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# Bacteriology of the Upper Respiratory Tract: What Is Important?

## SUMMARY

Oropharyngeal and nasopharyngeal swabs are commonly collected from patients with a variety of respiratory infections.

Unfortunately, the significance of potential pathogens in such specimens is clouded by the prevalence of these organisms in asymptomatic patients and in patients with non-bacterial upper respiratory tract illnesses. Specimens from the oro- and nasopharynx seldom predict the flora in other parts of the respiratory tract, and empiric antibiotic therapy for infections such as acute otitis media, sinusitis, and pneumonia is usually inevitable. The author of this article reviews the bacteriology of the upper respiratory tract and makes recommendations for diagnosis and treatment. (*Can Fam Physician* 1988; 34:2155-2159.)

**Key words:** bacteriology, upper respiratory tract, antibiotic therapy

## RÉSUMÉ

Quelle que soit l'infection respiratoire que présente le patient, on lui impose routinièrement des prélèvements oropharyngés et nasopharyngés. Malheureusement, la valeur significative des agents pathogènes retrouvés dans ces spécimens est altérée par la prévalence de ces organismes chez des patients asymptomatiques et chez des patients souffrant de maladies non bactériennes des voies respiratoires supérieures. Les spécimens provenant de l'oropharynx et du nasopharynx permettent difficilement de prédire la flore présente dans les autres parties des voies respiratoires et, habituellement, l'empirisme de l'antibiothérapie devient presque inévitable dans des infections comme l'otite moyenne, la sinusite et la pneumonie. L'auteur révisé la flore bactérienne des voies aériennes supérieures et propose des recommandations diagnostiques et thérapeutiques.

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**U**PPER RESPIRATORY infections (URIs) are a common problem in the practice of community practitioners.<sup>1</sup> Although many of the pathogens are viral, a bacterial etiology is commonly sought because of the potential for successful treatment by means of antibiotics. Throat and nasopharyngeal specimens are therefore frequently taken for diagnostic purposes. Although beta-hemolytic Group A streptococci (*Streptococcus*

*pyogenes*) are routinely sought in these specimens, less common bacterial pathogens including *Mycoplasma pneumoniae*, *Neisseria gonorrhoeae*, *Corynebacterium diphtheriae*, and *Corynebacterium hemolyticum* (*Arcanobacterium hemolyticum*) may require special transport, culture media, and provision of relevant information or specific requests to the laboratory. Nasopharyngeal specimens are useful for detecting *Bordetella pertussis* in association with acute lower respiratory tract disease and are also employed occasionally to determine carrier states.

Nose and throat cultures are, however, also commonly employed by community practitioners, with the understanding that they may give information about infection elsewhere in the respiratory tract. Bacte-

ria with the potential for causing systemic disease, such as *Streptococcus pneumoniae*, *Hemophilus influenzae*, *Staphylococcus aureus*, and *Branhamella catarrhalis*, are commonly cultured from both throat and nasopharyngeal specimens and yet are often part of the normal flora. Are they however, primary agents of pharyngitis? And does their presence predict disease secondary to the same organism elsewhere? Do these organisms deserve laboratory work-up in these sites? And should their presence bias treatment?

Berger and colleagues<sup>2</sup> have recently examined the attitudes of a group of Canadian physicians towards the importance of certain bacteria as primary etiologic agents of pharyngitis. Although their poll included only a small subset of south-

ern Alberta physicians, it indicated that over-treating of pharyngitis was probably common. Specifically, there was a significant bias towards treating patients with pharyngitis when throat culture reports demonstrated the presence of *Hemophilus* sp., *S. aureus*, *S. pneumoniae*, and *N. meningitidis*.

Despite the large amount of resources expended Canada-wide to study antibiotic use and resistance mechanisms, these findings point to a need for study and education in the area where many antibiotic prescriptions are made: community-acquired infectious diseases, particularly pharyngitis. The laboratory work-up of these specimens and appreciation of laboratory reports are equally important. The significance of bacterial cultures from the nose and throat in respiratory disease is reviewed here, and recommendations are made for their proper use and interpretation.

