Gonococcal Infection

CDNA National Guidelines for Public Health Units

Revision history			
Version	**Date**	**Revised by**	**Changes**
1.0	27 August 2018	Developed by Gonococcal Infection SoNG working group	Original Endorsed by CDNA: 6 February 2019 Endorsed by AHPPC: 23 April 2019

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These guidelines capture the knowledge of experienced professionals and provide guidance on best practice based upon the best available evidence at the time of completion.

Readers should not rely solely on the information contained within these guidelines. Guideline information is not intended to be a substitute for advice from other relevant sources including, but not limited to, the advice from a health professional. Clinical judgement and discretion may be required in the interpretation and application of these guidelines.

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Endorsed by CDNA: 06 February 2019
Endorsed by PHLN (Laboratory Section): 11 September 2018
Endorsed by AHPPC: 23 April 2019
Released by Health: 08 May 2019

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Gonococcal Infection

CDNA National Guidelines for Public Health Units

1. Summary

Response to notified cases of gonococcal infection is often seen as a shared responsibility between public health units, sexual health clinics, and individual diagnosing clinicians. While the balance of responsibility may vary between jurisdictions, and in different situations, these guidelines are primarily intended for public health units and should be adapted to suit local practices, recognising that there are some situations, such as cases with multi-drug resistant gonococcal infection, where public health involvement is critical.

Public health priority

Priority Classification	***Public health response timeline***	***Data entry timeline***
High – ceftriaxone* resistant infections, infections in minors and pregnant women, outbreaks	Act as soon as possible, generally within 1 working day	Within 3 working days
Routine	Action should be carried out as part of routine duties	Within 5 working days

* Resistance to ceftriaxone (Minimum Inhibitory Concentration, MIC ≥ 0.5mg/L)

Case management

Isolation of case is not required.
Case management is the responsibility of the diagnosing clinician.

Advice should be provided to the case that:

- all medications should be taken as directed
- all sexual partners should be notified, and encouraged to be tested and treated if necessary
- sexual contact should be avoided until 7 days after the case and their current sexual partner(s) have been treated

Contact management

- contact tracing and management for most cases is the responsibility of the treating clinician
- contact tracing is a priority for all patients with confirmed infection
- offer testing and recommend treatment to known sexual partners
- contact tracing outcome measures should be recorded

2. The disease

Infectious agent

Neisseria gonorrhoeae, a Gram-negative diplococcus.

Reservoir

Humans

Mode of transmission

Gonococcal infection is highly contagious and is usually transmitted through unprotected vaginal, anal or oral sexual contact with an infected person. Transmission is by direct inoculation of infected secretions from one mucous membrane to another (1, 2). Primary sites of infection are mucous membranes of the urethra, endocervix, rectum, pharynx (3) and conjunctiva (1, 4).

Gonococcal infection can be transmitted perinatally from an infected mother to her child during childbirth resulting in ophthalmia neonatorum (5). It can also be transmitted via non-sexual means to infants and young children via fomites, although such cases are rare. Flies and fomites have been implicated in the spread of gonococcal conjunctivitis (6).

People with asymptomatic infections can transmit the infection to others (7).

Natural infection from *N. gonorrhoeae* does not elicit immunity (8). Gonococcal strains are antigenically heterogeneous (9), however reinfection (10) with the same strain is possible.

Incubation period

The time elapsed between the exposure to *N. gonorrhoeae* to when the symptoms first become apparent varies depending on the site of infection.

The incubation period for symptomatic urethral gonococcal infection in men is usually 2-5 days, but may be 1-14 days or longer (11).

The incubation period for urogenital gonococcal infection in women is more uncertain as infections in many women are asymptomatic. If asymptomatic, gonococcal infection in women may not be identified unless complications [such as pelvic inflammatory disease (PID)] have developed. When symptomatic, symptoms probably develop within 10 days of infection (12).

Infectious period

N. gonorrhoeae is a rapidly dividing organism, and patients should be regarded as infectious from the time of exposure for as long as organisms persist. When treated, a patient should be considered infectious until 7 days after completion of treatment, though organisms may be cleared more rapidly than this (13).

The infectious period for untreated gonococcal infection is not well described and may vary according to the site of infection (14). For example, the duration of asymptomatic rectal gonococcal infection may be up to a year whereas pharyngeal gonococcal infection usually clears spontaneously within 12 weeks (15).

Clinical presentation and outcome

Gonococcal infection is manifested by a wide range of presentations including asymptomatic and symptomatic local infections, local complicated infections and systemic dissemination. Up to 80% of women and 10-15% of men with urogenital gonococcal infection have no genital symptoms (13). Rectal and pharyngeal infections are usually asymptomatic in both males and females.

Men:

Urethral infection is symptomatic in 80% of cases. The predominant symptom in men with urethral infection is urethral discharge or dysuria with variable degrees of oedema and erythema of the urethral meatus (16). Urethral infection in men is usually symptomatic within 2-5 days following exposure. Local complications include penile oedema, periurethral and paraurethral abscesses, urethral stricture, epididymoorchitis, and prostatitis. Bilateral epididymitis could potentially impair fertility (16).

Women:

Gonococcal infection usually involves the endocervix and/or urethra and is often asymptomatic. When symptomatic, symptoms may include increased vaginal discharge and dysuria, and probably occur within 10 days following exposure. Local complications include Bartholin abscess, lymphangitis and ascending infection involving the uterus, fallopian tubes, or ovaries sometimes resulting in endometritis, salpingitis and PID with a risk of subsequent tubal infertility. If asymptomatic, gonococcal infection in women may not be identified unless complications have developed.

