Surveillance of antibiotic resistance in *Neisseria gonorrhoea*e in the WHO Western Pacific Region, 2002

WHO Western Pacific Gonococcal Antimicrobial Surveillance Programme

Abstract

The World Health Organization's Western Pacific Region (WHO WPR) long standing programme for surveillance of antimicrobial resistance in *Neisseria gonorrhoeae,* GASP, continued in 2002. Seventeen countries contributed data on about 11,500 gonococci by determining susceptibility patterns using standardised methodologies. Resistance to quinolone and penicillin antibiotics remained widely dispersed and at historically high levels. Gonococci with decreased susceptibility to third generation cephalosporins were again observed in several centres. Spectinomycin resistance was infrequently encountered. Control of gonorrhoea in the WHO WPR is compromised by the further reduction in options for cheap and effective treatment of gonorrhoea. *Commun Dis Intell* 2003;27:488–491.

Keywords: surveillance; Neisseria gonorrhoeae*; antimicrobial resistance; gonorrhoea; antibiotics; quinolones; penicillins; spectinomycin; cephalosporins*

Introduction

Antimicrobial resistance in *Neisseria gonorrhoeae* has deleterious consequences for the successful treatment of the individual patient and on control measures for gonococcal disease. The potential for emergence and spread of antibiotic resistant gonococci is well documented in the World Health Oragnization Western Pacific Region (WHO WPR). Resistance to the quinolone group of antibiotics is the most recent example of antimicrobial resistance compromising the efficacy of a gonococcal treatment, and quinolone resistant gonococci (QRNG) have now spread widely within and beyond the WPR. Ominously, there have been instances of altered susceptibiity to third generation cephalosporins in the region[1,2] and recently these strains have also appeared in centres outside the WHO WPR.[3] Currently in the WHO WPR it is difficult to define cheap and effective standard treatments for gonorrhoea. It thus becomes increasingly important to have available accurate data on antimicrobial resistance in the gonococcus in order to guide selection of an appropriate standard treatment schedule.

The WHO WPR Gonococcal Antimicrobial Surveillance Programme (GASP) is a continuing program of susceptibility surveillance in the Region and has published surveillance data annually since 1992.[4] This communication provides an analysis of surveillance of antimicrobial resistance in *N. gonorrhoeae* in the WHO WPR in 2002.

Methods

The methods used by the WHO WPR GASP have been published[5] and provide full details of the source of isolates, sample populations, laboratory test methods and quality assurance programs used to generate data. These methods were unaltered in 2002. Most isolates were collected from symptomatic sexually transmitted disease clinic patients. As a guide to the interpretation of the following data, a WHO expert committee has recommended that treatment regimens be altered once resistance to a particular antibiotic reaches five per cent.[6]

Results

About 11,500 gonococcal isolates were examined for susceptibility to one or more antibiotics in 17 participating countries (listed in the acknowledgements) in 2002.

Quinolones

Quinolone resistant gonococci (QRNG) have been widely distributed in the WHO WPR for many years and use of this group of agents is no longer recommended for treatment of gonorrhoea in many countries. Travellers who acquire infection in the WPR, but present in other regions, would require treatment with agents other than quinolones.

Correspondence: Assoc. Professor John Tapsall, WHO Collaborating Centre for STD and HIV, Department of Microbiology, Prince of Wales Hospital, Randwick, NSW Australia 2031. Telephone: +61 2 9382 9079. Facsimile: +61 2 9398 4275. Email: j.tapsall@unsw.edu.au

QRNG were detected in 13 of the 14 countries that examined a total of about 10,700 isolates for quinolone resistance in 2002. The exception was Papua New Guinea where use of these quinolones is limited. Data from these 14 WPR countries are shown in Table 1 and QRNG are divided into 'less susceptible' and 'resistant' categories on the basis of susceptibility determinations. Rates of QRNG, where detected, ranged from five per cent (New Caledonia) to 95 per cent (Korea). Very high proportions of QRNG were detected in Brunei, China, Hong Kong, Japan, Korea, Laos, Malaysia, the Philippines, Singapore and Vietnam. Most of the QRNG in the majority of countries displayed high level resistance.

Cephalosporins

A small number of isolates with altered susceptibility to third generation cephalosporins was noted in both the 2000 and 2001 reports. In 2002 these were again detected in small numbers in Australia, Brunei, China, Korea and Malaysia. Non-GASP data from Japan[7] indicate the continuing presence of these resistant strains in that country.

Spectinomycin

A small number of spectinomycin resistant strains were found in China and Vietnam. Only very occasional strains resistant to this injectable antibiotic have been found in recent WPR surveys.

Penicillins

Resistance to the penicillins has been at high levels for many years and use of this group of antibiotics has been largely discontinued except for a few areas such as rural Australia, where monitoring demonstrates a continued susceptibility to the agent. For most centres in the region, resistance by both chromosomal (CMRNG) and plasmid-mediated mechanisms (penicillinase producing *N. gonorrhoeae* – PPNG) remained widespread. Table 2 provides details of CMRNG, PPNG and/or total penicillin resistance in 17 WPR countries.

Very high rates of penicillin resistance (CMRNG +/– PPNG) were recorded in Laos (100%), the Philippines (92%), Korea (81%), China (85%), Papua New Guinea (82%) and Hong Kong (70%). Malaysia and Brunei (60%), Singapore (55%), Tonga (25%) and Vietnam (30%) also had high rates of penicillin resistance. In past years, low rates of penicillin resistance were observed in Pacific Island states, and continued to be low in New Caledonia (3%) and Fiji (1.8%). However, PPNG were prominent in Vanuatu (20%). Other participants submitting data in 2002 (Australia, Japan and New Zealand) had rates of penicillin resistance between 9 and 30 per cent.

