

Recommendations for the prevention of neonatal ophthalmia



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Despite the decreasing prevalence of *Neisseria gonorrhoeae* in Canada, the Canadian Paediatric Society recommends that, as soon as possible after birth, all infants receive prophylaxis with silver nitrate, tetracycline or erythromycin, to reduce the risk of neonatal ophthalmia due to this organism. The use of these agents may also provide some benefit in the prevention of ophthalmia due to other organisms. As well, the Canadian Paediatric Society supports routine prenatal screening for *N gonorrhoeae* and *Chlamydia trachomatis*, and the treatment of identified infections during pregnancy.

Key Words: Neonatal ophthalmia

The present statement replaces the previous statement on neonatal ophthalmia, which was written by the Infectious Diseases and Immunization Committee of the Canadian Paediatric Society (CPS), and published in 1983 (1). Neonatal ophthalmia is defined as conjunctivitis that occurs within the first four weeks of life (2). It is a relatively common illness, occurring in 1% to 12% of newborn infants. Originally, neonatal ophthalmia referred to conjunctivitis in the newborn caused by infection with *Neisseria gonorrhoeae*, but now the term refers to any conjunctivitis in this age group, irrespective of the cause. *N gonorrhoeae* accounts for less than 1% of reported cases of neonatal ophthalmia in Canada and the United States, while that due to *Chlamydia trachomatis* varies from 2% to 40%. Rates of ophthalmia by these two sexually transmitted pathogens have declined over the past two decades as a result of the decreased prevalence of these infections in the general population as well as the general institution of routine prenatal screening for them. Nonsexually transmitted

bacteria, such as *Staphylococcal* species, *Streptococcal* species, *Haemophilus* species and other Gram-negative bacterial species, account for 30% to 50% of ophthalmia cases. Chemical conjunctivitis from the instillation of silver nitrate accounts for the majority of the rest of the cases.

In most instances, neonatal ophthalmia is a relatively mild illness (2). The exception is ophthalmia due to infection with *N gonorrhoeae* (3,4). Without preventive measures, gonococcal ophthalmia has been observed to occur in 30% to 42% of infants exposed to *N gonorrhoeae* during delivery (5,6) and may progress quickly to corneal ulceration and permanent visual impairment (3). The primary purpose for the use of prophylaxis for neonatal ophthalmia is to prevent disease due to *N gonorrhoeae*. Despite the dramatic decrease in prevalence since 1983, *N gonorrhoeae* remains endemic in Canada. Furthermore, the infection is frequently asymptomatic in women. Thus, the CPS continues to promote universal prophylaxis for neonatal gonococcal ophthalmia, in addition to routine prenatal screening for *N gonorrhoeae* and *C trachomatis*, and treatment of identified infections during pregnancy.

Silver nitrate prophylaxis against ophthalmia neonatorum caused by *N gonorrhoeae*, first used by Credé in 1880 (3), has been a significant preventive medicine triumph. When introduced, it reduced the incidence of gonococcal ophthalmia from 10% to 0.3% (3). Prophylaxis with this agent also slightly reduces the incidence of purulent conjunctivitis caused by other bacterial species (7,8). However, silver nitrate is not a perfect agent. It does not prevent all cases of gonococcal ophthalmia, having an estimated failure rate of 0.063% (9). It causes transient chemical conjunctivitis in 50% to 90% of infants (4,10), which is thought by some to interfere with mother-infant bonding (7).

Other antibiotics used in the prevention of gonococcal ophthalmia (tetracycline and erythromycin) may be more effective than silver nitrate and they are considered to be acceptable alternatives (2,11-14). Tetracycline is more

active than erythromycin in vitro against sensitive isolates of *N gonorrhoeae*. The estimated failure rate of tetracycline prophylaxis is 0.012%, while that of erythromycin is 0.005% (9). Other agents may also be effective in prophylaxis. One study has shown that the use of a 2.5% solution of povidone-iodine resulted in comparable rates of gonococcal ophthalmia when compared with erythromycin and silver nitrate prophylaxis in a population in Kenya (15). While this suggests a protective effect, confirmatory studies in which a sufficient number of mothers are determined to be infected at the time of delivery are necessary before this compound can be recommended routinely.

Neither silver nitrate nor tetracycline completely prevent conjunctivitis caused by *C trachomatis* (13,16-19). When the mother is infected at the time of delivery, the risk of neonatal conjunctivitis due to *C trachomatis* is between 18% and 40% (20,21). In most studies conducted to compare the use of tetracycline and silver nitrate to prevent neonatal ophthalmia, secondary analysis showed up to a 50% reduction of ophthalmia due to *Chlamydia* species relative to historical observations. Although preliminary observations did not indicate that erythromycin would be effective, ocular prophylaxis with erythromycin was very effective in preventing inclusion conjunctivitis caused by *Chlamydia* species (22). However, subsequent studies have failed to confirm this (17-19,23). In most instances, there were no significant differences between the rates of chlamydial ophthalmia when prophylaxis with erythromycin was compared with that with either silver nitrate or tetracycline, although the rates of infection among infants with known exposure to *Chlamydia* species were somewhat lower than historical controls. In a study that assessed povidone-iodine prophylaxis, the incidence of ophthalmia due to *Chlamydia* species was significantly lower among the group of infants who received povidone-iodine prophylaxis (5.5% of 1076 infants) compared with those who received either silver nitrate (10.5% of 929 infants, $P < 0.001$) or erythromycin (7.4% of 1112 infants, $P = 0.008$) (15). As with povidone-iodine use for gonococcal ophthalmia prophylaxis, studies with a sufficient number of maternal chlamydial infections detected at the time of delivery will be necessary to confirm this finding. Finally, topical ocular prophylaxis does not prevent nasopharyngeal infection or the subsequent development of pneumonia due to *Chlamydia* species (22). In conclusion, there appears to be only a modest reduction in ophthalmia due to chlamydial infection with the use of the agents currently recommended for gonococcal prophylaxis.