Gonococcal vaginitis is the most common form of gonococcal infection in pre-pubertal girls where the non-oestrogenised vaginal mucosa can be infected.

Infection during pregnancy can result in premature rupture of membranes and premature delivery. *N. gonorrhoeae* can be transmitted to the neonate, usually at delivery, resulting in ocular and/or anogenital infection. Acute purulent conjunctivitis occurs in the newborn usually 2-5 days after birth. Eyelid oedema and chemosis can progress rapidly to keratitis and endophthalmitis. This requires early recognition and treatment to avert blindness.

Other sites:

Rectal infections are usually asymptomatic. If symptoms occur they may include pruritus, mucopurulent discharge, rectal pain and bleeding or proctitis. The prevalence of rectal infection in women is positively correlated with the duration of endocervical infection.

Pharyngeal infections may be an important source of urethral and perhaps rectal infections in men who have sex with men (MSM). It is estimated that 90% of pharyngeal infections are asymptomatic with a spontaneous cure rate reported as 100% at 12 weeks (16).

Gonococcal conjunctivitis, though rare, is a medical emergency at any age. In adults it is often attributed to auto-inoculation. The clinical presentation ranges from mildly symptomatic to marked photophobia with purulent discharge and formation of crusts accompanied by sore red eyes (17, 18). Gonococcal conjunctivitis is sight threatening (18, 19) and must be treated urgently.

Disseminated gonococcal infection (DGI) can lead to a range of clinical symptoms including arthritis or arthralgias, tenosynovitis, and multiple skin lesions. Bacteraemia, fever, endocarditis and meningitis have been also been reported with DGI (20). DGI is estimated to occur in 0.5 to 3 percent of patients infected with *N. gonorrhoeae* (21).

Persons at increased risk of infection

Any person can acquire gonococcal infection through unprotected vaginal, anal or oral sex with an infected person. In Australia, people at highest risk of gonococcal infection are MSM, female partners of MSM, sex workers, and young Aboriginal and Torres Strait Islander people in remote areas. Infection does not confer immunity against *N. gonorrhoeae*, so these groups are at risk of reinfection (8).

Disease occurrence and public health significance

Heterosexual transmission of gonococcal infection among urban non-Indigenous communities is an emerging issue for Australia (22). Gonococcal infection notification rates in Australia have increased by 63% between 2012 and 2016 (62 to 101 per 100,000 population). Rates increased in both men (by 72%) and women (by 43%) (23). The ratio of notifications to Medicare-rebated gonococcal infection tests increased in both men and women between 2015 and 2016 (23). The increase in notifications may be due to a number of factors, including the introduction of more sensitive diagnostic tests like nucleic acid amplification testing (NAAT), increased testing of extragenital sites, increase in routine sexually transmissible infections (STIs) screening and ongoing high levels of unprotected sex. Co-infection with other STIs is common (24).

In Australia, the gonococcal infection notification rate in the Aboriginal and Torres Strait Islander population was 6.9 times that in the non-Indigenous population (582 per 100 000 compared to 84 per 100 000 population) in 2016. In the Aboriginal and Torres Strait Islander population residing in remote/very remote areas, the notification rate of gonococcal infection was nearly 30 times higher than in the non-Indigenous population (25). The gonococcal infection notification rate here was reported to be 1,444 per 100,000 population. In both Indigenous and non-Indigenous populations, rates are highest among young people (15-24 year olds) (26).

The reasons for these disparate rates are complex. They include social disadvantage including poverty, income and education inequality, and challenges accessing culturally appropriate health care and specialist STI services. These factors are known to be associated with higher STI rates in populations globally (27).

Higher gonococcal infection notification rates in the MSM community have been observed in recent years (22). The increase in notifications is most likely due to multiple factors including increased screening and use of more sensitive tests to screen and diagnose the infection. Individual-level risk behaviours, such as number of lifetime sex partners, rate of partner exchange and frequency of unprotected sex, may also contribute to the increased notifications observed in MSM (28, 29).

The development of antimicrobial resistance in *N. gonorrhoeae* has led to an increase in the prevalence of multidrug resistant (MDR) and extensively drug resistant (XDR) gonococcal

infection[1], which includes resistance to extended-spectrum cephalosporins (30, 31). Isolates of strains exhibiting critical antimicrobial resistance to ceftriaxone (MIC ≥ 0.5 mg/L) and with high level resistance to azithromycin (MIC ≥ 256 mg/L) have been reported including in Australia (32, 33), raising concerns that gonococcal infection may become challenging to treat in certain circumstances.

3. Routine prevention activities

A combination of coordinated prevention activities is more effective than an isolated, single activity. Testing should be done on all individuals requesting sexually transmissible / blood-borne infection screening.

Sexual health promotion and education programs aim to increase awareness of STIs and empower people to adopt safer sex practices, such as using condoms. These programs are targeted to priority populations including young people, MSM, Aboriginal and Torres Strait Islander populations, and sex workers.

Regular testing is encouraged for:

- individuals with multiple and new partners to limit onward transmission
- individuals who have had sexual contact with a person with confirmed or suspected gonococcal infection
- individuals with a history of previous gonococcal infection
- individuals with a history of other STIs such as syphilis, chlamydia and human immunodeficiency virus (HIV)
- sex workers
- MSM, and
- Aboriginal and Torres Strait Islander people aged 15-29 years

4. Surveillance objectives

- Monitor disease trends to direct and evaluate public health strategies.

