Experience using tablet technology for detection and monitoring of hearing loss among patients with MDR-TB in the STREAM clinical trial
I. Qawiy, J. Komrska, J. Nan, L. Patel on behalf of the STREAM Trial Collaboration

Background

New portable technologies have been introduced in various healthcare systems in low resource settings. While these devices are instrumental in facilitating care, they can present unintended and potentially disruptive consequences. We summarize our experience using tablet technology in Stage 2 of the STREAM clinical trial. Initial training on the tablet and audiometry application, and continuous monitoring and technical support was provided to all sites by the Sponsor.

Objectives

To identify challenges experienced at STREAM trial sites using mobile technology for detecting and managing hearing loss for patients over the course of MDR-TB treatment.

Methods

- Audiometry queries were collected from 12 STREAM stage 2 clinical trial sites in 6 countries via email correspondence and Sponsor monitoring visits.
- We reviewed queries related to the tablet from 12 Stage 2 sites, and challenges identified during site visits. These were categorized into four categories: software, user error, internet connectivity, and supply chain. Queries identified and addressed during Sponsor monitoring visits at trial sites were excluded from the analysis.
- Tablet queries were then verified, analyzed, and addressed with coordination between the site, Sponsor, and device manufacturer and/or the software developer as needed.

Results

- A total of 23 queries were reviewed (Table 1). Software issues including tablet operating system updates and audiometry application malfunctions accounted for just over half of the inquiries (13 (56.5%).
- User error, including forgotten login information and incorrectly recording test results under the wrong patient profile, accounted for 5 (21.7%) of the reported queries.
- Internet connectivity issues also posed challenges – updating the tablet and/or audiometry application systems and uploading audiometry results contributed to 3 (13%) queries.
- Supply chain issues such as customs clearance delays of annually calibrated headsets used with the tablet contributed to 2 (8.7%) queries.
- Hardware issues were not identified as a key challenge affecting the use of the tablet and audiometry application.
- The average number of days spent resolving an issue varied by category. The number of days ranged from 1 day for a software issue to 520 days due to challenges with the supply chain.
  - Software: 25 days
  - User Error: 13 days
  - Internet: 11 days
  - Supply Chain: 248 days

Table 1: Types of Queries by Country

<table>
<thead>
<tr>
<th>Country</th>
<th>South Africa</th>
<th>India</th>
<th>Moldova</th>
<th>Mongolia</th>
<th>Ethiopia</th>
<th>Georgia</th>
<th>Total N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td></td>
<td>13 (56.5)</td>
</tr>
<tr>
<td>User Error</td>
<td>1</td>
<td>3</td>
<td></td>
<td>1</td>
<td></td>
<td>5</td>
<td>5 (21.7)</td>
</tr>
<tr>
<td>Internet</td>
<td>2</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>3 (13)</td>
</tr>
<tr>
<td>Supply Chain</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 (8.7)</td>
</tr>
</tbody>
</table>

Conclusion

- Tablet-based technology is important for improving access to audiometry testing in low resource settings, but rollout and implementation can be challenging.
- Seamless coordination with manufacturers and software developers are essential to resolving issues in the field.
- While the number of queries are limited in number, the time involved in resolving each issue emphasizes the level of potential disruption.
- The number of queries we reported is likely an underestimate, as these were not systematically collected, and additional queries and challenges were identified during site visits. This highlights the need for ongoing training and support to ensure proper audiometry testing in the context of clinical trials.

This study is made possible by the generous support of the American people through the United States Agency for International Development (USAID) through the TREAT TB Cooperative Agreement No. GHN-A-00-08-00004. The contents are the responsibility of the authors and do not necessarily reflect the views of USAID or the United States Government.