### Asymptomatic Carriage

Numerous studies have documented the presence of potentially systemic pathogens as normal flora of the respiratory tract. In asymptomatic adults and children, organisms including *S. aureus*, *H. influenzae* and *S. pneumoniae* may be cultured from throat and nasopharyngeal specimens<sup>3-9</sup> and high isolation rates are especially obtainable with use of selective culture media in the laboratory.<sup>10</sup> The incidence of isolation from these sites appears to be higher in children, especially for *H. influenzae* and *S. pneumoniae*, and prospective family studies have not demonstrated a significant seasonal variation. Carrier rates, which varied among different geographical areas, have ranged from 5%–60% for *H. influenzae* and *S. pneumoniae*. *S. aureus* and *N. meningitidis* carriage in the nasopharynx is also commonly encountered.

### Pneumonia

Two studies have examined the value of upper respiratory tract cultures for predicting pathogens in acute bacterial pneumonia by simultaneously culturing upper respiratory tract and transthoracic lung-puncture specimens.<sup>11,12</sup> Using the lung puncture specimen as the "gold standard", both studies demonstrate the insensitivity of upper respiratory

cultures for demonstrating a pathogen.

Poor specificity is also evident, as a significant number of upper respiratory specimens that were positive for a putative pathogen had either an alternate pathogen or no pathogen demonstrated in lung aspirate.

### Pharyngitis

Although references to pharyngitis secondary to *H. influenzae* exist, the data are insufficient to implicate this organism or *S. pneumoniae*, *S. aureus*, or *N. meningitidis* as a primary etiologic agent of pharyngitis. Antibiotic treatment may well be motivated, in part, by the physician's and patient's desire to take active steps and by lack of unequivocal proof that these pathogens never cause illness in any patient. However, the strong balance of probability that treatment may be harmful or ineffective should be weighed against the remote possibility of doing good.

Concern on the presence of *H. influenzae* in throats is probably based on the high incidence of this organism in throats of patients with systemic disease.<sup>13,14</sup> This concern is compounded by the clinical finding of pharyngitis in a majority of patients with invasive *H. influenzae* illnesses.<sup>14</sup> It is unlikely, however, that one could prospectively confer significance to such bacteria in view of isolation rates from throat swabs in asymptomatic patients and patients with non-specific upper respiratory tract illnesses. Pharyngitis accompanying invasive *H. influenzae* disease might be secondary to an antecedent viral infection that could subsequently facilitate the entry of *H. influenzae*.

One study that examined cultures from asymptomatic patients and patients with pharyngitis did not demonstrate a significant difference in isolation rates for *S. pneumoniae*, staphylococci, enteric bacilli, and *Neisseria* sp.<sup>15</sup> A minor association was observed between *Hemophilus* sp. and sore throats, but most positive cultures for *H. influenzae* yielded this organism as a total of only 10%–30% of all bacteria cultured. Therefore, a predominance of *H. influenzae* would not have signaled significance.

In another study of predominantly upper respiratory infections that

included pharyngitis patients, no differences could be demonstrated between symptomatic patients and controls for *H. influenzae*, *H. parainfluenzae*, *H. parahemolyticus*, *S. aureus*, *S. pneumoniae*, *Neisseria* sp., and enteric bacilli.<sup>16</sup>

In a study lacking adequate case controls, it was suggested that *H. influenzae* could be important in upper respiratory tract infection.<sup>17</sup> However, a "significant number" of *Hemophilus* isolates were recovered from both asymptomatic and symptomatic patients. Furthermore, the symptomatic patients in this study had "upper respiratory tract infection" that was not further defined.

A high incidence of *H. influenzae* in throat swabs from adults with "upper respiratory infection" and "common cold" was also recognized by Dick and colleagues.<sup>18</sup> Again, however, the cause and effect were poorly established.

