

## Comparison of the pain experienced with anterior nasal swabs and nose and throat swabs in children

The mainstay of COVID-19 diagnosis remains the nose and throat swab for reverse transcriptase-PCR (RT-PCR).<sup>1</sup> Comparison between nose and throat swabs (NTS) and anterior nasal swabs (ANS) has shown a reduction in the sensitivity of RT-PCR from 99% to approximately 80%–90%.<sup>2</sup> Novel methods of molecular and antigen testing have also explored the use of alternative respiratory tract samples. An in-hospital pilot study (NCT04629157) of an antigen-based test aimed to compare the pain associated with nose and throat swabs to that experienced with anterior nasal swabs in children.

Children undergoing routine NTS for SARS-CoV-2 were consented and underwent an ANS prior to NTS. Children and their parents were asked to score the pain experienced with each swab type on a Likert scale of 0–10. Children used the Wong-Baker Faces Tool to aid this and parents were advised that 0 was no pain and 10 was the worst pain.

One hundred and seventeen children and 159 parents of children with a mean age of 7.7 years (SD 5.2 years) gave paired scores for both swab types. Using linear regression analysis we see that children and parents report a significantly lower pain score ( $p < 0.0001$ ) for ANS compared with NTS. Parent-reported pain scores significantly reduced with increasing age with both swab types (ANS:  $r^2 = -0.10$ , NTS:  $r^2 = -0.08$ ,  $p < 0.001$ ), and child-reported pain scores for ANS reduced significantly with age ( $r^2 = -0.02$ ,  $p < 0.02$ ) but did not reduce for NTS ( $r^2 = -0.005$ ,  $p = 0.45$ ).

Children undergo testing when symptomatic within the community, when admitted to hospital as an acute or elective

admission, and as screening in transplant wards and intensive care. Testing is known to have a negative impact on children and can create aversive behaviours, particularly in those requiring repeated procedures.<sup>3</sup>

The prevalence of COVID-19 in hospitals is far lower in children compared with adults,<sup>4</sup> approximately that of community levels, and therefore the likelihood of a positive test (the pretest probability) is lower. Changes in the prevalence of COVID-19 alter the positive and negative predictive values of the test, with a higher prevalence increasing the positive predictive value and reducing the negative predictive value.<sup>5</sup> Modelling the data using a prevalence of 0.5% and a specificity of 99.7%, we see that a reduction in sensitivity from 100% to 80% results in a reduction in positive predictive value from 62.6% to 57.3% and a reduction in negative predictive value from 100% to 99.9%. A prevalence of 2.0% using the same parameters of sensitivity and specificity shows a reduction in positive predictive value from 87.2% to 84.5% and a reduction in negative predictive value from 100% to 99.6%.<sup>5</sup> The minimal reduction in positive and negative predictive values of RT-PCR performed with ANS coupled with significantly lower pain scores with ANS means that we recommend that ANS is considered for routine mode of testing used for RT-PCR in children.

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