- Enable timely notification of cases to facilitate prompt management of cases and contacts (testing and treatment).

- Enable timely detection of clusters and outbreaks to facilitate prompt investigation and implementation of interventions to control transmission.

[1] In this document, MDR and XDR *N. gonorrhoeae* are defined as by Tapsall et. al. (31). In brief, MDR-*N. gonorrhoeae* are defined as those infections resistant to one of the category I antibiotics (which includes injectable extended spectrum cephalosporins, oral extended-spectrum cephalosporins and spectinomycin) and at least two of the antibiotic classes listed in category II (which includes penicillins, fluoroquinolones, azithromycin, aminoglycosides and carbapenems). XDR-*N. gonorrhoeae* are defined as those resistant to two or more of the antibiotic classes in category I and three or more in category II (30).

- Monitor antimicrobial susceptibility to identify XDR strains to facilitate urgent case management and contact tracing, and to evaluate treatment guidelines.[2]

Data management

Confirmed cases should be entered into the jurisdictional notifiable diseases database within three working days for high priority cases and five working days for routine cases following laboratory notification.

If an individual has *N. gonorrhoeae* detected in more than one anatomical site for specimens taken on the same day, then these positive results will be counted as a single case.

Where a positive culture or NAAT test is reported following a previous notification, this report should be counted as a new infection if more than 21 days have passed since completion of appropriate treatment.

5. Communications

Confirmed cases must be notified to the state / territory Communicable Disease Branch (CDB) (via PHUs in some jurisdictions) as routinely required under public health legislation of that jurisdiction. This will involve notification by the diagnosing laboratory and in some jurisdictions also by the diagnosing clinician. The CDB will notify the case to the National Notifiable Diseases Surveillance System (NNDSS).

The patient should be advised that gonococcal infection is a notifiable disease and that it is necessary for the jurisdictional health department / PHU to be notified of this infection. It is the responsibility of the treating clinician to do the case follow-up including contact tracing and partner notification; PHUs may elect to do this under specific circumstances if resources permit.

[2] World Health Organization recommends that if the proportion of resistant strains from tested samples is ≥ 5%, treatment guidelines need to be reviewed and modified. All isolates of gonococci should be sent to the Australian Gonococcal Surveillance Programme (AGSP) reference laboratory for susceptibility testing (www.health.gov.au/internet/main/publishing.nsf/content/cda-pubs-annlrpt-gonoanrep.htm).

6. Case definition

The case definition may have been updated since the publication of this guideline. Please check the case definitions webpage on the Australian Government Department of Health's website (www.health.gov.au/internet/main/publishing.nsf/Content/cdna-casedefinitions.htm) for the latest version.

Reporting

Only **confirmed cases** should be notified.

Confirmed case

A confirmed case requires **laboratory definitive evidence** only.

Laboratory definitive evidence

1. Isolation / detection of *Neisseria gonorrhoeae* by culture

OR

2. Detection of *Neisseria gonorrhoeae* by nucleic acid testing

7. Laboratory testing

Testing guidelines

Patients with probable gonococcal infection on clinical appearance or who have tested positive by NAAT should have a swab collected from that site sent for culture and susceptibility testing whenever it is possible, prior to treatment. This is increasingly important with the emergence of resistance to antimicrobials routinely used for treatment.

On-site microscopy, if available, of a Gram-stained smear from a man with a urethral discharge can provide a rapid presumptive diagnosis with high (>95%) sensitivity and specificity. Due to poor sensitivity and specificity, microscopy is not recommended for cervical, vaginal, rectal and throat infections.

There is no blood test for gonococcal infection.

NAATs are the mainstay of gonococcal infection diagnosis (34). These tests are usually combined with a NAAT for chlamydia. NAATs that provide some limited information on antimicrobial sensitivity are becoming available but are not yet widely used in diagnostic laboratories.

Rapid (90 minutes) point-of-care NAAT tests for gonococcal infection and chlamydia using the GeneXpert® system are becoming available, greatly reducing the time to treatment. These point-of care tests perform as well as laboratory-based NAATs. Positive results from point-of-care tests that are not confirmed with conventional laboratory testing should be notified to the relevant state/territory health authority by the person performing the test. It is important that swabs are also collected where possible, so that antimicrobial susceptibility testing can be undertaken.

Rapid lateral flow tests for gonococcal infection are not recommended due to poor performance.

8. Case management

Response times

Prioritisation of the public health response to a case of critical antimicrobial resistant gonococcal infection is HIGH. Where a case of critical antimicrobial resistant gonococcal infection is identified, the relevant PHU should respond within 1 working day following the 'Public Health response to critical antimicrobial resistant gonococcal infection' procedure outlined in Appendix D.

Critical antimicrobial resistant gonococcal infection is defined (30) as gonorrhoea with:
- High level resistance to azithromycin (MIC ≥ 256mg/L) OR
- Resistance to ceftriaxone (MIC ≥ 0.5mg/L) OR
- Both of the above (including MDR and XDR isolates)

For all other gonococcal infection cases, the public health response is ROUTINE. Within 5 working days of notification enter confirmed cases into jurisdictional database and begin follow up where there is capacity to do so, using the relevant state/territory disease investigation form (example provided in Appendix C). Follow up should be prioritised for the following populations – children aged <16 years, pregnant women (where known), sex workers (where known), people with repeat notifications within 12 months and any identified clusters. A **cluster** is an unusually high incidence of a disease in close proximity in terms of both time and geography.

