H35 Use of an Automated, Nested, Multiplex, Respiratory Pathogen Polymerase Chain Reaction (PCR) Panel Postmortem in the Pediatric Forensic Setting

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After attending this presentation, attendees will understand the benefits of using an automated, nested, multiplex, respiratory pathogen PCR panel in determining cause of death in decedents, ages 0 to 12 years.

This presentation will impact the forensic science community by demonstrating the utility of an automated, nested, multiplex, respiratory pathogen PCR panel in determining cause of death in a pediatric population.

Molecular diagnostic techniques have only recently become useful as rapid diagnostic tools due to innovations in automation, decreasing cost, and resultant increased accessibility. Several studies have been published regarding the use of Polymerase Chain Reaction (PCR) to identify respiratory pathogens postmortem.[1-11] No prior study has been conducted using an automated, nested, multiplex, respiratory pathogen PCR panel on fresh postmortem samples. The potential benefits of such analysis include a greater breadth of pathogen detection. As costs have decreased, implementation of sophisticated molecular testing in the postmortem setting has become possible. The purpose of the current study was to determine the utility of automated, nested, multiplex respiratory pathogen PCR panels in in determining cause of death.

In order to ascertain the utility of this technology in determining cause of death, such tests were performed on coronial decedents, ages 0-12 years, from January 1, 2009 to June 6, 2015, in the Medical and Forensic Autopsy Section at the Medical University of South Carolina. Cases were selected for PCR on the basis of pathologist suspicion of potential respiratory illness at time of death. Samples were acquired via postmortem mucosal swabs from nasopharyngeal, tracheal, or bronchial regions. Samples were analyzed using an automated, nested, multiplex PCR panel of respiratory pathogens.[12] Over the course of the study, the respiratory pathogen panel detected from 12 to 17 potentially pathogenic agents, with the most recent panel including Adenovirus, *Bordetella pertussis*, *Chlamydia pneumoniae*, Coronavirus 229E, Coronavirus HKU1, Coronavirus NL63, Coronavirus OC43, Influenza A and B, *Mycoplasma pneumoniae*, Metapneumovirus, Parainfluenza 1-4, Respiratory Syncytial Virus, and Rhinovirus/Enterovirus. The contribution of each positive PCR result to the cause of death was critically examined and interpreted based on the autopsy findings and known circumstances surrounding death.

A total of 37 cases warranted a respiratory pathogen PCR panel in 0-to-12-year-old decedents. Of those, 17 (45.9%) yielded positive PCR results. In 41% (7/17) of these cases, the cause of death was associated with the respiratory illness detected by the PCR panel. Five (29.4%) of the cases with a positive PCR result were determined not to play a significant role in cause of death. The remaining five PCR positive cases remained undetermined regarding the role of the detected pathogen in the death. Potentially pathogenic agents detected included Rhinovirus/Enterovirus (12 cases), RSV (4 cases), Adenovirus (2 cases), Coronavirus NL63 (2 cases), and influenza B (1 case). Co-infections were documented in three cases. Of the 26 cases in which the decedent was under one year of age, 11 (42.3%) had a positive viral PCR result. Thirteen decedents less than one-year-old were assigned sudden unexplained infant death or "undetermined" as cause of death; 5 of those 13 (38.5%) cases had a positive viral PCR result.

Results indicate that an automated, nested, multiplex, respiratory pathogen PCR panel currently used for diagnostic purposes in living patients can be applied at time of autopsy to aid in determining cause of death. Furthermore, regular use of such PCR panels postmortem could have a significant impact on our knowledge of public health and epidemiology.

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