Table 1. Quinolone resistance in *Neisseria gonorrhoeae* isolated in 14 countries in the WHO Western Pacific Region in 2002

	Tested	Less susceptible		Resistant		All QRNG	
Country	n	n	%	n	%	n	%
Australia	3,861	77	2.0	312	8.1	389	10.1
Brunei	33	1	3.0	20	61.0	21	63.6
China	1,249	–	–	–	–	1,115	92.5
Hong Kong SAR	3,488	165	4.7	3,205	89.1	3,272	93.8
Japan	211	24	11.4	155	73.4	179	84.8
Korea	210	68	32.4	133	63.3	201	95.7
Laos	58	1	1.7	43	74.1	44	75.9
Malaysia	10	1	10.0	4	40.0	5	50.0
New Caledonia	62	3	4.8	0	–	3	4.8
New Zealand	718	48	6.7	61	8.5	109	15.2
Papua New Guinea	279	0	–	0	–	0	0.0
Philippines	99	2	2.0	57	57.5	59	59.6
Singapore	200	9	4.5	93	46.5	102	51.0
Vietnam	213	49	23.2	97	46.0	146	79.2

QRNG Quinolone-resistant *Neisseria gonorrhoeae*

Table 2. Penicillin sensitivity in *Neisseria gonorrhoeae* isolated in 17 countries in the WHO Western Pacific Region in 2002

Country	Tested	PPNG		CMRNG		All penicillin resistant	
	n	n	%	n	%	n	%
Australia	3,861	274	7.1	421	10.9	695	18.0
Brunei	42	25	59.5	0	0.0	42	59.5
China	1,250	434	34.7	637	50.9	1,071	85.6
Fiji	672	9	1.3	3	0.5	12	1.8
Hong Kong SAR	3,488	768	22.0	1,651	47.3	2,419	69.4
Japan	211	2	1.0	61	29.0	63	30.0
Korea	210	48	22.8	123	58.6	171	81.4
Laos	20	18	90.0	2	10.0	20	100.0
Malaysia	10	3	30.0	3	30.0	6	60.0
New Caledonia	62	2	3.2	0	–	2	3.2
New Zealand	718	23	3.2	43	6.0	66	9.2
Papua New Guinea	279	111	40.0	114	41.0	245	82.0
Philippines	99	88	88.8	3	3.0	91	91.9
Singapore	200	103	51.5	6	3.0	109	54.5
Tonga	41	–	–	–	–	10	25.0
Vanuatu	55	11	20.0	NT	NT	11	20.0
Vietnam	213	61	28.6	3	1.4	64	30.0

PPNG Penicillinase producing *Neisseria gonorrhoeae.*

CMRNG Chromosomally mediated resistance in *Neisseria gonorrhoeae.*

NT Not tested.

Tetracyclines

Although tetracyclines are not a recommended treatment for gonorrhoea, these agents are widely used and readily available in the WPR. One particular type of plasmid-mediated resistance gives rise to high level tetracycline resistance (TRNG). Ten thousand five hundred and seventeen gonococci were examined for high level tetracycline resistance in 15 WPR countries in 2002 (Table 3). High rates of TRNG continue to be reported from Brunei, Laos, Malaysia, Singapore, China, Hong Kong, Vietnam and the Philippines, all with rates between 26 and 97 per cent. In other countries rates of TRNG ranged between 1 and 11 per cent of strains examined.

Table 3. High level tetracycline resistance in *Neisseria gonorrhoeae* isolated in 15 countries in the WHO Western Pacific Region in 2002

Country	Tested	TRNG	TRNG
	n	n	%
Australia	3,861	442	11.4
Brunei	30	28	93.0
China	1,250	388	31.0
Hong Kong SAR	3,488	996	28.6
Japan	211	2	1.0
Korea	210	9	4.3
Lao PDR	58	56	96.6
Malaysia	10	7	70.0
New Caledonia	62	1	1.6
New Zealand	718	45	6.3
Papua New Guinea	279	6	2.1
Philippines	99	28	28.0
Singapore	200	128	64.0
Tonga	41	1	2.4
Vietnam	213	56	26.3

TRNG Tetracycline resistant *Neisseria gonorrhoeae.*

Discussion

The 2002 WHO WPR GASP surveillance data confirmed trends in resistance patterns in gonococci seen in recent years. This surveillance is difficult to undertake, and sample sizes in some settings are restricted. Despite these limitations, there are sufficient data to determine that resistance to cheap oral antibiotic agents such as the penicillins and quinolones in most countries is so high as to preclude their use. Any contemplated use of these agents for patients infected in these countries would be ill advised unless laboratory confirmation of susceptibility is available.

The choice of alternative treatment regimens is limited by the cost of suitable alternative antibiotics. The continued occurrence of gonococci with altered susceptibility to third generation cephalosporins associated with documented treatment failure remains a matter of considerable concern. However this problem with oral third generation cephalosporins has not as yet extended to injectable agents such as ceftriaxone. Spectinomycin resistance remains sporadic and has been observed in parts of the region in the past. The current situation is one for great concern, as the resistance occurred in a pathogen causing a high incidence of disease and with a documented propensity to widely disseminate resistant subtypes.

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