Response procedure - routine

Case investigation

For routine cases, case management is the responsibility of the diagnosing clinician; in some jurisdictions PHUs elect to follow up all cases, whereas in others the involvement of PHUs is confined to specific circumstances. Jurisdictions may adapt the following in accordance with local practice and resourcing. Any public health response to a notification will usually be carried out by, or in collaboration with, the case's clinician.

For a confirmed case of gonococcal infection the diagnosing clinician should:

- ensure specimens are collected for culture and antimicrobial susceptibility testing from all anatomical sites in cases that are NAAT positive for *N. gonorrhoeae*, and from presumptive cases prior to treatment
- confirm results of relevant pathology tests and review antimicrobial susceptibility results for all cultures
- obtain demographic information (including age, sex, postcode, gender, country of birth and Indigenous status)
- confirm onset date and symptoms
- obtain a detailed history which should include sexual history, recent overseas travel and occupational exposures
- ensure that correct treatment has been administered to both cases and contacts
- ensure a follow up visit for test of cure, and assessment of symptom resolution as relevant
- seek expert advice for all treatment failures or before using alternative treatments
- ensure testing for other STIs, including HIV and syphilis
- where a case of gonococcal infection is reported in a child <16 years old, ensure that jurisdictional legislative child protection reporting requirements have been fulfilled.

Case treatment

All presumptive / confirmed cases of gonococcal infection should be offered recommended treatment. See *Australasian Contact Tracing Guidelines – Gonorrhoea* (35) and the *Australian STI Management Guidelines* (13) for more information.

Appropriate specimens for antimicrobial susceptibility testing should be obtained prior to initiating treatment.

The diagnosing clinician is responsible for treatment following appropriate guidelines.

Treatment options are dependent on where the infection was acquired.

Treatment failures should be investigated using culture to allow for antimicrobial susceptibility testing.

Special consideration should be given to pregnant women undergoing gonococcal infection treatment regarding medication risk. Neonates born to infected mothers must be tested and treated for gonococcal infection.

Refer to the *Australian STI Management Guidelines* (13) for more information.

Education

The case should receive education covering gonococcal infection, risk of infection, prevention, and contact tracing. The information should include the risks of reinfection, and the need for the infected person to abstain from sex until 7 days after the completion of treatment and until the symptoms have resolved.

Patients diagnosed with gonococcal infection should also be educated about antimicrobial resistance and instructed to return to care if symptoms do not resolve in 3-5 days, and the importance of test of cure. Provide further sexual health education and prevention counselling when reviewing the case in 1 week.

Refer to the Disease factsheet (Appendix A).

Isolation and restriction

The case should be advised to have no sexual contact (including vaginal, oral and anal sex) for 7 days after the completion of treatment. The case should also be advised to have no sexual contact with partners from at least the last 2 months until the partners have been tested and treated if necessary.

Active case finding

Sporadic cases

Regular screening is recommended for high risk groups (Section 3 – Routine prevention activities). Additionally, people who have a clinical presentation consistent with gonococcal infection should be tested including a swab for culture. Contact tracing should be undertaken for every diagnosed gonococcal infection case to identify additional cases (Section 10 – Contact management).

People who are diagnosed with *N. gonorrhoeae* strains with critical antimicrobial resistance, and their contacts, should be managed as per Appendix D – Public health response to critical antimicrobial resistant gonococcal infection.

Clusters

Where clusters are identifiable and defined by time, person and place, an outbreak investigation should be initiated by PHU staff in conjunction with local sexual health services and other health services as appropriate. For clusters detected in remote Aboriginal communities, consultation with and involvement of local Aboriginal community controlled health services is advised. Where a cluster of gonococcal infection notifications is associated with a brothel or sex-on-premises venue, refer to Section 11 – Special situations.

9. Environmental evaluation

Not applicable

10. Contact management

When patients are diagnosed with a treatable STI it is vital that testing and treatment of their sexual partners is properly considered, discussed and supported. Research shows that a substantial proportion of the partners of such patients will be infected but unaware of this, warranting efforts to ensure partner notification is facilitated and completed successfully. Treatment of infected partners will help them avert complications and reduce the duration of infectiousness, potentially curbing further sexual transmission (35).

Partner notification/contact tracing includes a range of supportive interventions intended to assist cases to get their partners tested and treated. Establishing rapport and engagement with cases is important to facilitate identification of contacts.

Timely contact tracing/partner notification should be prioritised and performed in all cases of confirmed infection, and the treating clinician is primarily responsible for this. High priority should be given to critical antimicrobial resistant cases, minors (under 16 years of age), pregnant women and outbreaks, and public health units should oversee this.

There are various resources that clinicians may utilise in supporting the case to undertake prompt partner notification, such as web based notification services[3]. Clinicians may seek assistance, advice and support for contact tracing via sexual health services or PHUs[4].

[3] These sites can help answer the patient's questions about how to tell their partners that they need to get tested.
- www.letthemknow.org.au
- www.thedramadownunder.info (for men who have sex with men (MSM))
- www.bettertoknow.org.au (for Aboriginal and Torres Strait Islander people)

[4] Resources to support clinicians:
- STI/HIV Testing Tool
- Contact Tracing Manual
- STI Contact Tracing for General Practice (ThinkGP online module)

Identification of contacts

A **contact** is anyone who has had unprotected sexual contact (including oral and anal sex) with a person with gonococcal infection. A neonate born to an infected mother is also considered a contact. Contacts should be traced back for a minimum of 2 months according to the case's sexual history.

