REACHING UNDERSERVED ADULTS WITH DIABETES THROUGH INTERACTIVE TECHNOLOGY: MOBILE DIABETES DETECTIVE (MODD)

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Sponsored by: NIDDK 5R01DK090372-05
Diabetes self-management education is effective in improving glycemic control

Medically underserved do not receive DSME

Delivering DSME using health information technology could improve access

Medically underserved are adopting technology at increasing rates

TTM individual progresses through the five Stages of Change

Change processes includes both cognitive and behavioral activities
MOBILE ACCESS TO HEALTH INFORMATION (MAHI)

- Interactive technology including a conventional blood glucose meter (LifeScan OneTouch™) enhanced with a Bluetooth adapter and a cell phone (Nokia N80™).
- Data capture includes the user’s interaction with the glucose meter, blood glucose values, and media recordings of participants voices and pictures.
STUDY DESIGN

- To develop a theoretically grounded knowledge base for problem solving in diabetes
- To develop an expandable knowledge base related to DSME/S
- To promote diabetes self-management in underserved adult with type 2 diabetes using patient-centric decision support tools (MoDD)
## Development of the Mobile Diabetes Detective

<table>
<thead>
<tr>
<th>Participatory Design Employed by an Interdisciplinary Team</th>
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<tbody>
<tr>
<td>Bioinformatics Knowledge Engineers</td>
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<th>Development of MoDD Knowledge Base</th>
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<td>4 Knowledge Elements</td>
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<th>Validation of the MoDD Knowledge Base</th>
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<td>Federally Qualified Health Centers CDEs and Clients</td>
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KNOWLEDGE BASE DEVELOPMENT

- Conducted in collaboration with Clinical Directors Network (CDN)
- Knowledge base was created in a participatory design
- Used knowledge acquisition with academic diabetes educators (ADE) as domain experts
- Recruited CDE’s and participants from Community Health Centers (CHC)
- Validated by scenario-based approach with CDEs and participants from CHC
- Inclusion criteria: Age- 18-65, T2DM, language proficiency English or Spanish
VALIDATION OF THE DATA BASE

Purpose: Evaluate domain accuracy, completeness, and missing items of knowledge base

- **2 focus groups** with 8 diabetes educators at FQHC sites lasting 1.5 hours each
- **5 semi-structured interviews** with participants of MoDD at FQHCs
- Presented with case-scenarios
- Asked how they would problem-solve these patterns
- Discussion of potential causes, recommendations or action to be taken
ABOUT MODD

- Web based intervention to promote problem solving in diabetes self-management
- Theoretically grounded in TTM of stages of change and theories of problem-solving in diabetes
- Focus on individual discovery and problem solving
- Structured around 8 glycemic problems and 4 knowledge elements
MoDD PLATFORM

- User enters BG readings into MoDD website, or sends through SMS
- MoDD organizes BG readings and helps user to identify patterns where BG is too high or low
- Engages user in problem solving by:
  1. Identifying Glycemic control pattern (i.e. high upon waking)
  2. Identify potential behavioral trigger (i.e. did not take medication)
  3. Action-oriented goal related to this behavior
  4. Notifications to Implement the change and to monitor it
IDENTIFY A GLYCEMIC PATTERN

MoDD Mobile Diabetes Detective

My Readings

My Goals

Admin

My Goal: No goal set yet. Select a pattern to set a goal.

Average Last 3 days

<table>
<thead>
<tr>
<th>Time</th>
<th>Before</th>
<th>After</th>
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<tbody>
<tr>
<td>Wake Up</td>
<td>156.7</td>
<td>132.3</td>
</tr>
<tr>
<td>Breakfast</td>
<td>140.0</td>
<td></td>
</tr>
<tr>
<td>Lunch</td>
<td>139.7</td>
<td>188.7</td>
</tr>
<tr>
<td>Dinner</td>
<td>167.7</td>
<td>238.3</td>
</tr>
<tr>
<td>Bedtime</td>
<td>147.3</td>
<td>114.7</td>
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Goal Achievement

Pattern: Blood glucose upon waking is too high.

Your average blood sugar reading for the past few days is higher than your target range, 70 and 120. Now it's time to figure out why. There are many reasons for high blood sugar levels in the morning. It may be related to your level of activity, the food you ate for dinner, the time you ate dinner, or perhaps forgetting to take your medication. Click SELECT to find out if one of these reasons may apply to you and learn steps you can take to control your blood sugar levels.

To work on this pattern, choose the Select button.

Select
IDENTIFY PARTICULAR BEHAVIORAL TRIGGER
ACTION ORIENTED GOAL
NOTIFICATIONS TO MONITOR AND RE-EVALUATE
CONCLUSIONS

- Combination of theory-driven and participatory design approaches led to the knowledge base that is theory-driven and patient-centric tools for Diabetes Self-management
- MoDD is a decision-support tool that helps individuals make daily self-management decisions
- Decision support tool development needs to consider:
  - Cultural sensitivity
  - Low literacy
  - Actionable short term goal setting
  - Access to healthy food, health care and diabetes education
- Similar knowledge base tools can be extended to other chronic diseases