RECOMMENDATIONS

Therefore, the CPS recommends the following for the prevention of neonatal ophthalmia due to *N gonorrhoeae*.

- Prophylaxis to prevent neonatal ophthalmia due to *N gonorrhoeae* should be provided to all infants. (Strength of the recommendation — category A; quality of the evidence — grade 1) (Appendix 1). This conforms with current provincial public health policies across Canada. In some provinces, this is legally mandated.
- Physicians and their patients may choose among the recommended prophylactic agents — that is, 1% silver nitrate solution in single-dose ampoules, or an ointment containing 0.5% erythromycin base or 1% tetracycline hydrochloride in single-dose tubes. These agents provide essentially equivalent protection against gonococcal neonatal ophthalmia in the general population. (Strength of the recommendation — category A; quality of the evidence — grade 1).
- To date there is insufficient evidence to recommend the use of povidone-iodine for ophthalmia prophylaxis. (Strength of the recommendation — category C; quality of the evidence — grade 1).
- To prevent potential cross-contamination, a separate ampoule or tube should be used for each eye. Ampoules and tubes should be discarded after use. (Strength of the recommendation — category A; quality of the evidence — grade 3).
- When 1% silver nitrate solution is used, each eyelid should first be wiped gently with a sterile cotton ball to remove foreign matter and permit adequate eversion of the lower lid. Two drops of solution are placed in each lower conjunctival sac, a single ampoule being used for each eye. The closed eyelids can be massaged gently to help spread the solution to all areas of the conjunctiva. After 1 min, any excess silver nitrate should be gently wiped from the eyelids and surrounding skin with sterile cotton. (Strength of the recommendation — category A; quality of the evidence — grade 3).
- When an ophthalmic ointment (tetracycline or erythromycin) is used, the eyelids should be prepared as for the application of silver nitrate. A line of ointment 1 to 2 cm long is placed in each lower conjunctival sac, if possible covering the whole lower conjunctival area. Care is needed to prevent injury to the eye or the eyelid from the tip of the tube. The closed eyelids can be massaged gently to help spread the ointment. After 1 min, any excess ointment should be wiped gently from the eyelids and surrounding skin with a sterile cotton. (Strength of the recommendation — category A; quality of the evidence — grade 3).
- The eyes should not be irrigated after instillation of a prophylactic agent. Irrigation may reduce the efficacy of the agent and probably does not decrease the incidence of chemical conjunctivitis caused by silver nitrate (10). (Strength of the recommendation — category A; quality of the evidence — grade 3).
- Prophylaxis should be given as soon as possible after birth. However, delaying prophylaxis for up to 1 h after birth probably does not impair the agent's efficacy.

(Strength of the recommendation — category B; quality of the evidence — grade 3).

- A check system should be established to ensure that all infants are treated. (Strength of the recommendation — category A; quality of the evidence — grade 3).
- Infants born by caesarian section should also receive prophylaxis. Infections have been reported following caesarian section deliveries but the actual risk is unknown (24). (Strength of the recommendation — category B; quality of the evidence — grade 3).
- Pregnant women should be screened for infection by *N gonorrhoeae* and *C trachomatis* during pregnancy and their identified infections should be treated during pregnancy (12,14). (Strength of the recommendation — category A; quality of the evidence — grade 3).
- Infants born to women with gonococcal infection discovered during labour or at the time of delivery should be given a single dose of ceftriaxone (25 to 50 mg/kg) or cefotaxime (100 mg/kg) in addition to topical prophylaxis (2,12). Optical prophylaxis does not prevent oropharyngeal colonization by *N gonorrhoeae* (13). Infants with established gonococcal disease require additional investigation and therapy (2,12). (Strength of the recommendation — category A; quality of the evidence — grade 2).

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APPENDIX 1

Classification used to determine the strength of the recommendations and the quality of the evidence on which the recommendations are based

Category	Definition
A	Good evidence to support a recommendation for use
B	Moderate evidence to support a recommendation for use
C	Insufficient evidence to support a recommendation for or against use
D	Moderate evidence to support a recommendation against use
E	Good evidence to support a recommendation against use
Grade	
1	Evidence from at least one properly randomized, controlled trial
2	Evidence from at least one well-designed clinical trial without randomization, from cohort or case-controlled analytic studies, preferably from more than one centre, from multiple time series, or from dramatic results in uncontrolled experiments
3	Evidence from opinions or respected authorities on the basis of clinical experience, descriptive studies or reports of expert committees

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The recommendations in this statement do not indicate an exclusive course of treatment or procedure to be followed. Variations, taking into account individual circumstances, may be appropriate.

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