In-house pureed food production: current practices & future improvements in LTC

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This project was a collaboration between the Schlegel-UW Research Institute for Aging and the University of Guelph.
Dysphagia- “difficulty swallowing”

• Commonly occurs as a consequence of:
  • Stroke, neurodegenerative diseases
  • Can also stem from psychological, surgical and structural causes (CASLP-OAOO, 2007)

• General physiological decline in the aging process may put older adults at greater risk for dysphagia
  • Xerostomia (dry-mouth)
  • Lower maximum tongue strength
  • Sensory deficits (temperature detection)
  • Longer time needed to initiate a swallow
Most common therapeutic management for *dysphagia* or difficulty swallowing

- **Puree** = Paste or liquid suspension, usually made from cooked food, ground finely by food processor

- In a long-term care (LTC) setting, 15-20% of people may be on a *pureed* diet (Hotaling, 1992)
Synopsis of Research

• **STEP 1**: How are pureed food prepared in-house in LTC-setting?
  ▫ Interviews with Nutrition Managers (NMs) & Cooks

• **STEP 2**: Product formulations
  ▫ Sensory
  ▫ Nutrition
  ▫ Instrumental testing

• **STEP 3**: Linking it all together
• Rationale
  ▫ To determine current practices and challenges to in-house pureed food production in LTC

• Recruitment
  ▫ 27 Nutrition Managers (NMs) and 26 Cooks from 25 LTCHs in Ontario
  ▫ LTCHs varied in bed-size capacity, ownership status & number of residents on pureed food
DATA COLLECTION

Audio-recorded & written notes provided context to interview data

INTERVIEW STRUCTURE

One-on-one interviews* (with NMs and Cooks)

Kitchen tour observations

DATA ANALYSIS

Semi-structured with aid of questionnaire

**Inductive thematic analysis**

1. Transcription of audio recordings
2. Coding development
3. Identification of main themes
LTC Home Interviews

So what did we find???

• In-house preparation vs. commercially purchased

• Some reasons for producing pureed food in-house:
  ▫ Cost (only $7.33/resident/day for raw food)
  ▫ More variety to match regular-textured menu
  ▫ Lack of freezer space
  ▫ Fresh, home-style cooking
  ▫ Better quality (taste, nutrition)
  ▫ Control over ingredients
• **Challenges** in pureed food production

  • Standardized pureed recipes
    ▫ Inconsistent end-point texture

  • Lack of visual appeal
NM and Cooks reported **Appearance** to require most improvement for in-house pureed food

- 3-ball-meal
- Compliance with volume amounts

**Table 1**- Garnishing ideas provided by interview participants

<table>
<thead>
<tr>
<th>Common garnishing items</th>
<th>Food item applied on</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jams</td>
<td>Pureed bread</td>
</tr>
<tr>
<td>Condiments (ketchup, relish, mustard)</td>
<td>Pureed hot dogs, burgers</td>
</tr>
<tr>
<td>Gravy</td>
<td>Pureed meat and potatoes</td>
</tr>
<tr>
<td>Salad dressing</td>
<td>Pureed salad</td>
</tr>
<tr>
<td>Puree cream of celery soup</td>
<td>Pureed fish</td>
</tr>
<tr>
<td>Puree maraschino cherries</td>
<td>Banana bread pudding</td>
</tr>
<tr>
<td>Paprika</td>
<td>Pureed tuna sandwich</td>
</tr>
</tbody>
</table>

Schwarz et al., 2000
(US Patent 6162039A)
Lack of standardized guidelines

**Table 2** - Interview participants’ responses to the “ideal pureed food” consistency

<table>
<thead>
<tr>
<th>Qualitative descriptor</th>
<th>Frequency of responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pudding consistency</td>
<td>15</td>
</tr>
<tr>
<td>Holds shape on a plate/does not spread</td>
<td>13</td>
</tr>
<tr>
<td>Soft/Smooth/ mousse-like/ lump-free</td>
<td>12</td>
</tr>
<tr>
<td>Baby food</td>
<td>7</td>
</tr>
<tr>
<td>Mashed potato</td>
<td>3</td>
</tr>
<tr>
<td>Applesauce</td>
<td>2</td>
</tr>
<tr>
<td>Nectar</td>
<td>2</td>
</tr>
<tr>
<td>Honey</td>
<td>2</td>
</tr>
</tbody>
</table>
Simple table-top tests to check consistency

• Heaping spoon test (Australia TMF standard)
  ▫ A mound of puree should hold its shape on a spoon

• Spoon immersion test (British TMF standard)
  ▫ A light disposable plastic spoon should stand upright