It is the responsibility of the diagnosing clinician to initiate contact tracing discussions with the case. Clinicians should then follow up with the case after one week to ensure partners have been notified or to offer more contact tracing support.

Highest priority should be given to critical antimicrobial resistant cases (Appendix D), pregnant women, minors and outbreaks (Section 11 – Special situations). In the case of critical antimicrobial resistant gonococcal infection, the clinical service treating the case may be best placed to undertake contact tracing but it is the responsibility of the PHU to ensure that it has been undertaken.

Infants who may have been exposed to gonococcal infection during vaginal delivery require urgent identification, follow up and treatment.

Treatment of contacts

Recommended treatment should be offered to all contacts. See *Australasian Contact Tracing Guidelines – Gonorrhoea* (35) and the *Australian STI Management Guidelines* (13) for more information.

All contacts should be treated presumptively with recommended gonococcal infection treatment. Appropriate specimens for antimicrobial susceptibility testing should be obtained prior to initiating treatment.

Special consideration should be given to pregnant women undergoing gonococcal infection treatment regarding medication risk. Neonates born to infected mothers must be tested and treated for gonococcal infection; expert advice should be sought.

Education

Education on prevention of gonococcal infection should be provided for contacts (as for cases).

Isolation and restriction

The contact should be advised to have no sexual contact (including vaginal, oral and anal sex) for 7 days after the completion of treatment. The contact should also be advised to have no sexual contact with partners from at least the last 2 months until the partners have been tested and treated if necessary.

11. Special situations

Sex Workers

The prevalence of all STIs in sex workers is equivalent to the general population, however there has been an increase in the incidence of chlamydia and gonorrhoea in this population in recent years (13, 36).

Very high compliance with safe sex practices is reported within the Australian sex industry, but lower consistent condom use has been noted for oral sex than vaginal/anal sex (37). This may

represent a lower awareness of the risk of pharyngeal infection, and emphasises the need for targeted health promotion initiatives in this area, e.g. additional education around pharyngeal infection should be provided in the context of any gonococcal infection.

Within the sex worker population, some groups who are more marginalised from health services, such as street based sex workers, report higher rates of STIs (36). These groups are a high priority for screening. Other more marginalised sub-populations of sex workers include sex workers who work in isolation, mobile sex workers, sex workers in rural and remote areas, migrant and culturally and linguistically diverse sex workers, Aboriginal and Torres Strait Islander people engaged in sex work, male sex workers, trans and gender diverse sex workers, sex workers with HIV, people with complex needs and people from other priority populations.

As sex workers and their clients are often anonymous, client contact tracing may not be feasible. Contact tracing of non-paying partners should be a priority, particularly in cases who report intermittently or never using condoms with non-paying partners.

Notification of a cluster of gonococcal infections associated with a brothel requires a public health response. Contact by specialist health service personnel (provider-led referral) may be the preferred method. Involvement with sexual health clinical services and sex industry outreach is important to ensure sensitivity in the approach and maintenance of trust.

Remote Aboriginal and Torres Strait Islander Communities

The rates of STIs are disproportionately high in remote and very remote Aboriginal communities compared to the urban non-Aboriginal and urban Aboriginal population. Even though the rates of HIV infection are comparable to the non-Indigenous populations in most geographic areas, the high rates of untreated gonococcal infection heighten the probability of HIV transmission (24), making this group potentially more vulnerable to HIV.

Treatment and public health management of individual cases will usually be decided by the diagnosing clinician. Seek advice / counselling from local Aboriginal community controlled health services or health council.

A successful and sustainable comprehensive sexual health program in this context requires sexual health to be integrated as a core component of service delivery within remote primary health care facilities. Evidence suggests that implementing a comprehensive sexual health program, including opportunistic STI screening integrated into routine primary health care practice, can lead to early case detection and timely treatment and follow up of individuals diagnosed with STIs (38, 39).

Special considerations in this context include:

- Offering opportunistic testing when Aboriginal and Torres Strait Islander people who are asymptomatic attend a health service, especially young people aged 15-30 years (or from age of first sexual exposure up to 34 years if from remote and very remote areas).

- Even if all tests are negative, clinical encounters can be used to educate about safe sexual behaviours and risk minimisation. Active reminders for regular screening tests and an annual STI check should be offered.

- A lower threshold for presumptive treatment. Time until test results are available may be longer in regional/remote areas than in urban areas. As a result failure to return for results may be more common.

- Treatment protocols for gonococcal infection are different in some regional/remote areas of Australia owing to regional patterns of antimicrobial resistance (13).

- Contact tracing is important and best undertaken when appropriate and culturally sensitive support services are readily available to both the index case and contacts. Working in partnership with the local Aboriginal community controlled health services, health councils, and respected community members is invaluable.

- Transport of cultures - Gonococci are highly susceptible to environmental conditions and transportation of specimens from the clinic to the laboratory will reduce the viability of the organisms. Protracted travel times with consequent specimen degradation is more likely to occur in regional and remote areas where specimens need to be transported to a distant laboratory.