### Nasopharyngitis

Nasopharyngitis is frequently a consequence of viral infection, although bacterial nasopharyngitis is occasionally suspect when heavy growths of potential pathogens such as *H. influenzae*, *S. pneumoniae* and *B. catarrhalis* are isolated from nasopharyngeal swabs. The incidence of these organisms is higher in those patients with upper respiratory infection who have nasal discharge. Although less commonly isolated, the presence of *S. pyogenes* is considered important. Todd and colleagues have addressed the issue of bacterial nasopharyngitis with a placebo-controlled trial<sup>19</sup> and have demonstrated a lack of benefit in the use of an antibiotic (cephalexin). Despite the isolation of *S. pneumoniae* and *H. influenzae* from a majority of nasopharyngeal specimens, antibiotic use did not appear to reduce symptoms when compared to placebo treatment. Although some patients with nasopharyngitis may have an underlying sinusitis, it would appear at this time that nasopharyngitis alone should not prompt the physician to obtain nasopharyngeal cultures, nor should treatment be initiated if *H. influenzae*, *S. pneumoniae*, or *B. catarrhalis* is isolated.

## Sinusitis

Poor predictive values of nasopharyngeal isolates for predicting bacterial causes of acute sinusitis have been documented.<sup>20</sup> In their study, Axelsson and Brorson found that only 64% of nasopharyngeal and sinus specimens yielded the same bacteria. The specificity of nasopharyngeal culture would also be a concern, in view of the incidence of potential systemic pathogens in non-specific upper respiratory infections. These findings were reaffirmed by Evans and colleagues.<sup>21</sup>

## Otitis Media

Otitis media ranks as one of the most common clinical pediatric diagnoses for which antibiotics are prescribed. Because of the inherent difficulty in acquiring cultures from the middle ear, the nasopharyngeal specimen is occasionally obtained to provide information for predicting middle-ear pathogens. This practice has led to much study and several insights.<sup>22-31</sup>

The results of throat swabs correlate poorly with middle-ear isolates in patients with both acute otitis media and effusions. Colonization studies in which investigators have examined the incidence of *H. influenzae* type b (the type commonly associated with invasive disease) in the throat did not demonstrate a difference between well patients and those with acute otitis media. This result might be anticipated, however, since most *H. influenzae* isolates from the middle ear are non-typable (i.e., unencapsulated).

When routine culture methods are used, nasopharyngeal specimens also correlate poorly with middle-ear isolates. Quantitative nasopharyngeal cultures have been proposed, but they would be cumbersome for routine use. In the study carried out by Long and colleagues,<sup>31</sup> predominant growth of *H. influenzae* correlated positively with tympanocentesis isolates. However, predominant growth of *S. pneumoniae* was not significantly correlated with the middle-ear isolate, and the predominant growth of *B. catarrhalis* correlated negatively with the presence of bacterial otitis media. The value of semi-quantitative cultures has been suggested by Schwartz and colleagues,<sup>32</sup> who have found that

predominating numbers of a single organism in nasopharyngeal specimens have a high positive predictability for determining a middle-ear pathogen. Unfortunately, the predictive value of a negative result was not high.

In summary, it would appear at this time that semi-quantitative culture of nasopharyngeal swabs for *H. influenzae* have limited clinical value.

## Other Respiratory Infections

Several studies have examined the utility of upper respiratory tract cultures in a variety of "upper respiratory infections". In a Scandinavian study of children with chronic cough,<sup>33</sup> nasopharyngeal cultures of symptomatic and control children did not reveal differences for *S. pneumoniae* and *H. influenzae*, although a trend to increased colonization with *B. catarrhalis* was noted in the symptomatic group. In other populations with a variety of respiratory illnesses, specimens from the anterior nares, nasopharynx, and oropharynx have not been of value in discriminating symptomatic and asymptomatic patients, nor have they been of value in indicating etiology.<sup>16,34-38</sup> These findings have applied to organisms including *S. pneumoniae*, *H. influenzae*, and *S. aureus*. It is suggested, however, that many of these illnesses have a viral etiology and that there is a positive correlation

between the presence of virus and the higher isolation rates for some of these bacteria.<sup>36,37</sup>

Viral cultures are expensive, and although the information gained is of epidemiological significance, it is seldom of value in managing individual out-patients with respiratory infections. Even in patients whose pharyngeal inflammation was a component of upper respiratory infection, oropharyngeal cultures were not of demonstrable value.

