

## Challenge M122-3

August 2012

### Eye – *Neisseria meningitidis*

#### HISTORY

The challenge was sent to category A and B laboratories. The sample was a simulated eye swab obtained from a 3 year old patient with conjunctivitis.

Participants were expected to isolate and identify *Neisseria meningitidis*. Correlation with results obtained for the companion Gram challenge (G122) was also expected.

#### CMPT QA

CMPT control yielded a pure growth of *Neisseria meningitidis*, viable for 15 days.

#### SURVEY RESULTS

Reference Labs: 15/15 reference laboratories reported *Neisseria meningitidis*. Consensus was reached therefore the challenge was graded.

Identification (Table 1): 76% of participants correctly reported *N. meningitidis* and received a grade of 4. Nine laboratories identified the isolate to the genus level and reported *Neisseria* species, seven of these laboratories indicated they would refer the isolate, and were

#### MAIN EDUCATIONAL POINTS of M122-3

1. Correctly identifying *N. meningitidis* from conjunctival samples is important because the treatment is different than that of most other bacterial entities.
2. *Neisseria* species, including *N. meningitidis*, can cause a hyperacute bacterial conjunctivitis that is severe and sight-threatening.

graded 3. The two laboratories that reported *Neisseria* species, but did not refer were graded 1.

Two participants identified the isolate as *Moraxella catarrhalis*/group and were graded 0.

Four participants reported gram negative diplococci (n=3) or cocci (n=1), refer and were graded 3.

The laboratory that did not submit a report was graded 0.

Although Public Health notification was not required, the committee considered the information on how laboratories proceed in this scenario could be useful (table 2).

#### Grading

##### Maximum grade: 12

Reporting *N. meningitidis* was graded 4.

Reporting *Neisseria* species was downgraded to 3. Laboratories should be able to identify a meningococcus.

Reporting gram negative diplococci is not helpful since this report could suggest *Moraxella* species, therefore it was graded 1.

Reporting *Moraxella* species was graded 0.

Not reporting results is always graded 0.

**Table 1.** Identification results

| Reported results  | A Labs    | B Labs    | Grade    |
|---|-----------|-----------|----------|
| <i>Neisseria meningitidis</i> , ± group W135, ± refer               | 63        | 7         | 4        |
| gram negative diplococci, resembling <i>N. meningitidis</i> , refer | 1         |           | 3        |
| <i>Neisseria</i> species, refer ± presumptive                       | 4         | 2         | 3        |
| gram negative cocci, possible <i>Neisseria</i> species, refer       |           | 1         | 3        |
| <i>Neisseria</i> species  | 2         |           | 1        |
| gram negative diplococci, refer ± unidentified                      | 3         |           | 1        |
| gram negative cocci (can't ID gnc's), refer                         |           | 1         | 1        |
| <i>Neisseria sicca</i>  | 1         |           | 0        |
| <i>Moraxella catarrhalis</i>  | 1         |           | 0        |
| <i>Moraxella</i> group  | 1         |           | 0        |
| no report   | 1         |           | 0        |
| refer, sample not normally processed                                | 4         | 1         | ungraded |
| <b>Total</b>  | <b>81</b> | <b>12</b> |          |

**Table 2.** Reported results

| PH notification                    | Identification reported   | Labs      |
|------------------------------------|---|-----------|
| yes                                | <i>N. meningitidis</i>  | 50        |
|                                    | gram negative diplococci, resembling <i>Neisseria meningitidis</i> , refer                    | 1         |
|                                    | gram negative diplococci, +/- possible <i>Neisseria</i> , +/- refer, <i>Neisseria</i> species | 5         |
| reporting not required in province | <i>N. meningitidis</i>  | 1         |
| no report                          | <i>N. meningitidis</i>  | 19        |
| n/a                                | <i>Neisseria</i> species, <i>N. sicca</i> , <i>Moraxella</i> species, no report               | 7         |
| refer                              | <i>Neisseria</i> species, gram negative diplococci/cocci                                      | 5         |
| sample not normally processed      | sample not normally processed   | 5         |
| <b>Total</b>                       |   | <b>93</b> |

51/71 (72%) laboratories that reported *N. meningitidis* indicated they would report the isolate to Public Health (PH) authorities.

Interestingly, 5 laboratories said they would report to public health despite their partial identification of the isolate.

20 participants that had identified the isolate as *N. meningitidis* did not report to PH, one of which commented their province does not require notification of non-invasive meningococcal infections.

