

# Real-time PCR Testing Scheme for Detecting Bacterial Meningitis Pathogens During Routine Surveillance and Outbreak Responses



Toolkit

This testing scheme can be used as a guide to test for bacterial meningitis pathogens during routine surveillance and outbreak testing.

## INTRODUCTION

The purpose of this tool is to propose testing schemes for the detection of bacterial meningitis pathogens using the real-time PCR method during routine surveillance and outbreak investigations. The proposed outline of the testing scheme, which may be implemented in the event of an outbreak, is to triage a large influx of incoming specimens, to conserve resources (i.e., reagents) and provide faster results for public health response.

## TOOL CONTENTS:

- Routine Surveillance Testing Scheme that depicts the laboratory tests that should be performed during low levels of activity
- Outbreak Testing Scheme that depicts the laboratory tests that should be performed during high levels of activity

## TOOL INSTRUCTIONS:

The first testing scheme (Figure 1) is recommended for routine surveillance use during non-epidemic periods. Laboratories should be routinely confirming species identification for all three meningitis pathogens (*Neisseria meningitidis*, *Streptococcus pneumoniae*, and *Haemophilus influenzae*). Should either of the three species be detected, additional genogrouping/genotyping should be performed to identify the types of pathogen(s) in circulation. The prioritization of genogroup testing of *Neisseria meningitidis* strains will vary based on the epidemiology of circulating strains within each country. Depending on the country's epidemiology, a more targeted genogrouping testing algorithm could be used for genogrouping of *N. meningitidis* strains.

An example of a testing scheme (Figure 2) is provided in the event of an outbreak, where there is a large influx of specimens sent to the laboratory for confirmatory testing. In this event, the testing demand exceeds the current laboratory capacity. Therefore, this scheme details a more targeted testing approach to improve throughput, allowing for rapid reporting and conservation of reagents. In this example, *N. meningitidis* serogroup C has been detected and confirmed as the major pathogen in circulation during the season. As clinical specimens continue to be positive for serogroup C, the testing scheme could be re-prioritized to detect the suspected species and genogroup initially.

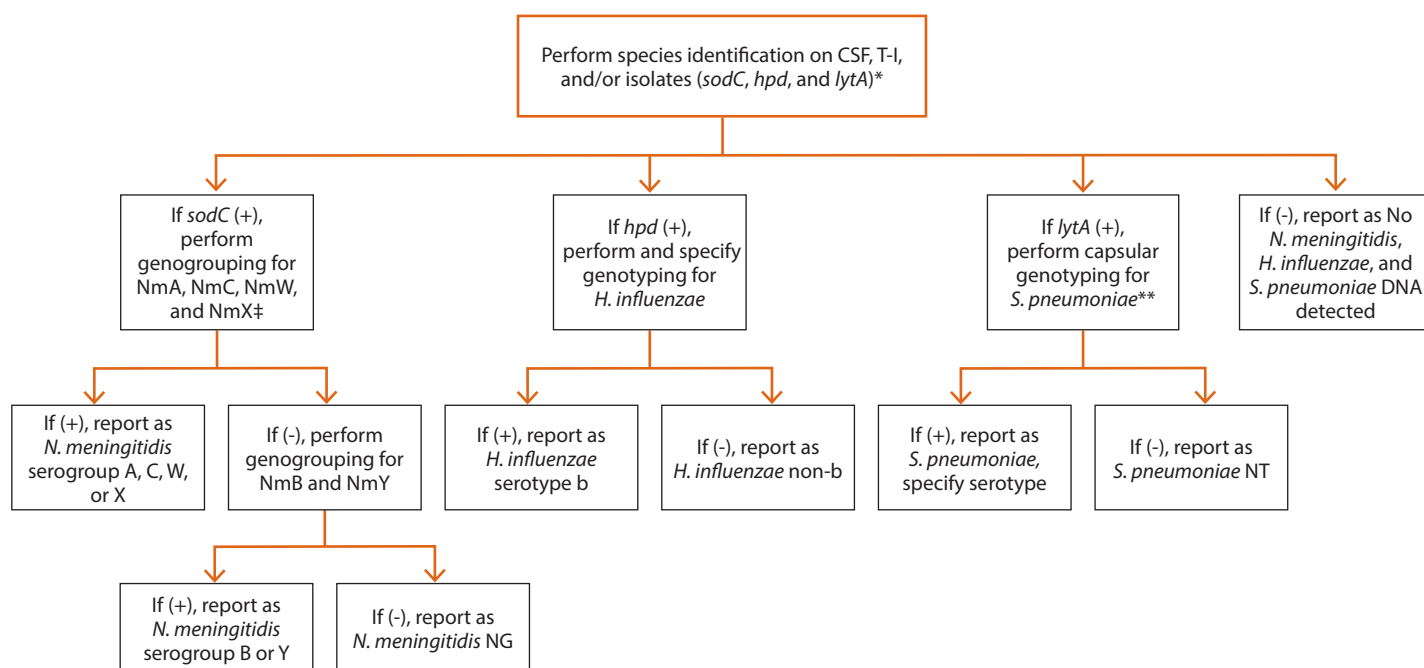
## ACKNOWLEDGEMENTS

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## Scheme 1: Testing scheme for routine surveillance