## Implications for Therapy

The lack of benefit of antibiotic treatment in non-specific upper respiratory infections has long been noted<sup>39-44</sup> and is commonly a point of instruction in undergraduate medical education. However, the report of isolation of a potential systemic pathogen from oropharyngeal and nasopharyngeal sites can bias physicians towards prescribing treatment even when they cannot localize infection.

This review provides evidence supportive of the belief that oropharyngeal and nasopharyngeal cultures are generally of poor predictive value for determining the bacterial cause of pneumonia, sinusitis, and otitis media. Furthermore, there is insufficient evidence to implicate organisms, including *H. influenzae*, *S. pneumoniae*, *S. aureus*, *H. parainfluenzae*, and *N. meningitidis*, as primary agents of pharyngitis.

**Table 1**  
**Bacterial Etiology of Out-Patient Upper Respiratory Infections**

Disease	Etiology	
	Common	Less Common
Pharyngitis	<i>Streptococcus pyogenes</i>	<i>Corynebacterium diphtheriae</i> <sup>a</sup> <i>Neisseria gonorrhoeae</i> <sup>a</sup> <i>Mycoplasma pneumoniae</i> <sup>a</sup> <i>Corynebacterium (Arcanobacterium) hemolyticum</i> <sup>a</sup> (? other beta-hemolytic Streptococci)
Nasopharyngitis	—	<i>Streptococcus pyogenes</i>
Sinusitis	<i>Hemophilus influenzae</i> <i>Streptococcus pneumoniae</i>	<i>Branhamella catarrhalis</i> <i>Staphylococcus aureus</i> anaerobes
Otitis media	<i>Streptococcus pneumoniae</i> <i>Hemophilus influenzae</i>	<i>Branhamella catarrhalis</i> <i>Streptococcus pyogenes</i> <i>Staphylococcus aureus</i>

a. Require special consideration for culture.

Given, as well, the high colonization rate of potentially systemic pathogens in the upper respiratory tract, I would propose the following protocol:

- culture and identify bonafide pathogens of the respiratory tract when possible;
- treat empirically those infections where specimen collection is difficult, but where the knowledge of the bacteriology in infection is established (Table 1).

These recommendations would, of course, apply to out-patients with uncomplicated illness. The perception of significant bacteria in oropharyngeal and nasopharyngeal sites might be biased in patients with underlying chronic diseases such as oncology or cystic fibrosis patients, or hospitalized patients with other diseases. Knowledge of carrier states for some organisms such as *N. meningitidis* in epidemics and *S. aureus* in recurrent staphylococcal skin infections may be useful. In addition, in a patient with recurrent or non-responding infection, diagnostic aspiration of a sinus or middle ear might be preferred to determine the specific etiologic agent.

The choice of empiric chemotherapy for sinusitis and otitis media should be directed to the more common isolates (i.e., *H. influenzae* and *S. pneumoniae*), and ampicillin or amoxicillin is often chosen. Such therapy commonly results in clinical cure. Regimens that make use of cefaclor, co-trimoxazole, sulphonamide-erythromycin, and amoxicillin-clavulanic acid have a broader or different spectrum of antimicrobial coverage that may be beneficial in some cases (e.g., beta-lactamase positive strains which are ampicillin and amoxicillin resistant) of *H. influenzae* and *B. catarrhalis*. The incidence of beta-lactamase positive *H. influenzae* in both hospitalized and community patients is approximately 15%–25%.<sup>45,46</sup> The value of screening nasopharyngeal isolates for beta-lactamase positivity to predict strains in the sinuses or middle ear that are beta-lactamase positive has not been well studied. Such screening might be of value in therapeutic failures of otitis media, where nasopharyngeal specimens have yielded predominant growths of *H. influenzae*, but, again, this possibility warrants further study.

