Assistive Drinking Device For Dysphagia due to Parkinson’s Plus Diseases

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Background

Problem
- Progressive Supranuclear Palsy
  - Result of neuronal loss due to tau protein build up
  - Nearly 50% of patients with neurodegenerative disorders develop dysphagia within 5 years of diagnosis2
- Neurogenic Dysphagia: difficulty swallowing due to neurological disorder

Existing Solutions
- Solutions target reducing incidence of aspiration
- Treatment must evolve as disease progresses
- End stage treatment is placement of feeding tube to bypass swallowing

Needs Statement
A way to reduce aspiration in patients who have difficulty swallowing caused by Parkinson’s and Parkinson’s plus diseases that allow for safe ingestion of liquids.

Product Specification
- Small, adjustable bolus delivery
- Time/Volume Control
- Hot/cold, thin/thick liquids
- Durable
- Washable
- Reusable

Proposed Solution

- Fluid is pumped from closed-off reservoir to drinking space where patient can access the fluid for drinking
- Time-delayed bolus delivery system requires patients to wait a set time before receiving another bolus
- Peristaltic pump is powered by 12V DC Motor controlled by Arduino
- Pump is time-calibrated to deliver bolus of desired volume

Testing

- Bolus error increases as bolus size increases
- Bolus error is approximately equivalent for fluids of varying viscosities
- Increasing viscosity does not significantly impact time required to deliver bolus of given volume
- Due to shear-thinning properties of common fluids, varying viscosity has minimal effect on pump performance

Cost, Patent, Reimbursement

Table 1. Descriptions and approximate viscosity ranges for liquid consistencies outlined by the National Dysphagia Diet (NDD).1

<table>
<thead>
<tr>
<th>Consistency</th>
<th>Description</th>
<th>Viscosity (cP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thin</td>
<td>Liquids (e.g., water, juice, tea)</td>
<td>1-50</td>
</tr>
<tr>
<td>Mastic-thick</td>
<td>Pours easily, but thicker than water</td>
<td>51-350</td>
</tr>
<tr>
<td>Honey-thick</td>
<td>Flows more slowly, requires more effort to drink</td>
<td>351-1750</td>
</tr>
<tr>
<td>Pudding-thick</td>
<td>Requires spoon to eat</td>
<td>&gt;1750</td>
</tr>
</tbody>
</table>

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References