Feasibility of Implementing a Tablet-Based Decision Support and Integrated Record-Keeping (DESIRE) Tool in the Nurse Management of Hypertension in Rural Kenya

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Background
• Hypertension, a major risk factor for cardiovascular disease (CVD), contributes significantly to the CVD burden in sub-Saharan Africa (SSA)
• Task redistribution of hypertension care from physicians to nurses in low- and middle-income countries (LMICs) has been proposed2
• In order to support nurses in this new role, Academic Partnership Providing Access to Healthcare (AMPATH) has developed a tablet-based decision Support and Integrated Record-Keeping (DESIRE) tool to record patient data and assist with clinical decision-making
• The DESIRE tool is a data entry system with branching logic featuring decision support, alerts and reminders with the ability to retrieve and display historical data derived from the electronic health record stored on a central data server (Figure 1)

Objective
To assess the feasibility of implementing the DESIRE tool in the Nurse Management of Hypertension in rural Kenya
To potentially broadly impact treatment of non-communicable diseases in LMICs by optimizing the implementation of mhealth interventions in task redistribution among frontline health workers

Methods
• Data collected:
  • Five semi-structured interviews with nurses
  • Two semi-structured interviews with implementation team members
  • One focus group discussion with five nurses
• Content analysis of the qualitative data was used (Nvivo, QRS International. Version 10.), focusing on:
  • Acceptability
  • Likelihood of recommending the DESIRE tool
  • Value added by the tool to the workflow
  • Impact on the practitioner-patient relationship
  • Empowerment of the end-users
• Infrastructure
  • Technical
  • Logistical
  • Human
  • Cultural

Results
• Five themes were found to emerge:
  • Barriers to implementation
  • Facilitators to implementation
  • Provider issues
  • Feature requests
• Technical Axis

<table>
<thead>
<tr>
<th>Technical Axis</th>
<th>Human Axis</th>
</tr>
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<tbody>
<tr>
<td>Server (16)</td>
<td>Program Administration (12)</td>
</tr>
<tr>
<td>Cellular (19)</td>
<td>Provider access to equipment</td>
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<tr>
<td>Network Coverage (10)</td>
<td>Lack of data storage</td>
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<tr>
<td>Software (7)</td>
<td>Nurse (11)</td>
</tr>
<tr>
<td>Interface (1)</td>
<td>Hardware (3)</td>
</tr>
<tr>
<td>Device Quality (3)</td>
<td>Drug availability</td>
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<tr>
<td>Data Entry and Validation (3)</td>
<td>Scale of Disease (3)</td>
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</tbody>
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Figure 1: A schematic overview of the DESIRE tool and its integration with the AMPATH Medical Records System (AMRS)

• The feasibility of this type of tool for hypertension care has not previously been assessed in a LMIC setting

Results (cont.)
• Barriers to implementation were found to exist along both a Technical and Human Axis (Figure 2)
• Solutions were proposed to the barriers to implementation (Table)

<table>
<thead>
<tr>
<th>Barriers to Implementation</th>
<th>Proposed Solution</th>
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<tbody>
<tr>
<td>Acceptability</td>
<td>Close collaboration with other teams using server</td>
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<tr>
<td>Acceptability</td>
<td>Improve server internet connection and uptime</td>
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<td>Lack of reliable network coverage</td>
<td>Work with network providers to ensure wireless coverage</td>
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<tr>
<td>Lack of data credit</td>
<td>Allow application to work in both online and offline modes</td>
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<tr>
<td>Lack of data credit</td>
<td>Regular schedule for data bundle transfer</td>
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<tr>
<td>Interactivity hardware failing</td>
<td>Replace defective hardware</td>
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<tr>
<td>Barriers to implementation</td>
<td>Barriers to implementation</td>
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Table: Barriers to implementation, categorized into technical and human axes, with corresponding proposed solutions.

• Facilitators included:
  • Privacy of digital health information
  • Improved health record organization
• Provider issues included:
  • Steep initial learning curve
  • Delays in implementation decrease user confidence
  • Barriers to implementation decrease user confidence
  • Prior smart phone use correlated with user confidence
  • Decision support perceived as improving quality of care

Results (cont.)
• Patient Issues included:
  • Initial decreased communication during patient-provider encounter
  • Improved communication with continued use
  • Perception that device provides higher quality care
  • Ten feature requests were proposed including:
    • Ability to create new records
    • Encounter review screen
    • Free-text field
    • Confirmation of data sync

Conclusions
• The use of a participatory feasibility study uncovered many previously unknown feasibility issues in implementing a tablet-based decision support tool for use in hypertension care by nurses in a resource-limited setting.
• The feasibility issues identified resulted in system change suggestions, highlighting the importance of feasibility testing as part of implementing mhealth systems in LMICs.
• In addition to confirming the presence of previously reported technical issues, we highlight the importance of human factors that can impact an mhealth intervention’s implementation success.

Limitations
• Delays in implementation of the program resulted in variability of the duration and intensity of nurse use of DESIRE prior to testing.

Future Plans
• Design change suggestions and feature requests have been incorporated into updated versions of the tool that AMPATH has subsequently developed
• Implementation of a revised system/tool based on feedback/feasibility testing
• Evaluation of patient perceptions of the DESIRE system directly through semi-structured interviews and a focus group study

References

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