Upper respiratory infections in the community are common, and therefore overuse of antibiotics could raise significantly the costs of treatment, the incidence of side-effects, and the development of antibiotic-resistant micro-organisms. A balanced approach to the interpretation of upper respiratory tract cultures and to the choice of antimicrobial chemotherapy is imperative. ■

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## References

1. Marsland DW, Wood M, Mayo F. A data bank for patient care, curriculum, and research in family practice: 526,196 patient problems. *J Fam Pract* 1976; 3:25–8, 37–68.
2. Berger PC, Elford RW, Yeo MA, et al. Pharyngitis 1987: a survey of physicians' attitudes and practices in southern Alberta. *Can J Pub Health*. (in press).
3. Dunlap MB, Harvey HS. Host influence on upper respiratory flora. *New Engl J Med* 1956; 255:640–6.
4. Cunliffe AC. Incidence of *Staphylococcus aureus* in the anterior nares of healthy children. *Lancet* 1949; ii:411–4.
5. Masters PL, Brumfitt W, Mendez RL, et al. Bacterial flora of the upper respiratory tract in Paddington families, 1952–4. *Brit Med J* 1958; i:1200–5.
6. Loda FA, Collier AM, Glezen WP, et al. Occurrence of *Diplococcus pneumoniae* in the upper respiratory tract of children. *J Ped* 1975; 87:1087–93.
7. Harvey HS, Dunlap MB. Seasonal prevalence of upper respiratory pathogens. *New Engl J Med* 1961; 264:684–6.
8. Hendley JD, Sande MA, Stewart PM, et al. Spread of *Streptococcus pneumoniae* in families. I. Carriage rates and distribution of types. *J Inf Dis* 1975; 132:55–61.
9. Durr ML, Gray SJ, Howells CHL. A survey of nasal *Streptococcus pneumoniae* in children. *J Hyg* 1982; 88:425–31.
10. Hovig B, Aandahl EH. A selective method for the isolation of *Hemophilus* in material from the respiratory tract. *Acta Path Micro Scand* 1969; 77:676–84.
11. Mimica I, Donoso E, Howard JE, et al. Lung puncture in the etiological diagnosis of pneumonia. *Am J Dis Child* 1971; 122:278–82.
12. Silverman M, Stratton D, Diallo A, et al. Diagnosis of acute bacterial pneumonia in Nigerian children. *Arch Dis Child* 1977; 52:925–31.
13. Todd JK, Bruhn FW. Severe *Hemophilus* infections: spectrum of disease. *Am J Dis Child* 1975; 129:607–11.

14. Walker SH. The respiratory manifestations of systemic *Hemophilus influenzae* infection. *J Ped* 1963; 62:386–92.
15. Branson D. Bacteriology and clinical significance of hemolytic *Haemophilus* in the throat. *Appl Micro* 1968; 16:256–9.
16. Hable KA, Washington JA, Herrmann EC. Bacterial and viral throat flora: comparison of findings in children with acute upper respiratory tract disease and in healthy controls during winter. *Clin Ped* 1971; 10:199–203.
17. Bridger RC. *Hemophilus influenzae*: the relationship to upper respiratory tract infection. *NZ Med J* 1974; 80:19–22.
18. Dick EC, Carr DL, Kan L. *Hemophilus influenzae*: association with acute respiratory illness in adults. *Arch Environ Health* 1966; 13:450–3.
19. Todd JK, Todd N, Damato J, et al. Bacteriology and treatment of purulent nasopharyngitis: a double blind, placebo-controlled evaluation. *Ped Inf Dis* 1984; 3:226–32.
20. Axelsson A, Brorson JE. Correlation between bacteriological findings in the nose and maxillary sinus in acute maxillary sinusitis. *Laryngoscope* 1973; 83:2003–11.
21. Evans FO, Sydnor JB, Moore WEC, et al. Sinusitis of the maxillary antrum. *New Engl J Med* 1975; 293:735–9.
22. Mortimer EA, Watterson RL. A bacteriologic investigation of otitis media in infancy. *Pediatrics* 1956; 17:359–67.
23. Feingold M, Klein JO, Haslam GE, et al. Acute otitis media in children: bacteriological findings in middle ear fluid obtained by needle aspiration. *Am J Dis Child* 1966; 111:361–5.
24. Kamme C, Lundgren K, Mardh PA. Etiology of acute otitis media in children. *Scand J Inf Dis* 1971; 3:217–23.
25. Branefors-Helander P, Dahlberg T, Nylen O. Clinical, bacteriological, and serological study of children with frequent episodes of acute otitis media. *Acta Otolaryngol* 1975; 80:399–409.
26. Bernstein JM. Biological mediators of inflammation in middle ear effusions. *Ann Otol Rhinol Laryngol* 1976; 85(Supp. 25):90–6.
27. Schwartz R, Rodriguez WJ, Mann R, et al. Nasopharyngeal culture in acute otitis media: a reappraisal of its usefulness. *J Amer Med Assoc* 1979; 241:2170–3.
28. Henderson FW, Collier AM, Sanyal MA, et al. Longitudinal study of respiratory viruses and bacteria in the etiology of acute otitis media with effusion. *New Engl J Med* 1982; 306:1377–83.
29. Gray BM, Converse GM, Dillon HC. Epidemiologic studies of *Streptococcus pneumoniae* in infants: acquisition, carriage, and infection during the first twenty-four months of life. *J Inf Dis* 1980; 142:923–33.
30. Bergeron MG, Ahronheim G, Richard JE, et al. Comparative efficacies of

