Task Shifting for Point-of-Care Early Infant Diagnosis Testing: Comparison of Internal Quality Control Failure Rates Between Nurses and Specialized Laboratory Trained Personnel

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BACKGROUND

- Decentralizing point-of-care (POC) early infant HIV diagnosis (EID) and task-shifting to nurses can give HIV-exposed and infected infants greater access to diagnosis and early treatment initiation.
- Unlike conventional testing that requires specialised laboratory personnel, POC EID uses automated technology and may be operated by non-specialised personnel.
- POC EID technologies include internal error controls that detect user control issues.
- High rates of error may suggest inadequate user capacity.
- Comparing internal quality control failure (IQC) rates (also known as error rates) and results return to caregivers for samples run on a POC EID technology (Alere q HIV 1/2 Detect) by two types of operators (nurses versus lab personnel [MLSc/Techs]) allows assessment of user competence and can be used to inform POC EID rollout in other resource-limited settings.

RESULTS

- A total of 1,847 tests were conducted by 45 testers (12 MLSc/Techs and 33 nurses), resulting in 165 IQC failures.
- Nurses performed 1,483 tests and MLSc/Techs performed the other 364 tests.
- Overall IQC failure rate was 8.93%; 7.69% for MLSc/Techs vs. 9.24%, for nurses, p=0.36.
- User IQC failure rate was 6.17%; 5.22% for MLSc/Techs and 6.41% for nurses; p=0.38.
- There was no statistical difference between IQC failure rates for MLSc/Techs and for nurses.
- Over time, both cadres’ IQC failure rates decreased.
- Of results, 98.7% were issued to clients by MLSc/Techs; versus 98.92% for nurses.
- Median TATs were similar for tests conducted by nurses and those conducted by MLSc/Techs (overall TAT of one day (Q₁=0.5, Q₃=3.5) for MLSc/Techs versus same day (Q₁=0.5, Q₃=2.5) for nurses.

METHODS

- All ten pilot sites providing POC EID for routine clinical use in Zimbabwe were included in the study.
- POC EID machines in two sites are operated by MLSc/Techs only, in six sites by nurses only, and in the other two sites by both cadres.
- All sites received the same type of training and were mentored/supported at the same frequencies.
- Data from December 2016 to June 2017 were reviewed.
- IQC failure rates were downloaded from each POC EID machine and exported to excel to analyse IQC failure rates by type of operator.
- The dataset had a total of 1,847 EID entries with unique identifiers.
- Turnaround time (TAT) from sample collection to caregiver receipt of results was extracted from the EID testing form (test request and result form) and uploaded into an excel-based database for analysis.

Table 1: Comparison of IQC failure rates in the use of Alere q platform for POC EID by type of operator in Zimbabwe, 2017 (n=1847)

<table>
<thead>
<tr>
<th>Error Category</th>
<th>Testing Cadre</th>
<th>Error Rate</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>General IQC Failures</td>
<td>MLSc/Techs</td>
<td>7.69%</td>
<td>0.36</td>
</tr>
<tr>
<td></td>
<td>Nurses</td>
<td>9.24%</td>
<td></td>
</tr>
<tr>
<td>End-User IQC Failures</td>
<td>MLSc/Techs</td>
<td>5.22%</td>
<td>0.38</td>
</tr>
<tr>
<td></td>
<td>Nurses</td>
<td>6.41%</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Issuing of results by type of operator

<table>
<thead>
<tr>
<th>Provision of results issued to clients</th>
<th>MLSc/Techs</th>
<th>Nurses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion of results issued to clients</td>
<td>98.75%</td>
<td>98.92%</td>
</tr>
<tr>
<td>Median time from sample collection to receipt of results by caregiver</td>
<td>1 day (IQR 0.5 – 3.5)</td>
<td>Same day (IQR 0.5 – 2.5)</td>
</tr>
<tr>
<td>Median time from sample collection to processing</td>
<td>Same day (IQR 0.5 – 1.5)</td>
<td>Same day (IQR 0.5 – 0.5)</td>
</tr>
<tr>
<td>Median time from processing to issuing of results to caregiver</td>
<td>Same day (IQR 0.5 – 2)</td>
<td>Same day (IQR 0.5 – 1)</td>
</tr>
</tbody>
</table>

CONCLUSIONS

- Similar IQC failure rates and TAT between nurses and lab-tech-operators suggest that non-specialized laboratory trained personnel can perform POC EID equally well as specialized laboratory personnel.
- Nurse-operated POC EID testing will ensure decentralization and timely return of test results without compromising the quality of testing.
- Continuous mentoring/support and refresher trainings remain equally important for both nurses and lab-techs to reduce end-user IQC failures and ensure timely return of test results.

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