of its doctrines ... it helps to deepen biological knowledge, and to light up still further that region of the unknown which still envelops the intimate structure of living matter”.¹ In short, an understanding of pathology is an essential prerequisite to an understanding of medicine.

Against this background, it is of serious concern to the Royal College of Pathologists of Australasia that the role of pathology has been downgraded and marginalised with the ascendancy of problem-based learning in Australian medical schools.^{2,3} It is true that medical curricula over the previous half century placed too much emphasis on the basic sciences at the expense of the social and communicative aspects of medicine. However, as so often happens when changes are made, the pendulum has now swung too far the other way, to the detriment of pathology and anatomy. As Sir John Lilleyman, past President of the Royal College of Pathologists (UK), recently observed, “Current students are taught everything about grieving, but little about the causes of death”.⁴

By its very nature, problem-based learning involves a multidisciplinary approach to clinical problems.² Sometimes the facilitator for problem-based learning sessions is not a medical graduate. Furthermore, pathologists in academia are now in such short supply that those remaining have limited time to participate in these sessions. (In one Australian university with a faculty of medicine, there is only one half-time academic in pathology, and another university no longer has an independent department of pathology.) The end result is reduced exposure of medical students to pathologists and loss of invaluable mentoring. Consequently, more and more teaching is falling on already overburdened hospital pathologists and registrars-in-training. Furthermore, pathologists in private practice are reducing their teaching commitments because of heavy workloads.

Anecdotal evidence suggests that the recruitment of medical graduates into a specialist discipline depends on a number of factors. These include the exposure to that discipline in the medical course and in postgraduate years 1 and 2, and the presence of role models in particular fields. Over the past half century, Australian pathology has been fortunate in having people of stature in academic positions.

A recent Australian Medical Association study⁵ showed that lifestyle issues are becoming an increasingly important subject in career selection. With the currently decreasing staffing levels in academic departments of pathology and lack of formal rotations into pathology in the immediate postgraduate years, there is every likelihood that future recruitment of Australian graduates into pathology will be difficult. We are currently awaiting the report into the pathology workforce of the Australian Medical Workforce Advisory Committee. It will provide recommendations on the number of training positions needed in each State to satisfy future workforce requirements.

What can be done to reverse the decline in pathology, particularly in academia? Firstly, the profile of pathology needs to be raised in the pre-university, medical, and general communities. To this end, the College introduced “Pathology Week” in 2002. It involved laboratory tours for secondary-school students, meetings with medical students in some universities, and a dinner bringing together pathologists and leaders in the business community. This year, “Pathology Week” will be held on 10–16 March. Part of the purpose of the Week is to raise the profile of pathology in the wider community: very few Australians know what a pathologist does, despite millions of pathology tests being performed each year. The College has also produced educational material for members of the public and for students contemplating a career in pathology.

The Federal Government, through its Quality Use of Pathology Committee, is seriously considering providing financial support to create teaching modules for use in problem-based learning courses. The aim is to ensure that medical graduates of the future have some knowledge of the proper ordering of pathology tests in clinical practice. The Federal Government has also supported the production of a new edition of the *Manual of use and interpretation*