Diagnostic Accuracy of the COVID-19 Rapid Detection Assay and Identification of COVID-19 in Patients Requiring Admission at Scarborough Health Network

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Background

At Scarborough Health Network (SHN), we are challenged by a limited number of single patient rooms, with the majority of rooms being semi-private or wardrooms. The COVID-19 pandemic presented major challenges with COVID-19 patient management and patient flow. Rapid decisions based on accurate laboratory test results were needed in order to isolate patients with possible COVID-19 infection both in the emergency department (ED) and when admitted to acute care to minimize nosocomial spread, maintain patient flow and ensure appropriate treatment. Reverse transcription polymerase chain reaction (RT-PCR) assays are considered gold standard in diagnosis of COVID-19 but have a long turn around time (TAT) and are therefore too slow to make isolation decisions for patients requiring admission to acute care hospitals with limited isolation capacity. The COVID-19 rapid detection assay is a simple, user-friendly test utilizing an isothermal nucleic acid amplification technology (NAAT). This test provides the qualitative detection of nucleic acid from SARS-CoV-2 viral RNA, with a shorter TAT allowing point-of-care testing, thus helping in timely decision-making for patient isolation.

Method

Nasopharyngeal samples of patients from all age groups requiring admission to SHN, both with and without COVID-19 symptoms were collected in ED and sent to the Laboratory in viral transport medium (VTM) to test with both the COVID-19 rapid detection assay and Multiplex RT-PCR assay for COVID-19 detection.

Objective

To assess the diagnostic performance of COVID-19 rapid detection assay in comparison to Multiplex RT-PCR assay for COVID-19 detection as a COVID-19 diagnostic tool for isolating patients requiring admission from the ED of an acute care hospital.

Results

From the total of 6209 samples collected from ED admissions, we observed a high concordance among the COVID-19 rapid detection assay and Multiplex RT-PCR assay for COVID-19 detection, with 6008 (96.76%) tests concordant and 201 (3.24%) tests discordant.

<table>
<thead>
<tr>
<th></th>
<th>No. of samples</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Concordant</td>
<td>6008</td>
<td>96.76%</td>
</tr>
<tr>
<td>Discordant</td>
<td>201</td>
<td>3.24%</td>
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<td>Total samples</td>
<td>6209</td>
<td>100%</td>
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Conclusion

Given the high concordance between the COVID-19 rapid detection assay and the gold standard RT-PCR assay, it can be concluded that the COVID-19 rapid detection assay provides a rapid and reliable alternative for the faster identification of COVID-19 positive cases. With limited isolation capacity at SHN, this ensures appropriate COVID-19 patient management and provides earlier opportunities for cohorting of patients which improved patient flow.

Discussion

Laboratory testing for detection of SARS-CoV-2 is mainly based on amplification and detection of viral gene sequences in upper respiratory tract specimens. The PCR tests have a longer TAT, therefore, management of EDs with large flow of patients becomes challenging and leads to a risk of overcrowding in these units and delay in initiation of treatment to the patients. Rapid COVID-19 tests using isothermal nucleic acid amplification technology (NAAT) have been able to address this issue by reducing the TAT and producing results comparable to RT-PCR testing. The results of our study were comparable to a similar study by Jean-Claude Nguyen Van et al.