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Short report

Group B streptococcus in the Northern Territory in 2023: clindamycin down but not out

Kate Proudmore, Ma Nu Nu Swe, May Leitch, Kim Clayfield, Jann Hennessy, Rob Baird

Abstract

Group B streptococcus (GBS) is a significant cause of perinatal morbidity and mortality; prophylactic antibiotics in the obstetric population can mitigate the risk of neonatal infection. The antibiotic of choice is penicillin; however, in women who have a penicillin hypersensitivity, clindamycin is the preferred agent. Worldwide resistance to clindamycin is rising in GBS isolates. In the Top End of the Northern Territory of Australia, we reviewed 113 GBS isolates in 2023. These GBS isolates revealed a 30% resistance to clindamycin. This rate has considerably increased since the Australia-wide survey published in 2011 where GBS resistance to clindamycin was quoted at 4.2%. As a result of this study, we are advocating for a change in practice in patients with known GBS resistance with penicillin hypersensitivity.

Streptococcus agalactiae, or group B streptococcus (GBS), is a significant cause of perinatal morbidity and mortality;^{1,2} however, prophylactic antibiotics can mitigate the risk of infection. The most important risk factor for neonatal GBS infection is maternal colonisation.¹ In the Northern Territory (NT) of Australia, the incidence of neonatal early onset GBS is 0.36 per 1000 live births.² The primary prophylactic agent for maternal administration to prevent neonatal GBS disease is penicillin, but for women who have a severe hypersensitivity to penicillin, recommendations include clindamycin as an alternative agent.³

In the adult population, GBS can cause a wide range of infections and effects most body systems.¹ More invasive disease like meningitis can occur in the immunosuppressed population. GBS is a notable but infrequent cause of infective endocarditis and is also associated with wound and urinary tract infections.¹

Group B streptococci are highly susceptible to penicillin, but there is emerging evidence of increasing resistance to erythromycin and clindamycin worldwide.⁴ The resistance patterns for macrolides stems from ribosomal modifications

by methylation from encoded *erm* genes.⁵ Gene expression causing clindamycin resistance may be constitutive (c-MLSB phenotype) or induced by the presence of erythromycin (i-MLSB phenotype).⁶ More rarely, isolates may express *lnu* genes, resulting in susceptibility to erythromycin but resistance to clindamycin (L phenotype).^{5,6}

Clindamycin resistance rates among GBS vary widely depending on geographic region and local prescribing practices. An Australia-wide survey using data to 2006 showed low clindamycin resistance rates of 4.2%.⁴ However, a 2022 study from New South Wales showed a higher clindamycin resistance rate of 32%.⁷ In the United States of America, the overall prevalence of clindamycin-resistant isolates was reported to be approximately 40% in 2019.⁸ In Europe, clindamycin resistance rates among GBS vary by country, with reported rates ranging from less than 10% to over 36%.⁹ In Asia, clindamycin resistance rates among GBS also vary by country but overall are higher: for example, a study in South Korea reported a clindamycin resistance rate of 55.4% amongst GBS isolates, while a study in China reported a resistant rate of 73.3% to clindamycin.^{10,11}

Table 1: Group B Streptococcus antimicrobial susceptibility data, Top End NT, January–March 2023

Antibiotic	Susceptibility of GBS isolates	
	Susceptible, n (%)	Resistant, n (%)
Penicillin	113 (100)	0
Vancomycin	113 (100)	0
Erythromycin	68 (60)	45 (40)
Clindamycin	79 (70)	34 (30)

Table 2: Group B streptococcus clindamycin resistance rates within Australia^a

Jurisdiction	Collection year	Clindamycin resistance rate (%)	Reference
Australia	2006	4	4
Australia	2019	33	14
New South Wales	2020	12	15
New South Wales	2022	32	7
Western Australia	2021	40	16
Northern Territory	2023	30	(this work)

^a No local published data was found for the Australian Capital Territory, Queensland, South Australia, Tasmania, or Victoria.

Current NT public laboratory practice does not include routine antimicrobial susceptibility testing for GBS detected on antenatal screening swabs. We have conducted a review of GBS resistance to clindamycin and erythromycin in the Top End (which encompasses the northernmost section of the NT, covering an area in excess of 500,000 km² with a sparse population of 180,000 and a distinct tropical monsoonal season).¹² This review was undertaken to determine whether the current resistance testing practice and intrapartum antibiotic selection should be amended. This was a prospective study, looking at 113 sequential isolates sent to the public reference laboratory in the NT over a three-month period from January to March 2023. The isolates comprised wound swabs from various sites (47%); antenatal screening swabs (45%); urine cultures (4%); and sterile sites including blood cultures and intraoperative tissue (4%).

GBS was isolated using a variety of selective and chromogenic agars: Columbia horse blood agar (Thermo Fisher Scientific, TFS) and Columbia horse blood agar with colistin and nalidixic acid (TFS) for wound swabs; Brilliance UTI Agar (TFS) for urine and vaginal swabs; and Granada agar (TFS) for antenatal screening swabs. GBS was identified from Granada agar (TFS) by the presence of orange colonies.¹³ For all other agars, identification of GBS was confirmed using a Lancefield Streptococcal antigen grouping kit (Oxoid) or by matrix-assisted laser desorption-ionization time of flight (MALDI-TOF, Biomérieux) mass spectrometry. Antimicrobial susceptibility testing was performed according to the Clinical and Laboratory Standards Institute (CLSI), employing the double disc diffusion method using a 15 µg erythromycin disc and a 2 µg clindamycin disc placed at an edge-to-edge distance of 12 mm.^{1,13} Inducible clindamycin resistance was detected by a ‘D test’: a positive ‘D test’, indicated by flattening/blunting of the clindamycin zone closest to the erythromycin disk, giving the appearance of a ‘D’, is consistent with a i-MLSB phenotype.^{1,13}

The results reveal that 30% of GBS isolates tested were resistant to clindamycin. The GBS isolates were allocated categories according to resistance phenotypes (Table 1).^{1,13} Of these 34 clindamycin-resistant isolates, 28/34 (82%) showed constitutive resistance of the c-MLSB phenotype (23/34; 68%) or the L phenotype (5/34; 15%). Inducible resistance, i-MLSB phenotype, was found in 6/34 (18%) of the clindamycin-resistant isolates.

Clindamycin therefore should only be used as an alternative to penicillin in colonised antenatal patients as prophylaxis where it has been proven susceptible, otherwise intravenous vancomycin is the suggested alternative.³

The Garland study of 2011 is still widely quoted, with their data demonstrating clindamycin resistance in 4.2% of GBS isolates.⁴ Our results concur with recent data revealing increasing clindamycin resistance around Australia (Table 2); however, not all jurisdictions have published their rates.

Within the Northern Territory, we found a resistance rate of 30% to clindamycin in our GBS isolates. The therapeutic guidelines, for GBS-positive antenatal patients with a severe (immediate or delayed) hypersensitivity to penicillin, recommend vancomycin.³ On the basis of our study, we recommend that antimicrobial susceptibility testing should be performed on all positive antenatal GBS screening swabs in the NT, in particular for patients with a severe (immediate or delayed) hypersensitivity to penicillin. In addition, we should move away from clindamycin and consider vancomycin as first line for this cohort of patients whilst awaiting clindamycin susceptibility results. This has strong public health implications for the at-risk obstetric population within the NT. As a result of this research, we would suggest that other jurisdictions which have areas of a similar demographic population should undertake similar studies.

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