Technology in the Long Term Care Setting

The University of Maryland, College Park Dietetic Internship Class of 2019
How does this apply to me?

“How does this apply to me?

“Improving aging necessarily entails helping people thrive as they grow older. From a technology perspective, that means creating and leveraging tools that help people to form and practice good exercise, nutritional and social habits well before old age.”

-Ken Smith, Stanford Center on Longevity
TRENDS/STATS

mHealth technology market is set to grow by 33% to USD 60 bn by 2020.

93% of physicians believe that mobile health apps can improve patient’s health.

70% of mHealth practitioners rate diabetes highest for its market potential over the next 5 years.

Top 10 AI Applications

<table>
<thead>
<tr>
<th>APPLICATION</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robot-Assisted Surgery</td>
<td>$40B</td>
</tr>
<tr>
<td>Virtual Nursing Assistants</td>
<td>$20B</td>
</tr>
<tr>
<td>Administrative Workflow Assistance</td>
<td>$18B</td>
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<tr>
<td>Fraud Detection</td>
<td>$17B</td>
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<tr>
<td>Dosage Error Reduction</td>
<td>$16B</td>
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<tr>
<td>Connected Machines</td>
<td>$14B</td>
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<tr>
<td>Clinical Trial Participant Identifier</td>
<td>$13B</td>
</tr>
<tr>
<td>Preliminary Diagnosis</td>
<td>$5B</td>
</tr>
<tr>
<td>Automated Image Diagnosis</td>
<td>$3B</td>
</tr>
<tr>
<td>Cybersecurity</td>
<td>$2B</td>
</tr>
</tbody>
</table>

TOTAL = ~$150B
OBJECTIVES

1. List 1 reason why it is important for RDNs to be familiar with current technology tools
2. Explain 1 application of artificial intelligence to the nutrition sector
3. Define the term “smart kitchen gadgets”
4. List 2 advantages of 3D printed pureed foods to traditional pureed foods
Technology Tools to be Discussed

1. Artificial Intelligence
2. 3D Printed Foods
3. Smart Kitchen Gadgets
Artificial Intelligence in healthcare

By: Isabella Dang
Poll Question

#1
What comes to mind when you think of AI in healthcare? (open response)
Artificial Intelligence, sometimes called *machine intelligence*, is intelligence demonstrated by machines, in contrast to the natural intelligence displayed by humans and other animals.
Let’s break it down

Diagram:

- AI
  - Computer Science
  - Machine Learning
  - Pattern Recognition
  - Statistical Learning
  - Deep Learning
    - NLP
    - CNN
  - Image Processing
    - Symbolic learning
      - Robotics
      - Computer Vision
  - Speech Recognition
  - CNN
  - Computer Vision

Note:
- Machine Learning
- Deep Learning
- NLP
- CNN
A story about WATSON
FOR ONCOLOGY
Drawbacks

- Spotty results
- Told healthcare professionals what they already know
- Exceedingly difficult to make functional in health care
- Professionals are skeptical because of marketability
Nutrition-related tools

**AVA**

Daily, expert coaching empowered by data science helps to create new and lasting habits.

**Fit Genie**

A self-adjusting smart calorie counter that tells you exactly what to eat to reach your goals.

**22 Days Nutrition Meal Planner**

It's easy. Tell us your cooking habits, dietary needs, allergies, household size, and goals. We'll personalize meal recommendations for you!
Pic2Recipe

Pic2Recipe, an artificial intelligence system developed at MIT, can take a photo of an entree and suggest a similar recipe to it.
Ingredients
- 3 lbs salmon
- 1 teaspoon cajun seasoning
- 1 tablespoon olive oil

Cooking instructions
1. Rinse off salmon and pat dry with paper towel.
2. Drizzle cookie sheet with olive oil.
3. Place salmon (skin side down) on cookie sheet and drizzle more oil on top.
4. Shake Cajun seasoning on salmon to taste.
5. Broil 15-20 minutes or until center of salmon is done.
What does this mean for RDs?

- Fear of job replacement
- More education
- Ai competence
- Pt listening to Ai more
- More research
Strong collaboration
Smart X Lab
Sensors

“Smart X Lab uses a cutting edge sensor technology to develop a non-contact Smart Bed Sensor that is capable of detecting pulse, respiration rate. It comes in the form of a thin tape that you just slide under your bed sheet.”
Smart x Lab Sensors

Smart Bed Sensor

detect the pulse, breathing, snoring, and large movements of a person lying on top of it

Floor Sensor

Detects bed departure events
Implications

- Growing business
- HIPAA?
- Discern good and bad AI
- ???
POV / Conclusion

- Machine and human intelligence work best
- AI is on the rise and I’m excited to see where it will take us
- There are so many layers to improving healthcare
Thank You!
Smart Kitchen Gadgets

Kira Bursaw
University of Maryland, Dietetic Intern
Objectives

What are they?
Products
Research
What are Smart Kitchen Gadgets?

