Ergonomic Workflow Analysis of the APTIMA COMBO 2® Assays for Chlamydia trachomatis and Neisseria gonorhoeae on the TIGRIS® DTS™ System Compared to Four Semi-Automated Assay Systems. 


ABSTRACT

Background: This study is a continuation of ergonomic evaluations of manual and automation modifications (NA) for the APTIMA COMBO 2® Assay for Chlamydia trachomatis and Neisseria gonorhoeae (GC). We report a further study of upper extremity (UE) physical demands under manual (PT) and NA conditions on the TIGRIS® DTS™ System.

Methods: The APTIMA COMBO 2 assay was performed using 400 samples on the TIGRIS DTS™ 400 and DTS 1600 systems compared with the manual PT assay using the CA instrument (Roche Diagnostics). Instrument exposures were also compared with the semi-automated COBAS AmpliPrep (Roche Diagnostics, Inc.) and the fully automated TIGRIS® DTS™ System (Roche Diagnostics, Inc.). Video data were collected in order to assess exposure assessment of body postures and task performance. Biomechanical stresses were assessed using the TIGRIS® DTS™ System and used in an exposure assessment tool to determine if there were any ergonomic improvements.

Results: The PT and the DTS 400 and DTS 1600 systems were compared with the CA instrument (Roche Diagnostics). Instrument exposures were also compared with the semi-automated COBAS AmpliPrep (Roche Diagnostics, Inc.) and the fully automated TIGRIS® DTS™ System (Roche Diagnostics, Inc.). Video data were collected in order to assess exposure assessment of body postures and task performance. Biomechanical stresses were assessed using the TIGRIS® DTS™ System and used in an exposure assessment tool to determine if there were any ergonomic improvements.

Methods:

Assays studied:

- APTIMA COMBO 2 assay on the DTS 400 instrument system
- CA = COBAS AmpliPrep
- APTIMA COMBO 2 assay on the DTS 1600—more automated than DTS 400

Method:

- TIGRIS® DTS™ System (Roche Diagnostics, Inc.)
- PT = Pelham, MA
- COA = CA (Coamplification Amplification, Inc.)
- CT = Kaiser Laboratories, North Hollywood, CA

Analyses:

- Ergonomic approach: An ergonomic approach was used to assess the ergonomic exposure of manual versus semi-automated and fully automated assays. The TIGRIS® DTS™ System was compared to the CA instrument (Roche Diagnostics). The design of the CA instrument (2-handed operation) for aspiration of samples required a greater amount of force. This force was also required to press the buttons on the support frame of the vortexing instrument. Both were operated manually and when tightening and loosening the clamps on the support frame.

Table 2: Composite regional scores for the upper limb (the sum of posture, muscle use, and force scores). The greater the concern for the ergonomic exposures.

<table>
<thead>
<tr>
<th>Assay</th>
<th>Task</th>
<th>Composite Score</th>
<th>Grand Score</th>
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<tbody>
<tr>
<td>TIGRIS® DTS™ 400</td>
<td>CT</td>
<td>743 / 893</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>NA</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>TIGRIS® DTS™ 1600</td>
<td>CT</td>
<td>743 / 893</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>NA</td>
<td>14</td>
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</tbody>
</table>

Discussion:

Certain aspects of specimen preparation were identified by the exposure assessment, whereas other aspects were eliminated by the CA laboratory procedures and equipment. Some accommodations of the assay systems were made in duplicate and triplicate. Additional workload and equipment limitations were noted, as were potential ergonomic exposures that were not currently assessed or included in the exposure assessment tool. The CA exposure was evaluated with NA, but cleaning and decontamination was not included as an exposure assessment tool. The instrument exposures were limited to the right hand only.

REFERENCES


