Senior Capstone: 
Stool Sample Collection and Preservation Device
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BACKGROUND

- Between 60 and 70 million people suffer from gastrointestinal illnesses in the US annually
- 5,724 registered hospitals in the US
- Fecal matter is typically about 75% fluid and 25% solid material
- Preservatives typically need to be added within six hours of defecation

CURRENT METHODS

- Colorectal patients
  - According to the American Cancer Society in 2014, there is an ESTIMATED:
    - 96,830 new cases of colon cancer
    - 40,000 new cases of rectal cancer
- According to the Center for Disease Control and Prevention (CDC):
  - 131,607 people in the United States were diagnosed with colorectal cancer, including 67,700 men and 63,907 women.
  - 52,045 people in the United States died from colorectal cancer, including 27,073 men and 24,972 women.

USER NEEDS ASSESSMENT

- Improve collection methods
- Improve transfer and preservation
- Mass Production
- Cost effective
- Exposure to irritating smells and fumes
- Potential for direct contact with toxic chemicals
- Market internationally

“For a user that is required to provide a stool sample for testing of gastrointestinal abnormalities, there is a need for a means to collect and preserve stool samples in a way that is safe, physically simplified, and emotionally facilitated”

VALIDATION TESTING

- Blade Testing – Nathan
  - Triple blade system was most effective due to the fact that it produced the lowest maximum cutting force.

- Geometry Testing – Scott
  - The optimal angle for the wall of the collection bowl is 45 degrees.

- Containment Testing – Amelia
  - An aperture would be an effective closing mechanism for the collection cup if it would fit. The lid on the collection bowl will prevent contact with stool.

- Leakage Testing - Zak
  - The gasket is more effective at sealing the collection cup than an O-ring.

RISK ANALYSIS AND VERIFICATION

Table 34.4 FOODS AND MEDICATIONS THAT ALTER STOOL COLOR

<table>
<thead>
<tr>
<th>Altering Substances</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meat protein</td>
<td>Dark brown</td>
</tr>
<tr>
<td>Spinach</td>
<td>Green</td>
</tr>
<tr>
<td>Carrots and beets</td>
<td>Red</td>
</tr>
<tr>
<td>Cucumbers</td>
<td>Dark red or brown</td>
</tr>
<tr>
<td>Tomato</td>
<td>Yellow</td>
</tr>
<tr>
<td>Broccoli, broccoli, cabbage</td>
<td>Black</td>
</tr>
<tr>
<td>Tomatoes</td>
<td>Milky white</td>
</tr>
</tbody>
</table>

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