Use of Specialized Tissue-Based Diagnostic Techniques for Minimally Invasive Tissue Sampling to Determine Bacterial Causes of Death in Children Under the Age of 5 in South Africa

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Background
Infectious diseases are an important, potentially preventable, leading cause of mortality in infants and children <5 years old in low-income countries. Postmortem pathological examination is useful to identify infectious etiologies of deaths in infants and children. Few data are available on how well tissue-based diagnostic assays on specimens from minimally invasive tissue sampling (MITS) are able to identify infections in this population.

Materials & Methods
Formalin-fixed MITS samples from child deaths in South Africa were sent to the Infectious Diseases Pathology Branch (IDPB) as part of the pilot phase of the Child Health and Mortality Prevention Surveillance (CHAMPS) project in 2016. Histopathological evaluation was performed, and findings were discussed among pathologists from IDPB and South Africa through telepathology sessions, as needed, to achieve consensus diagnoses. Routine diagnostic tests, including special stains (SS), immunohistochemistry (IHC) and molecular testing by PCR and sequencing, were performed on MITS specimens that showed histopathologic evidence suggesting of an infectious etiology.

Conclusions
Tissue-based IHC and PCR assays performed on MITS samples are useful for identifying bacterial infections associated with childhood deaths in low-income countries. These infections include some that are preventable and treatable, emphasizing the potential for MITS to guide implementation of public health measures aimed at reducing childhood mortality.

Results
IDPB received MITS samples from 403 deaths with suspected infectious cause of mortality in children <5 years old and stillbirths. Among these deaths, 55% (225) had histopathologic features suggesting of infection. Further testing at IDPB identified common infectious bacterial agents as Klebsiella pneumoniae (3 PCR and 41 IHC positive tests), Pseudomonas aeruginosa (2 PCR and 5 IHC positive tests), Staphylococcus species, including Staphylococcus aureus (12 IHC positive tests), Streptococcus species, including Streptococcus pneumoniae (10 PCR and 3 IHC positive tests) and Acinetobacter species, including Acinetobacter baumannii (13 PCR and 7 IHC positive tests).

Findings of infectious etiology
Findings of non-infectious etiology

K. pneumoniae
P. aeruginosa
S. aureus
S. pneumoniae
Acinetobacter spp
No infectious agent identified

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The findings and conclusions in this presentation are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.