1 Comparison of Abbott ID Now, Diasorin Simplexa, and CDC FDA EUA methods for the detection
2 of SARS-CoV-2 from nasopharyngeal and nasal swabs from individuals diagnosed with COVID-
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13 Running Head: Comparison of NAAT methods for the detection of SARS-CoV-2
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Dozens of *in vitro* diagnostics (IVDs) have received emergency use authorization (EUA) from the U.S. Food & Drug Administration (FDA) for the detection of SARS-CoV-2, but little has been studied to determine how well these assays perform using clinical specimens. This study compared the positive percent agreement (PPA) of ID Now (Abbott; Chicago, USA) and Simplexa (Diasorin; Saluggia, Italy) using a modified CDC method as the reference standard (1). All three methods are used as part of standard of care testing within our hospital system. Ninety-six (96) remnant clinical specimens from April 2020 that tested positive for SARS-CoV-2 using standard of care testing were selected based on convenience and retested using the three methods. Fourteen negative controls (universal transport medium, UTM) were included to control for carryover contamination. Specimens included 11 supervised self-collected nasal swabs in 2 mL normal saline and 85 provider-collected nasopharyngeal swabs in 3 mL UTM. The online Medcalc tool (https://www.medcalc.org/calc/diagnostic_test.php) was used to determine the exact Clopper-Pearson 95% confidence intervals (CI). It is well documented that IVDs for SARS-CoV-2 can return falsely negative results in individuals with COVID-19 (2), and our study did not attempt to determine the clinical sensitivity of these assays.

The instructions for use (IFU) were followed for all methods with the exception that nasal swabs in saline were included, but these specimens are not explicitly described as acceptable in all of the assays' IFU. Other deviations from the IFU for the CDC method include: (1) using 7500 Fast instead of 7500 Fast Dx instrument, (2) using an alternate RNA extraction method (Maxwell RSC instrument with Viral TNA Kit [Cat# AS1330] [Promega, Madison, USA]), and (3) interpreting "inconclusive" (one positive target) results as "detected."

The results are in Table 1. The modified CDC assay detected SARS-CoV-2 in all 96 specimens (range of Ct values: 11.1-39.6). The ID Now assay detected SARS-CoV-2 in 90 of 96 specimens (PPA 94% [CI 87-98%]). The Simplexa assay detected SARS-CoV-2 in 92 of 96 specimens (PPA 96% [CI 90-99%]) (range of Ct values: 9.3-34.5).

The modified CDC assay detected both N1 and N2 targets in 94 of 96 specimens. In the other two specimens, the modified CDC assay detected only one of its two targets at ≥39 Ct, and SARS-CoV-2 was not detected using ID Now and Simplexa in these two specimens. In six other specimens, SARS-CoV-2 was not detected by only one of the assays; both targets in the modified CDC assay were detected at ≥32 Ct in these six specimens. Strong correlation of Ct values was observed when plotting the modified CDC assay N1 and N2 targets against the Simplexa S and Orf1ab targets ($R^2$=0.89-0.91).

In summary, the 95% CIs for the PPA was overlapping for the ID Now and Simplexa assays when using the modified CDC method as the reference standard. The sample size of this study was not large enough to conclude one of these assays had clearly superior or inferior performance for the detection of SARS-CoV-2 from upper respiratory specimens in liquid transport media. In addition to an assay's limit of detection and sensitivity, considerations of other important variables such as turn-around-time; complexity; cost; workflow; specimen type and stability; and availability of supplies, reagents, and equipment may influence selection of a health system's standard of care IVD that is implemented to detect SARS-CoV-2 RNA.

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62 References

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67 COVID-19: Comparison to RT-PCR. Radiology doi:10.1148/radiol.2020200432**:**200432.

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71 Table 1. Positive percent agreement (PPA) of the Abbott ID Now and Diasorin Simplexa assays
72 for the detection of SARS-CoV-2 was determined using a modified CDC assay as the reference
73 standard

| | Detected | Not Detected | PPA (95% CI) |
|---|---|---|---|
| Abbott ID Now | 90 | 6 | 94% (87-98%) |
| Diasorin Simplexa | 92 | 4 | 96% (90-99%) |
| Modified CDC assay | 96 | 0 | Not applicable |

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