

Assessment of sputum cultures for the diagnosis of lower-respiratory tract infections in the outpatient setting

To the Editor: The clinical relevance of lower-respiratory tract (LRT) specimens remains debatable. While a positive blood or pleural fluid culture provides a definitive cause, an organism cultured from a respiratory specimen is not definitive proof of an aetiological agent. Many bacterial species are normal flora or colonisers of the respiratory tract; therefore, routine use of sputum cultures, except for suspected *Mycobacterium tuberculosis* (TB), is not endorsed. Notably, the South African (SA) guideline for the management of community-acquired pneumonia (CAP) in adults and the American Thoracic Society/Infectious Diseases Society of America do not recommend the submission of a sputum sample in outpatients.^[1,2]

The objective of this study was: (i) to determine the yield of positive cultures from sputum collected in the outpatient setting in the Cape Town metropole; and (ii) to establish the prevalence of recognised pathogens and corresponding antibiograms. In our laboratory survey, sputum cultures were analysed retrospectively over 1 year from samples collected in the outpatient setting and submitted to the National Health Laboratory Service (NHLS), Groote Schuur Hospital (GSH), during 2018 (Fig.1). Patients with underlying lung disease caused by cystic fibrosis, and patients from respiratory clinics, were excluded.

A pathogen was identified in only 174 of 2 262 (7.7%) sputum cultures, while 2 088 cultures were reported as mixed growth or normal respiratory flora. Fifty-two percent ($n=92/174$) of specimens with a pathogen organism yielded *Haemophilus influenzae*, 12% ($n=26/174$) *Moraxella catarrhalis* and 9% ($n=12/174$) *Streptococcus pneumoniae*. These bacteria represent the common causes of CAP in adults and children between 2 months and 5 years of age in SA.^[1,3] From the 174 cultures, only 5% ($n=9$) were from children ≤ 5 years old. Ninety-nine percent ($n=90/91$) of *H. influenzae* were susceptible to co-amoxiclav, 97% ($n=87/91$) to amoxicillin and 100% to ceftriaxone, while 48% ($n=44/91$) were resistant to cotrimoxazole. Only 2 of 16 *S. pneumoniae* isolates were not susceptible to penicillin.

Numerous factors contribute to the low yield of pathogens cultured from sputum samples in the outpatient setting. These include patients with a low positive predictive value, given their symptoms and signs, and the likelihood of a viral infection, poor-quality samples collected with saliva and delayed transport from the healthcare facility to the laboratory, resulting in overgrowth of respiratory flora.^[4,5] Non-significant cultures do not only affect patient management, but also increase the need for additional laboratory staff and healthcare workers to process and collect samples. This situation also ultimately has financial implications.

The laboratory survey had the following limitations. It did not include clinical epidemiology, such as patient comorbidities, presence of structural lung diseases (e.g. acute exacerbations in chronic bronchitis), co-infection with TB or molecular diagnostics. We also did not investigate the diagnostic value of sputum-quality assessment. Data were obtained from community healthcare centres serviced by the NHLS at GSH. Furthermore, the retrospective nature of this study relied on the integrity of data extracted from the laboratory information system.

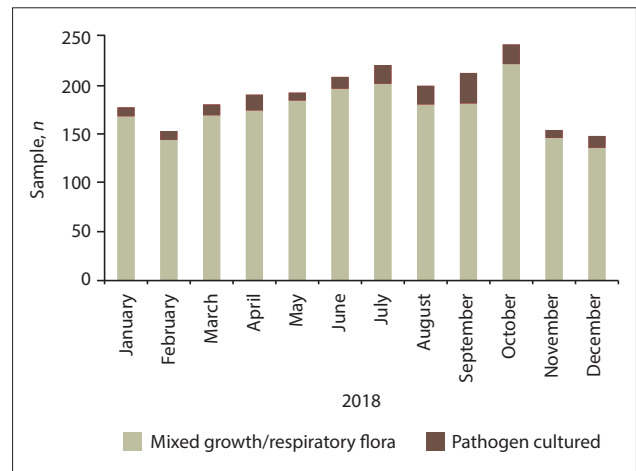


Fig. 1. Sputum cultures from suspected community-acquired pneumonia outpatients in 2018, submitted to the National Health Laboratory Service, Groote Schuur Hospital, South Africa. (Respiratory flora = normal nasopharynx-colonising flora; mixed growth = no predominance of Gram-negative or Gram-positive bacteria among normal respiratory flora.)

In conclusion, the diagnostic yield of sputum samples collected in the outpatient setting remains very low, with only 7.7% of cultures in this laboratory survey growing a recognised bacterial pathogen. The interpretation of sputum cultures continues to be a challenge for microbiology laboratories and the value of obtaining LRT samples is questionable.

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