  The swabs should be inserted into a non-nutritive transport medium such as Stuart or Amies and stored at 4°C before transport. Using a non-nutritive transport medium, the isolation rate after transportation of specimens at room temperature (20–25°C) is approximately 100% within 6 hours and more than 90% within 12 hours. After 48 hours, however, the number of gonococci decreases and recovery may no longer be possible, especially in specimens from asymptomatic patients that contain small numbers of organisms.

  When a transit time of more than 48 hours is expected, nutritive (growth) transport systems that incorporate a culture medium and provide an atmosphere with enhanced CO_2 (stored at 36±1°C before transport) should be used when it is required to transport swabs for culture (40).

- Response to an outbreak in an Aboriginal and Torres Strait Islander community should be done in partnership with the local community controlled health service, particularly when community engagement strategies are planned and implemented.

Notification in Minors

Notification of minors should trigger the diagnosing clinicians and/or the PHU to ensure that they have met mandatory reporting obligations.

Antimicrobial Resistant *N. gonorrhoeae*

Antimicrobial resistant *N. gonorrhoeae* is an emerging public health issue. The bacteria have developed resistance to all classes of antimicrobials used for treatment, and clinical treatment failure of infections caused by antimicrobial resistant strains has been reported (41-45).

Occurrences of high level azithromycin-resistant (MIC value ≥ 256 mg/L) gonococcal infection amongst MSM and heterosexuals have been reported (46, 47). Decreased susceptibility to ceftriaxone (MIC value ≥0.125 - ≤0.5 mg/L) has also been reported nationwide (46, 48). Penicillinase-producing *N. gonorrhoeae* is uncommon (49) in remote Aboriginal communities in the NT and northern WA and oral amoxicillin with probenecid and azithromycin is still recommended as first line treatment in these areas. Refer to the CARPA manual for more guidance on treatment in remote settings (50). A specialist referral is recommended to guide a tailored treatment for critical antimicrobial resistant gonococcal infection.

Refer to Appendix D for more information on critical antimicrobial resistant gonococcal infection.

Cases among travellers on aeroplanes

Not applicable

12. Appendices

- **Appendix A**: Disease factsheet
- **Appendix B**: Public Health Unit check list
- **Appendix C**: Disease investigation form
- **Appendix D**: Public health response to critical antimicrobial resistant gonococcal infection

13. Jurisdiction specific issues

Links to State and Territory Public Health Legislation, the *Biosecurity Act 2015* and the *National Health Security Act 2007*.

14. References and additional sources of information

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Appendix A: Disease factsheet

What is gonococcal infection?

Gonococcal infection is a sexually transmissible infection (STI) that can infect both men and women. It is caused by the bacterium *Neisseria gonorrhoeae*. It can infect the throat, rectum, urethra (urine passage), cervix (neck of womb) and eyes. If left untreated, gonococcal infection can cause serious health problems including infections of the skin, joints and the covering of the brain (meningitis). Untreated gonococcal infection in women can lead to a long-lasting infection of the womb and tubes called pelvic inflammatory disease (PID) and this can cause infertility (inability to get pregnant).

How is it spread?

Gonococcal infection is spread by having unprotected sexual contact with an infected person. A pregnant woman with gonococcal infection can give the infection to her child during vaginal childbirth.

What are the signs and symptoms?

The symptoms of gonococcal infection depend on the site of infection. In men, symptoms appear usually within 1-3 days. It commonly infects the urethra in men. Most women with gonococcal infection have no symptoms. When symptoms do appear in women, they are usually mild and develop within 10 days. The infection can be mistaken for bladder or vaginal infection.

Gonococcal infection of the throat and rectum usually has no symptoms.

Men – infections of the urethra

Symptoms in men can include:
- A white, yellow or green discharge from the penis
- A burning sensation while urinating
- Painful and/or swollen testicles
- Anal discharge and discomfort
- Sore, dry throat.

Women – infections of the cervix

Most women with gonococcal infection have no symptoms. Symptoms in women can include:
- Increased vaginal discharge
- Painful or burning sensation when urinating
- Lower abdominal pain.

Who is most at risk?

People particularly at risk include those who have multiple sexual partners, people who have unprotected sex with infected partners or partners with risky sexual behaviour; young people under the age of 25, men who have sex with men (MSM), people with a history of STIs or who are human immunodeficiency virus (HIV) positive, and sex workers.

What happens if gonococcal infection is not treated?

While people will eventually clear the infection without treatment, untreated gonococcal infection can result in serious and permanent health problems in both women and men.

In women, untreated gonococcal infection can cause pelvic inflammatory disease (PID). Some of the complications of PID are:

- Ectopic pregnancy
- Infertility
- Long-term pelvic/abdominal pain.

How is it diagnosed?

Gonococcal infection can be diagnosed by your doctor or a sexual health clinic. A urine sample can be used to check for infections in the urethra in men and urethra or cervix in women. Gonococcal infection is also diagnosed by taking a swab (using a long cotton bud) from any place that may have become infected– the cervix, urethra, anus, throat, or eyes – and having it tested in the laboratory.

How is it treated?

Gonococcal infection can be treated with antibiotics; in most places in Australia this is an injection and tablets. If you are diagnosed with gonococcal infection, complete the recommended course of treatment. Antibiotic treatment does not confer immunity to the disease. Reinfection is possible and common.

You should abstain from sexual activity for at least 7 days after completing your treatment. If you are treated for gonococcal infection but your sexual partner is not, you could be re-infected.

Do not have sex with partners from the last 2 months until the partners have been tested and treated if necessary. This is to make sure that your partners are clear of the infection and to prevent them re-infecting you.

How is it prevented?

