**OUR NEEDS STATEMENT**
A way for young adults (ages 14-20) recently diagnosed with Type 1 Diabetes (T1D) to passively manage and monitor symptoms to reduce the stress and burden caused by T1D.

**TYPE 1 DIABETES BURDEN**
- 1.5 M Americans have T1D and 1 in 10 are under the age of 20
- Most people are diagnosed before the age of 12
- ~1.5 hours of daily care
- ~$1,100 per month in costs

**STAKEHOLDERS**
- T1D Patients (14-20)
- Parents
- Primary Care Providers

**EXISTING SOLUTIONS**
- Finger Prick
- DEXCOM CGM
- MySugr
- T1D Travel Kit

**PROTOTYPES**
- Cardboard Case
- Fit Test
- Initial Seal Design
- Adhesion Design

**CORE FUNCTIONS**
1. Adhesion to Phone
2. Waterproof Seal
3. Hinge Design
4. Fit of Devices in Case
5. Silica Storage

**KEY COMPONENTS**
- Assist passive T1D Management
- Alleviate Social Burden
- Educate on T1D Management
- Keep Parents Informed

**FUTURE STEPS**
1. Optimize dynamics of case
2. Consult for manufacturability options
3. Continue further user testing

**PROTOTYPES**
- Cardboard Case
- Fit Test
- Initial Seal Design
- Adhesion Design

**EXISTING SOLUTIONS**
- Finger Prick
- DEXCOM CGM
- MySugr
- T1D Travel Kit

**CORE FUNCTIONS**
1. Adhesion to Phone
2. Waterproof Seal
3. Hinge Design
4. Fit of Devices in Case
5. Silica Storage

**KEY COMPONENTS**
- Assist passive T1D Management
- Alleviate Social Burden
- Educate on T1D Management
- Keep Parents Informed

**FUTURE STEPS**
1. Optimize dynamics of case
2. Consult for manufacturability options
3. Continue further user testing
Supplemental Information

Beta Watch

Presented by:
Brendan Ball\textsuperscript{2}, Abhay Bohra\textsuperscript{3}, Victoria Eng\textsuperscript{1}, Annie Garner\textsuperscript{2}, Honglam Van\textsuperscript{3}

With Novo Nordisk Partners:
Martin Hey-Mogensen\textsuperscript{4}, Chien Li\textsuperscript{4}, Hannah Sattler\textsuperscript{4}, Laura Smith\textsuperscript{4}

\textsuperscript{1}University of Washington, Foster School of Business
\textsuperscript{2}University of Washington, Department of Chemical Engineering
\textsuperscript{3}University of Washington, Department of Mechanical Engineering
\textsuperscript{4}Novo Nordisk
Bluetooth Device Candidates

- One Drop ($49.99)
- DIABNEXT Gluconext GA1 ($29.99)
- Dario Blood Glucometer ($24.90)
- iHeart Smart Wireless ($29.99)
- Contour Next One ($6.99)
- CURO G6s Glucose ($19.99)
Final Candidates: One Drop & Contour Next One

Table 1. Accuracy comparison between the Contour One and One Drop glucometers

<table>
<thead>
<tr>
<th>Experimental Trials</th>
<th>One Drop Device glucose level (mg/dL)</th>
<th>Contour Next One Device glucose level (mg/dL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trial 1</td>
<td>134</td>
<td>147</td>
</tr>
<tr>
<td>Trial 2</td>
<td>149</td>
<td>135</td>
</tr>
<tr>
<td>Trial 3</td>
<td>152</td>
<td>150</td>
</tr>
<tr>
<td>Average</td>
<td>145±10.913 (95% CI)</td>
<td>144±8.982 (95% CI)</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>9.643</td>
<td>7.937</td>
</tr>
</tbody>
</table>
Final Candidates: One Drop & Contour Next One