Erythromycin-Sulfisoxazole and Ceclor in acute otitis media: a double blind randomized trial. *Ped Inf Dis* 1987; 6:654-60.

31. Long SS, Henretig FM, Teter MJ, et al. Nasopharyngeal flora and acute otitis media. *Inf Immun* 1983; 41:987-91.

32. Michaels RH, Poziviak CS, Stonebraker FE, et al. Factors affecting pharyngeal Hemophilus influenzae type b colonization rates in children. *J Clin Micro* 1976; 4:413-7.

33. Brorson JE, Malmvall BE. Branhamella catarrhalis and other bacteria in the nasopharynx of children with longstanding cough. *Scand J Inf Dis* 1981; 13:111-3.

34. Willard CY, Hansen AE. Bacterial flora of the naso-pharynx in children. *Am J Dis Child* 1959; 97:318-25.

35. Box QT, Cleveland RT, Willard CY. Bacterial flora of the upper respiratory tract. *Am J Dis Child* 1961; 102:293-301.

36. Ramfrez-Ronda CH, Fuxench-Lopez Z, Nevarez M. Increased pharyngeal bacterial colonization during viral illness. *Arch Intern Med* 1981; 141:1599-603.

37. Nichol KP, Cherry JD. Bacterial-viral interrelations in respiratory infections in children. *New Engl J Med* 1967; 277:667-72.

38. Macasaet FF, Kidd PA, Bolano CR, et al. The etiology of acute respiratory infections. III. The role of viruses and bacteria. *J Ped* 1968; 72:829-39.

39. Hardy LM, Traisman HS. Antibiotics and chemotherapeutic agents in the treatment of uncomplicated respiratory infections in children. *J Ped* 1956; 48:146-56.

40. Townsend EH. Chemoprophylaxis during respiratory infections in a private pediatric practice. *Am J Dis Child* 1960; 99:566-73.

41. Townsend EH, Radebaugh JF. Prevention of complications of respiratory illnesses in pediatric practice: a double-blind study. *New Engl J Med* 1962; 266:683-9.

42. Ackerman BD. Treatment of undifferentiated respiratory infections in infants. *Clin Ped* 1968; 7:391-5.

43. Davis SD, Wedgwood RJ. Antibiotic prophylaxis in acute viral respiratory diseases. *Am J Dis Child* 1965; 109:544-53.

44. Soyka LF, Robinson DS, Lachant N, et al. Misuse of antibiotics for treatment of upper respiratory tract infections in children. *Ped* 1975; 55:552-6.

45. Tremblay LD, Lavoie GY, Bergeron MG, et al. Hemophilus influenzae resistance in Canada. Paper presented at the annual meeting of the *Amer. Soc. Micro.* Atlanta, Ga. 1987. Abs., C-286.

46. Jaeger R, Low DE. Prevalence of Ampicillin-resistant Hemophilus influenzae isolated from non-hospitalized patients in Ontario, New York, and Pennsylvania. *Can Dis Wkly Rep* 1987; 13(40):183-4.

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