If you are sexually active, you can lower your chances of getting and transmitting gonococcal infection by:

- Having protected safe sex every time – use a condom. Since the bacteria can survive in the throat, condoms should be used during oral-genital contact as well.
- Being in a long-term mutually monogamous relationship with a partner who has been tested and has negative STI results.
- Having regular STI check-ups.

All pregnant women or those with a risk factor for gonococcal infection should have a gonococcal infection test done in the first trimester of the pregnancy or at the first antenatal visit. Testing should be repeated if indicated by history during the pregnancy.

There is no vaccine for gonococcal infection.

What are your doctor's responsibilities?

Your doctor is responsible for:

- Providing you with appropriate tests, treatment and information about how to protect yourself from STIs.
- Helping you to ensure that your sexual partners get tested and treated.
- Notifying confirmed cases of gonococcal infection to the local public health unit (also done by the laboratory).

Where can you find more information about gonococcal infection?

Contact your GP, community health clinic, sexual health clinic or Aboriginal and / or Torres Strait Islander health worker.

Appendix B: Public health unit check list (where indicated)

Confirm case:

- Assess information against case definition
- Enter data into jurisdictional infectious disease notification database.

Contact the patient and/or the patient's doctor to:

- Ensure that the patient is aware of diagnosis
- Obtain patient demographic data including indigenous status, gender
- Confirm results of relevant pathology tests including site of infection
- Obtain antimicrobial susceptibility results for all cultures
- In case of multi-drug resistance, confirm correct treatment has been administered
- Obtain patient's risk exposure history
- Identify likely source of infection
- In case of multi-drug resistance, ensure that contact tracing has been carried out
- Ensure that statutory reporting obligations have been met for children <16 years who have been diagnosed with gonococcal infection.

Contact the laboratory to:

- Check samples received and obtain any outstanding results, including antimicrobial susceptibility for all cultures

Other issues:

Cases of extensively drug resistant (XDR) gonococcal infection should be managed as per 'Public health response to critical antimicrobial resistant gonococcal infection' (Appendix D).

Appendix C: Disease investigation form

(This page contains form/s that are intended to be paper based that you can download and complete. If you are using any assistive technology and are unable to use the form please contact us using the Online form and feedback - www.health.gov.au/internet/main/publishing.nsf/Content/health-comments.htm)

Public Health Unit / Sexual Health Clinic undertaking case investigation: ……..

Notification ID: ……..

Case details

Family name: …….
Given names: …….
Date of birth: dd/mm/yyyy

Age:…. (If <16yo – have jurisdictional statutory reporting obligations have been met) – yes/no

Sex:
□ M
□ F
□ Other…please specify

Female patients:
□ Pregnant
□ Not pregnant
□ Unknown
Note: *Infectious gonococcal infection occurring in a pregnant woman requires URGENT public health response due to the risk of perinatal infection.*

Indigenous Status:
□ Aboriginal but not Torres Strait Islander origin
□ Torres Strait Islander but not Aboriginal origin
□ Both Aboriginal and Torres Strait Islander origin
□ Neither Aboriginal nor Torres Strait Islander origin
□ Not stated / inadequately described

Address
…….
…….

Postcode ……

Country of birth: □ Australia □ Other, specify …….. □ Unknown

Past history

Previous gonococcal infection diagnosis: □ Yes □ No □ Unknown

Date of last gonococcal infection notification: dd / mm / yyyy
Previous gonococcal infection treatment: □ Yes □ No □ Unknown

If yes, provide details (if known)

Date given	Drug	Dose	Route	Comments

Other relevant information …….

Disease details

Symptoms and signs at time of diagnosis:
 None
 Urethral or vaginal discharge
 Dysuria
 Abdominal pain
 Cervical excitation / adnexal tenderness
 Proctitis / tenesmus
 Pharyngitis
 Other, specify ……

If symptoms present, site of infection:
 Urethral
 Cervical
 Rectum
 Pharynx
 Eyes
 Other, specify …….

Laboratory results

Health service where patient was diagnosed:
 Public hospital
 Private hospital
 Sexual health clinic
 Family planning
 GP
 Aboriginal health service
 Prison / detention centre
 Public / Community health clinic
Other, specify ……

Reason for presentation to health service:
 Symptoms
 Sexual contact of gonococcal infection
 Sexual contact of other STI
 STI screening
 Antenatal care, gestation …… /40
 Other, specify ……..

Risk Information

Where was the infection most probably acquired?
 This state
 Interstate, specify …… Overseas, specify …….
 Unknown

Sex of partner from whom the infection was most probably acquired:
 Opposite sex
 Same sex
 Unknown
 Not a sexual contact

Type of sex partner from whom the infection was most probably acquired:
 Regular
 Casual
 Sex worker
 Client of a sex worker
 Unknown
 Not sexual contact
 Other, specify ……..

Where did patient meet the sex partner from whom the infection was most probably acquired?
 Beat
 Internet
 Brothel
 Sex on premises venue
 Unknown
 N/A, regular partner or already known to patient
 Other, specify …….....

Most likely mode of transmission:
 Vaginal intercourse, insertive
 Vaginal intercourse, receptive
 Oral sex, insertive
 Oral sex, receptive
 Anal sex, insertive
 Anal sex, receptive
 Unknown
 Not sexually acquired

Management
Treatment details

Date given	Drug	Dose	Route	Comments

Other relevant information ……..