G122- M122-3 correlation: there was very good correlation between the two challenges. One laboratory reported gram positive cocci in G122 but did not process M122-3. Another laboratory reported gram negative coccobacilli in the Gram stain and reported *N. meningitidis* on M122-3.

## COMMENTS ON RESULTS

The large majority of laboratories correctly identified the isolate as *N. meningitidis*.

The laboratories that incorrectly identified the isolate or failed to refer for further identification should review their procedures.

Meningococci are oxidase positive, catalase positive, gram-negative, bean-shaped aerobic diplococci that are best isolated on blood or chocolate agar. Growth is stimulated by CO<sub>2</sub> and humidity and they produce acid from carbohydrates oxidatively. The only carbohydrates used by *N. meningitidis* are glucose and maltose.

Several diagnostic test kits combine carbohydrate utilization tests and direct enzyme detection assays for confirmation of identification.<sup>1</sup>

Matrix-assisted laser desorption ionization time-of-flight mass spectrometry (MALDI-TOF MS) is an emerging technique that promises to provide quick and accurate identification of *N. meningitidis*.<sup>2</sup>

## SAMPLE PROCESSING

Ideally, both eyes should be sampled as the uninfected eye can serve as a control with which to compare the agents isolated from the infected eye.<sup>3</sup>

Gram stains of conjunctival scrapings are useful because they can provide etiologic information. Smears from bacterial infections reveal numerous neutrophils. Lymphocytes and monocytes are predominant in viral infections, while eosinophilia can be observed in allergic disease.<sup>4-6</sup>

## CLINICAL RELEVANCE

Conjunctivitis is a common condition. Acute conjunctivitis is marked by unilateral hyperemia (red eye), mucopurulent discharge, and in some cases chemosis (conjunctival edema).<sup>7</sup> It is a diagnosis of exclusion and can be made only if the vision is normal and there is no evidence of keratitis, iritis, or angle closure glaucoma.<sup>8</sup>

Bacterial conjunctivitis is spread by direct contact and is highly contagious.

*S. aureus*, *S. pneumoniae*, *H. influenzae* and *M. catarrhalis* are the most common causes of bacterial conjunctivitis.

*N. meningitidis* conjunctivitis is uncommon, but occurs more frequently in children and young adults and has been reported in up to 2% of cases of conjunctivitis.<sup>9</sup>

Acute conjunctivitis caused by *N. meningitidis* is classified into primary and secondary disease. Primary meningococcal conjunctivitis (PMC) may be acute or hyperacute and is accompanied by a significant purulent discharge.<sup>6,10</sup> The hyperacute form is severe and sight threatening and requires immediate ophthalmologic referral.<sup>8</sup> It can rapidly progress to corneal ulceration and perforation. PMC can present as invasive or noninvasive form. In the invasive form, conjunctivitis is followed by systemic meningococcal disease (10–29.4%). In the noninvasive form, conjunctivitis is an isolated phenomenon.

Secondary meningococcal conjunctivitis follows systemic meningococcal disease and is a rare occurrence.<sup>10,11</sup>

If the clinician suspects *Neisseria* infection, a bacterial Gram stain and culture should be obtained immediately. The diagnosis of meningococcal conjunctivitis should be considered when gram-negative diplococci are observed.<sup>11-13</sup>

Treatment of conjunctivitis should include systemic therapy in view of the potential for invasiveness of *N meningitidis*, with topical antibiotics as an adjunct. The risk of invasive disease in those treated initially with topical therapy alone was estimated to be 19 times greater than for those receiving systemic antibiotic.<sup>11, 14</sup>

Ceftriaxone is the treatment of choice for *N meningitidis* conjunctivitis.<sup>6</sup>

## PUBLIC HEALTH NOTIFICATION

Not all provinces in Canada require cases of suspected primary meningococcal conjunctivitis to be reported to Public Health authorities.

In BC, all confirmed and probable cases of invasive disease and cases of primary meningococcal conjunctivitis must be notified to the BCCDC Epidemiology Services.<sup>15</sup>

In Manitoba, the isolation of *N. meningitidis* from the eye or the conjunctival sac, in association with purulent conjunctivitis, is reportable to Public Health authorities.

At this time conjunctivitis and pneumonia cases due to *N. meningitidis* are not nationally notifiable and reported to the Public Health Agency of Canada.<sup>16</sup>

Some guidelines consider meningococcal conjunctivitis to be an indication for chemoprophylaxis of close contacts.<sup>9,17</sup>

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