<table>
<thead>
<tr>
<th>Features</th>
<th>One Drop Device</th>
<th>Contour Device</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Image</td>
<td><img src="image" alt="Product Image" /></td>
<td><img src="image" alt="Product Image" /></td>
<td>N/A</td>
</tr>
<tr>
<td>Product Cost (USD)</td>
<td>$49.99</td>
<td>$6.99</td>
<td>Kit included</td>
</tr>
<tr>
<td>Product Dimensions (LxWxH) – (mm)</td>
<td>70 x 30 x 10</td>
<td>97 x 28 x 14.9</td>
<td>N/A</td>
</tr>
<tr>
<td>Weight (g)</td>
<td>19.54</td>
<td>37.48</td>
<td>Large Difference</td>
</tr>
</tbody>
</table>
## Final Candidates: One Drop & Contour Next One

<table>
<thead>
<tr>
<th>Features</th>
<th>One Drop Device</th>
<th>Contour Device</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>App Store Rating</strong></td>
<td>4.5</td>
<td>3.1</td>
<td>Number of Ratings: One Drop: 18,318</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Contour: 803</td>
</tr>
<tr>
<td><strong>Age Requirement</strong></td>
<td>4+</td>
<td>17+</td>
<td>Significant Difference</td>
</tr>
<tr>
<td><strong>App Download Cost</strong></td>
<td>Free</td>
<td>Free</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Subscription Options</strong></td>
<td>✓</td>
<td>✗</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Delivery Service</strong></td>
<td>✓</td>
<td>✗</td>
<td>Different Options</td>
</tr>
<tr>
<td><strong>Health Coach Service</strong></td>
<td>✓</td>
<td>✗</td>
<td>$19.99/mo. access</td>
</tr>
<tr>
<td><strong>Reminders &amp; Data</strong></td>
<td>✓</td>
<td>✓</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Prototype Evaluation: Fit Test

- Glucometer
- Lancets
- Silica beads
- 4 Sanitary Wipes
- Hinge
- 8 Testing strips

Prototype Image
Prototype Evaluation: Silica Bead Test

Goal:
Determine the amount of silica that will be required to sufficiently reduce humidity

Assumptions:
1. Silica beads contents optimized by Contour©
2. Negligible silica bead loss during extraction

Result: **0.35g** silica required per strip
Prototype Evaluation: Humidity Testing

Goal:
Determine optimal seal for humidity and water resistance

Seals Tested:

Test for Water Resistance
5 sec. duration

Test for Humidity in Air
12 hr duration

1) The control strip from the supply – used for reference
2) The strip that was left inside the silica bead container
3) The strip left in direct contact with the surrounding air
4) The strip inside the Tic Tac container and 5) Ice Breaker

Result:
Tic Tac container had the best seal, will be explored further
Prototype Evaluation: “Everyday Use”

Result:
Tic Tac container as interference fit is appropriate for daily use, will be further tested.

Tic Tac container on one person for 12-hours
Opened 10 times a day
(Repeated by 5 users 3 days each)

Next to shower curtain for 10 minutes
(Repeated 5 times)
Survey Results

Do you use a finger prick glucose monitor?

- **YES**: 87.5%
- **NO**: 12.5%

Are you aware of health monitoring apps such as MySugr, Apple Health, MyPlate, etc.?

- **YES**: 31.3%
- **NO**: 12.5%
- **Somewhat**: 54.3%

N= 16, responses still coming in

- Yes, I use it sometimes
- No, used to use it but don't currently
- Yes, it is my primary device
- No, I have never used it

- Yes, I have heard of them and am aware of some of the functions they may include
- Yes, I have heard of them but don't know much else about them
- No, I have never heard of them

**Result:**
- Majority of patients use a finger prick glucose monitor
- Education of T1D apps is needed
Initial Seal Prototype

Result:
- Snap seal was achieved
- Further Humidity testing will be done
- Further materials research will be done
CAD Design
CAD Design
Top View
Side Views
Integration with Phone
Previous Prototype
## Supplemental Mobile Apps

<table>
<thead>
<tr>
<th>App Name</th>
<th>Description</th>
<th>Assist Passive Management</th>
<th>Enable Parent Communication</th>
<th>Patient Education</th>
<th>Age Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>My Sugr</td>
<td>Glucose tracking app, pairs with glucometer</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>All Ages</td>
</tr>
<tr>
<td>Beyond Type 1</td>
<td>Community based app centered around discussion of different topics in diabetes management</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>14+</td>
</tr>
<tr>
<td>One Drop</td>
<td>Glucose tracking and health coaching app</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>4+</td>
</tr>
</tbody>
</table>