- Combination of traditional kitchen appliances with technology
- Appliances such as:
  - Coffee makers, refrigerators, faucets, ovens, measuring devices
- Technology such as:
  - Connectivity to smartphones, apps, voice assistants, WiFi, Bluetooth
- Purpose:
  - Improve health, lose weight, make cooking (and living) easier and more efficient
Products

- Range
- Drop Scale
- Aerogarden Farm Plus
Range

- Use: wireless cooking thermometer
- Technology: smartphone app, reminder alerts customized to food type, Bluetooth
- Nutrition Implication: food safety
- Cost: $59.95-79.95
- Research: digital thermometers perform better and are more accurate, consistent, and convenient than analog thermometers
Drop Scale

• Use: smart scale with ability to connect to recipes, make substitutions, and follow step by step instructions
• Technology: smartphone app
• Nutrition Implication: measure proper amounts and portion sizes
• Cost: $29.99
Aerogarden Farm Plus

- Use: smart garden that grow 24 plants in hydroponic pods; ready-to-harvest foods and herbs 5X faster with LED lights
- Technology: WiFi enabled, smartphone app that sends reminders
- Nutrition Implication: fresh produce available year-round at home
- Cost: $454.96
Research

- Difficult to find empirical support
- Smart kitchen devices haven’t been around very long
  - Many first generation products are from 2013
- Some research available is funded by the company making/selling the product
Poll Question

# 2
Do you have a smart kitchen gadget at home? Please answer "yes" or "no"
Conclusions

- Smart devices for just about every appliance in the kitchen
  - Some want to make life easier
  - Some want to improve health
- Consumer Electronics Show in Las Vegas every January
  - Showcases the newest and coolest gadgets
- Affordability
  - Prices range from single to triple digits
3D Printing of Dysphagia Appropriate Foods

Cristen Scifo
Mechanically Altered Foods - New IDDSI Criteria
Poll Question #3
Please correctly identify which image is 3D printed food.
Cons of Dysphagia Pureed Foods

- Food can look unappetizing
- Some patients may not like the texture modification they are required to eat
- Patients can feel isolated from family at meals as they are eating something else
- Potentially limited options
- Feeling of loss of control during meal times
Solution: 3D Print Pureed Foods

3D printed foods look more realistic, could potentially be safer for dysphagia affected patients, and give the patient some control and variety in what they are able to eat.
How does 3D printing work?

- Start with creating a 3D blueprint using something called CAD software (computer aided design)
- Prepare machine by inserting the desired materials
- Once you hit start, the machine does the rest
Personalized Nutrition

- Hypothetically the researcher would be able to decide exactly what they wanted to be in the food
  - I.e. if a patient needed more iron, the machine would be able to add more iron into the pureed food item
  - This method would allow dysphagia patients to choose from a wider variety of foods and would make sure that they got the proper nutrition
Deakin University - Australia

- Successfully printed a meal composed of tuna, pumpkin, and beetroot
  - Total printing time was only 3 minutes long to create the meal
- Renowned chefs sampled the meal to test quality
- Their research highlighted some of the potential problems with 3D printing food
- There is a large lack of knowledge on the safety of printing food which could prevent further research studies
What’s out there

- Aether: price TBA
  - Can print with up to 24 materials at a time
  - Collaborators include big names like Johnson & Johnson, Toyota, Harvard, Stanford, and the Naval Research Lab
- Chefjet Pro
  - Collaboration between 3D Systems and CSM Bakery, hasn’t hit the market yet
What’s out there Ctd.

- 3D pancake printer: ~$300
- by Flow Focus: $4,599
  - Prints thick pastes
- ChocEdge Choc Creator V2 Plus: $3,399
- Natural Machines Foodini: $4000
  - Can use a wide variety of materials
- Discov3ry Structure3d: $1299
  - Available to the public, prints pastes
Summary

- 3D printing may be the future of personalized nutrition
- It can be used to make pureed food more palatable and thus more likely to be eaten
- There is still not much research out on the subject but many foods have been printed to date
- Much research is needed on the safety of these foods
CONCLUSION

- AI is on the rise
- Smart kitchen devices haven’t been around very long
- 3D printing may be the future of personalized nutrition
The Academy of Nutrition and Dietetics presents a new Dietetic Practice Group:

**NUTRITION INFORMATICS**

**MEMBERSHIP BENEFITS:**
- Collaborative community and resource sharing
- Year-round communication
- A searchable member directory to identify fellow members
- Leadership, education & professional development
- CPEU webinar trainings, educational toolkits and scholarships
- Ability to act as an

**NUTRITION INFORMATICS ENCOMPASSES:**
- Electronic health records
- Personal health records
- Secure messaging
- Health information

**ARE YOU INTERESTED IN ADVOCATING FOR CAREER GROWTH IN NUTRITION INFORMATICS?**
Direct your questions to dpgmigrelations@

Check out the Academy of Nutrition and Dietetics online nutrition informatics modules for CE credits!
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