Early in the season, testing should be considered for all three meningitis pathogens (*Neisseria meningitidis*, *Streptococcus pneumoniae*, and *Haemophilus influenzae*).



\* *sodC* gene detects *N. meningitidis* species; *hpd* gene detects *H. influenzae*; *lytA* gene detects *S. pneumoniae*

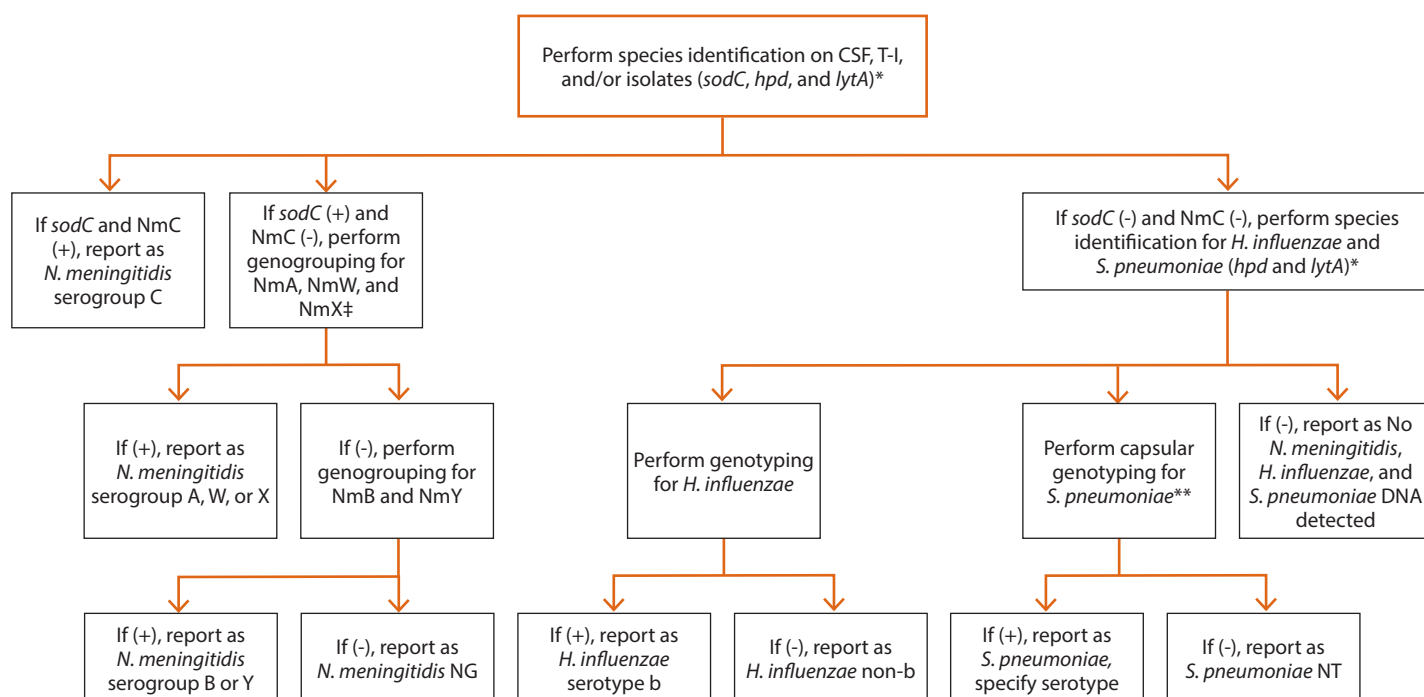
‡ The prioritization of *N. meningitidis* genogroup testing will depend on the epidemiology of circulating strains in the region or country

\*\*Capsular genotyping for *S. pneumoniae* will be depend on geographical distributions. Refer to <https://www.cdc.gov/streplab/pneumococcus/resources.html>

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## Scheme 2: Testing scheme for outbreaks

This testing scheme will depend on the major circulating pathogen detected from the early season testing. In this example, Nm serogroup C has been the major circulating pathogen. In this situation, the PCR cycling parameters can be reduced to 40 cycles for rapid results.



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