Accessible Syringe Dosing Device

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Outline

- Objective
- Market Research
- Design Features
  - Microprocessor, Motor, Ball-Shaft
- Professional Considerations
- Conclusion
- Questions?
Objective

- Intravenous medication necessary for many diseases and disorders.
- Self-dosing problematic for those with impaired vision, hearing, motor skills.
- Need for accessible, cost-effective device to dose accurately and fill syringes.
Market Research

Several products currently on the market:

- Count-A-Dose by Medicol: $59.95
- Load-Matic by Palco Labs: $49.95
- The Syringe Support by the Foundation Center Louise-Herbert: $19.95
- All three devices are difficult for use by those with poor motor skills.
- None of the devices have a digital display.
User Interface
Choose Proper Dose, Presets, Help Menu

Microprocessor
Display on C-LCD and Operate

Battery
Powers all components

Motor
Used to rotate ball-shaft mechanism

C-LCD Display

Ball - Shaft

Stage
Pulls to fill with insulin or heparin into syringe
Directions

- Insert one cubic centimeter syringe into syringe-dosing device
- Insert bottle of heparin or insulin into syringe-dosing device
- Depress on/off button
- Use keypad buttons or preset to choose proper dose
- Press enter to pump dose into syringe
- Remove syringe and inject
Design Components

- User interface with LCD display and keypad.
- Microprocessor
- Stepper Motor
- Ball-Shaft
Product will feature a user interface with a LCD display.
Microprocessor

- PIC16F874A
- Accepts data from the user interface.
- Outputs data from user to LCD display.
- Programmed in Assembly code, using Microchip MPLAB ICD2 software.
- Converts a input value of insulin volume into a number of motor rotations.
Stepper Motor

- Unipolar
- Low cost
- 1 step = 18 degrees of rotation
- Rotation of motor controls ball screw rotation that moves the glide linearly

Thomson AccuGlide® T-Series

Ball-screw
Motored Ball-Shaft
Professional Considerations

- Size of the housing box (dimensions X, Y, and Z).
- Distance (d) needed to pull back the syringe in order to draw one unit (.01 cc) into the syringe.
- Minimum force (Fmin) needed to draw back the syringe.
### Budget

<table>
<thead>
<tr>
<th>Part</th>
<th>Cost ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Counter chip</td>
<td>0.60</td>
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<tr>
<td>Motor</td>
<td>18.00</td>
</tr>
<tr>
<td>Display (Curtis Instruments)</td>
<td>22.00</td>
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<tr>
<td>Keypad</td>
<td>19.53</td>
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<tr>
<td>Express PCB miniboard</td>
<td>51.00 for 3—17.00 each</td>
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<tr>
<td>PIC16F874A</td>
<td>8.23</td>
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<tr>
<td>Ball-shaft</td>
<td>15.27</td>
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<tr>
<td>Stage</td>
<td>12.73</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>113.36 (1 board); 147.36 (3 boards)</td>
</tr>
</tbody>
</table>
Conclusion

- Product will be unique due to:
  - Accessibility to those with poor motor function
  - Digital user interface
- Product will remain cost-effective.
  - Projected cost of complete device: $120.00-$140.00
Questions?