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Comparison of nasal swab and saliva specimen for detection of SARS-CoV-2 in children

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Comparison of nasal swab and saliva specimen for detection of SARS-CoV-2 in children

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Role: Performed literature review, assembled home kit supplies, performed and compared different methods of PCR preparation, performed and analyzed PCRs on home samples.

Background: Stemming from the rapid need for COVID-19 testing when supplies were limited, we investigated alternate sample processing methods and sample types for SARS-CoV-2 detection. Respiratory specimen processing using an automated nucleic acid extraction system (easyMAG) provides highly quality of nucleic acid for amplification. Reagents and supplies for easyMAG were on short supply during the pandemic, so alternative sample processing methods were investigated. Due to COVID-19 quarantine and isolation, a home kit for specimen collection was desired, particularly one that was less invasive than nasopharyngeal swabs. We investigated the sensitivity and parent/ child satisfaction of home collection kits evaluating saliva and nasal specimens.

Objectives: Our objectives were to identify alternate sample processing methods and sample types for SARS-CoV-2 detection. We also assessed whether one specimen was preferable to parents and children for home collection.

Methods/Design: To assess alternate specimen processing methods a nasopharyngeal swab specimen was processed by four different methods simultaneously including easyMAG, heating at 95C for 10 min, lysis buffer plus heating and lysis buffer. All nucleic acid extraction preparations were tested by real-time PCR amplification to assess cycle threshold values (Ct) of three housekeeping genes. Home collection kits for both saliva and nasal swab collection were supplied to five volunteers to collect samples from children at home. All five pairs of nasal swabs and saliva were extracted by easyMAG and tested by PCRs for housekeeping genes. Finally, we sent a satisfaction survey to our participants to find which method of specimens collection was preferable to the parent and the child.

Results: All methods of specimen processing yielded similar Ct values, while lysis buffer with heating produced the closest Ct to the easyMAG method (Avg. CT of 28.13 vs 26.78). Saliva samples consistently yielded lower Cts than their nasal sample counterparts across all three assays (26.35 vs 28.74). On the survey, every parent preferred the nasal method of collection, while four of five children preferred the saliva method.

Conclusion: Although specimen processing by easyMAG is the gold standard, alternate processing by crude lysis of specimen with lysis buffer and heat resulted in comparable detection

of housekeeping genes. Saliva sample results are comparable to nasal swabs and are a less invasive and easy method of collection in children for COVID-19 testing. Home collection kits could be an effective means of specimen collection, potentially limiting patient exposure to healthcare providers.