Contact tracing:

□ Patient agreed to notify partners

□ Health service will notify partners,

Name of health service ……

□ Other, specify ……

Appendix D: Public health response to critical antimicrobial resistant gonococcal infection

Background

The World Health Organization has listed antimicrobial resistant *Neisseria gonorrhoeae* as one of twelve priority microorganisms posing a threat to human health globally. *N. gonorrhoeae* with resistance to a third generation cephalosporin or fluoroquinolone are listed as high priority organisms (51).

In Australia, the recommended treatment for uncomplicated gonococcal infection is dual therapy with ceftriaxone and azithromycin. Due to widespread resistance to fluoroquinolones, these are no longer recommended as first line treatment. While resistance to ceftriaxone or azithromycin is currently low, there have been previous introductions of resistant organisms into the community resulting in localised clusters of cases. Recently reports of extensively-drug resistant (XDR) *N. gonorrhoeae* have arisen, both in the United Kingdom (UK) and Australia (52, 53) with some infections acquired in Southeast Asia.

With gonococcal infection notifications increasing in all Australian jurisdictions antimicrobial resistance is of major public health concern, as it could require complex treatment with increased disease burden and associated health care costs.

The response to ceftriaxone and/or high level azithromycin resistant gonococcal infection requires an ongoing collaborative approach at both national and state/territory levels, and spans prevention as well as rapid control measures following identification of cases with critical antimicrobial resistant gonococcal infection, in order to reduce ongoing transmission.

Keys stakeholders include:
- State/territory health departments
- Public health units (PHUs)
- Clinicians (in primary care as well as sexual health clinics)
- Laboratories (including clinical diagnostic laboratories, Public Health Laboratory network (PHLN), National Neisseria Network)
- Communicable Diseases Network Australia (CDNA)

Public health response to critical antimicrobial resistant gonococcal infections

It is recommended that all jurisdictions develop and implement protocols for identifying and responding to cases with critical antimicrobial resistant gonococcal infection.

This document outlines the actions to be undertaken by PHUs following identification of a case / cases with critical antimicrobial resistant gonococcal infection.

1. Notification

Notification requirements for gonococcal infection vary among jurisdictions; however in all jurisdictions laboratory reporting is mandatory. The private laboratories and the public health reference laboratory in each jurisdiction should urgently notify the relevant public health authority (i.e. by phone followed by email/fax) following detection of isolates with critical antimicrobial resistance.

In Australia, critical antimicrobial resistant gonococcal infection is defined as gonorrhoea with:

- Resistance to ceftriaxone (MIC ≥ 0.5mg/L) OR
- High level resistance to azithromycin (MIC ≥ 256mg/L) OR
- Both of the above (including extensively drug resistant (XDR) isolates)

2. Risk assessment and response

Case and contact follow-up is the cornerstone of public health response to gonococcal infection.

The PHU staff should undertake an initial risk assessment and initiate control measures as soon as possible and within one working day of notification of a case with critical antimicrobial resistant gonococcal infection by **contacting the diagnosing clinician** to:

- Inform them about the critical antimicrobial resistance findings
- Discuss and agree actions regarding case and contact follow-up (see below)
- Gather information about the case from the diagnosing clinician and case including risk exposure, contacts etc. using a case interview form
- Ensure swabs are taken from additional sites based on sexual history
- Recommend specialist service (if available) referral for treatment and follow-up

Case/s follow-up:

- Interview case and inform them about the critical antimicrobial resistant gonococcal infection issue / need for immediate public health action
- Provide patient education regarding transmission; advise to avoid sexual contact until test of cure results are negative and contacts have been tested, treated and cured
- Ensure referral to a specialist service (if available) for treatment and follow-up (including test of cure) is made and attended
- Inform case that contact tracing will be conducted by PHU in collaboration with them and their specialist
- Ensure it is clear who is responsible for identifying and following up contacts
- Complete ‘Case report form’ in conjunction with treating clinician, in the initial risk assessment

Contact follow-up:

While partner notification (contact tracing) processes vary across jurisdiction, for all cases with critical antimicrobial resistant gonococcal infection, provider referral (in this case by PHU or specialist service) is recommended to ensure identification of all contacts, prompt assessment, treatment and follow-up.

The PHU / specialist service will undertake contact tracing to:

- Inform contact/s of the risk (including critical antimicrobial resistance)
- Provide advice regarding testing, and assist with urgent testing
- Provide advice regarding treatment
- Educate about risk of transmission, follow up test results and further management (if positive - see case follow-up)
- Facilitate additional testing, if required

3. Public health incident response

One or more cases with critical antimicrobial resistant gonococcal infection will trigger an incident response at jurisdictional level. An Incident Management Team may be formed and be responsible for:

- Case/outbreak investigation
- Implementation of control measures
- Internal/external communication.

Epidemiological and laboratory investigations are needed to inform control measures. This may include activation of enhanced case surveillance, antimicrobial resistance surveillance (i.e. culture for all diagnoses/or group at risk identified in the outbreak), and active case finding. Whole genome sequencing of isolates with critical antimicrobial resistance, undertaken by a reference public health laboratory, may play a key role in identifying relatedness to other isolates and potential clusters.

Enhanced surveillance and case follow up for gonococcal infection with decreased susceptibility to ceftriaxone (MIC ≥ 0.125 – <0.5mg/L).

It is recommended that enhanced surveillance and case follow up be considered for all cases following detection of gonococcal isolates when decreased susceptibility to ceftriaxone has been reported by the laboratory.