• Fork test (British TMF standard)
  ▫ “Thin puree”- flows through prongs of fork
  ▫ “Thick puree”- can be eaten with a fork

• Line-spread test (Paik et.al, 2004)
  ▫ Pureed food must not flow more than 1cm in one minute in a hollow cylindrical tube
Preferred practices in pureed food production

- Cooks’ involvement with improving pureed recipes
- Tailoring to the needs of resident on pureed diet
• **Preferred practices**
  
  ▫ Addressing quality concerns in pureed food production
    
    • **Nutrition**
      • Minimizing use of thickener and liquid
    
    • **Flavour**
      • Recognizing what food items would be enhanced or diminished in flavour as a result of being pureed
    
    • **Appearance & texture**
      • Using visual/tactile descriptor and cues to standardize texture
Recipe development

• Simple pureed recipes using Ontario-sourced foods

Formulations:

  ▫ Pureed turkey
  ▫ Pureed carrot
Turkey formulations

Pureed turkey varying in:

• Added liquid
  ▶ 40% w/w
  ▶ 45% w/w

• Meat muscle combination
  ▶ 100% white meat
  ▶ 60% white and 40% dark meat

• Seasoning application method
  ▶ seasoned prior to cooking
  ▶ seasoned post-cooking
Carrot Formulations

- Control pureed carrot (C)
- Carrot+ 1.6% w/w modified corn starch (MT)
- Carrot+ 1.6% w/w baby rice cereal (RC)
- Carrot+ 1.6% w/w skim milk powder (SMP)
Sensory

• Trained panel (n=10)
  ▫ characterize sensory attributes present in pureed food formulations (texture, taste, odour, appearance)
  ▫ 15 cm line scale to rate intensity of attributes
Turkey

Effect of added water on the sensory properties of in-house formulated pureed turkey

![Graph showing the effect of added water on sensory properties of pureed turkey]
Turkey

Effect of meat muscle type on the sensory properties of in-house formulated pureed turkey

[Diagram showing the comparison of sensory properties between 60% breast & 40% thigh meat and 100% breast meat]
Turkey

Effect of seasoning application method on the sensory properties of pureed turkey
Carrots

![Radial Chart showing various attributes of Carrots: Sweet Odour, Spicy Odour, Textured Appearance, Surface Shine Appearance, Firmness, Slipperiness, Boiled Carrot Flavour, Boiled Carrot Odour, Salty Flavour, Sweet Flavour, Bitter Flavour, Spicy Flavour. The chart compares different types of carrots: C, MT, RC, SMP.]
Nutrition

- Commercial pureed turkey
  - 11.3-16.5 g protein/100g meat
- In-house pureed turkey (40-45% w/w liquid with either white or combination dark-white meat)
  - 17.948 – 20.042g protein /100g meat

- In-house pureed turkey contains more protein
Macronutrient Analysis of pureed carrots

- Fat
  - C
  - MT
  - RC
  - SMP

- Protein
  - C
  - MT
  - RC
  - SMP

- Carbohydrate
  - C
  - MT
  - RC
  - SMP
Texture Analysis

- Firmness
- Cohesiveness
- Adhesiveness
- Consistency
# Compression-extrusion analysis

<table>
<thead>
<tr>
<th></th>
<th>Firmness (N)</th>
<th>Cohesiveness (N)</th>
<th>Adhesiveness (N*sec)</th>
<th>Consistency (N*sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>0.96c</td>
<td>1.02c</td>
<td>1.69bc</td>
<td>10.46c</td>
</tr>
<tr>
<td>MT</td>
<td>1.32a</td>
<td>1.578a</td>
<td>2.55a</td>
<td>13.90a</td>
</tr>
<tr>
<td>RC</td>
<td>1.14b</td>
<td>1.12b</td>
<td>1.82b</td>
<td>11.98b</td>
</tr>
<tr>
<td>SMP</td>
<td>1.11bc</td>
<td>1.05c</td>
<td>1.60c</td>
<td>11.82bc</td>
</tr>
</tbody>
</table>

1. Means in a column with the same letter are not significantly different (p<0.05)
2. The higher the value, the more force required to extrude the product
Conclusions

• There are challenges in production of in-house pureed food that relate to the lack of standards

• There is a need for nutritional and textural standards for therapeutic pureed food

• A battery of quality checks may be needed to ensure in-house pureed recipes meet the nutritional and sensory needs of older adults:
  ▫ Trialing recipes in LTC & collaboration with experienced Cooks
  ▫ Table-top consistency checks
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