

Technology in the Long-Term Care Setting

The University of Maryland, College Park
Dietetic Internship Class of 2019

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

Top 10 AI Applications

APPLICATION	VALUE
Image Analysis	\$200
Visual Search	\$200
Administrative	\$150
Medical Expenses	\$150
Food Detection	\$120
Computer	\$100
Diagnosis	\$100
Personalized Medicine	\$100
Business	\$100
Automated Drug Discovery	\$100
Telemedicine	\$100
TOTAL	\$1000

33% of people are expected to use AI by 2020.

70% of research publications were published by AI in the last 5 years.

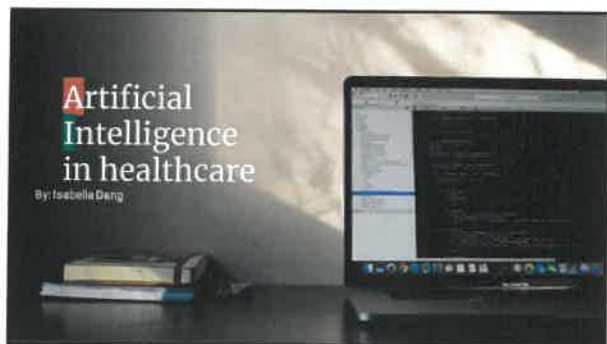
93% of physicians believe that mobile health apps will help over patients' health.

OBJECTIVES

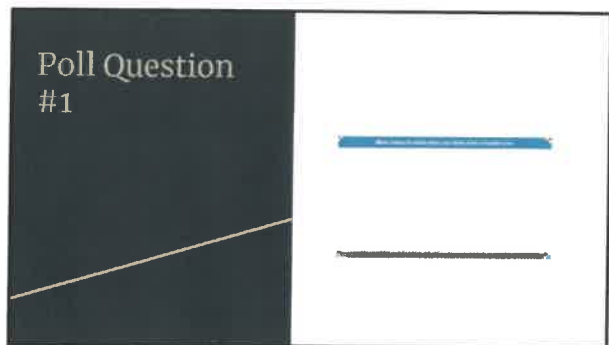
1. List 1 reason why it is important for RDNs to be familiar with current technology tools
2. Explain 1 application of artificial intelligence to the nutrition sector
3. Define the term "smart kitchen gadgets"
4. List 2 advantages of 3D printed pureed foods to traditional pureed foods

Technology Tools to be Discussed

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




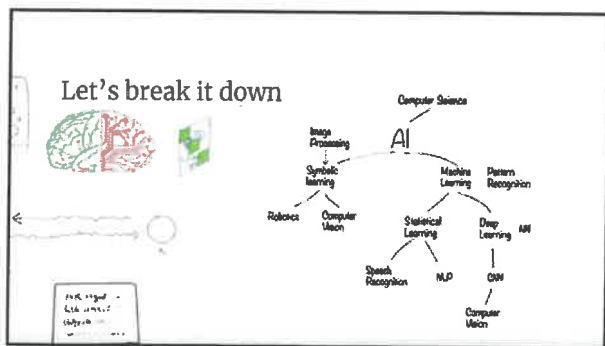
Poll Question #1

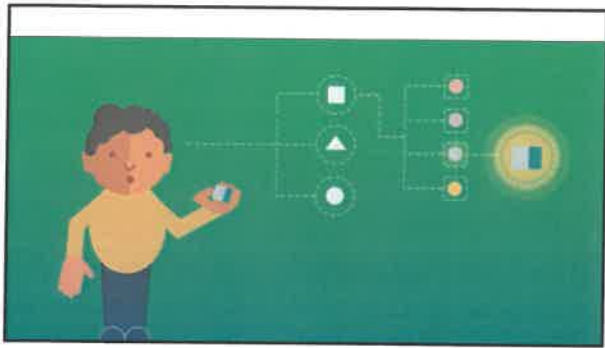


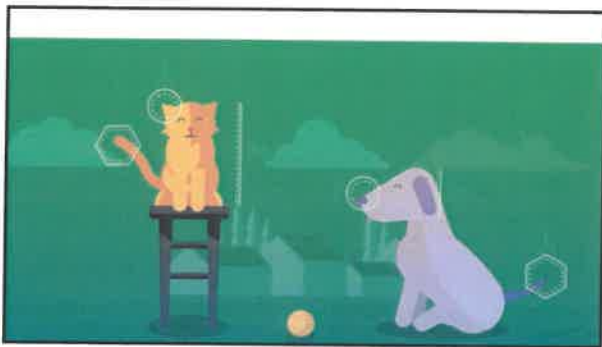
Overview

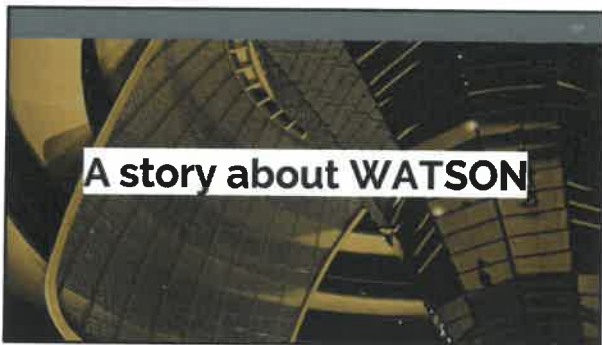
Artificial Intelligence, sometimes called **machine intelligence**, is intelligence demonstrated by machines, in contrast to the natural intelligence displayed by humans and other animals













Drawbacks

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

A photograph of a trade show booth for Watson Health, showing people interacting with a large digital display.

Personalized Nutrition

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

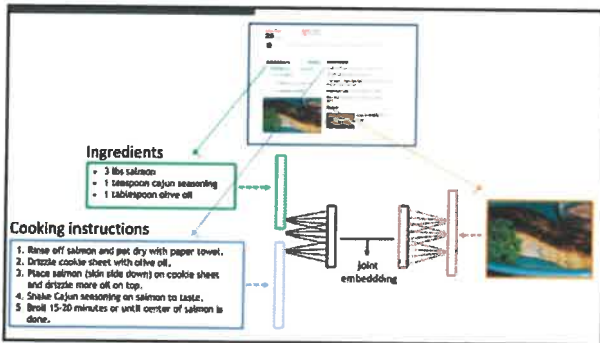
22 Days Nutrition Meal Planner
It's easy. Tell us your cooking history, dietary needs, allergies, nutritional goals and goals. We'll design the meal plan for you.



Pic2Recipe

Pic2Recipe, an artificial intelligence system developed at MIT, can take a photo of an entree and suggest a similar recipe to it.





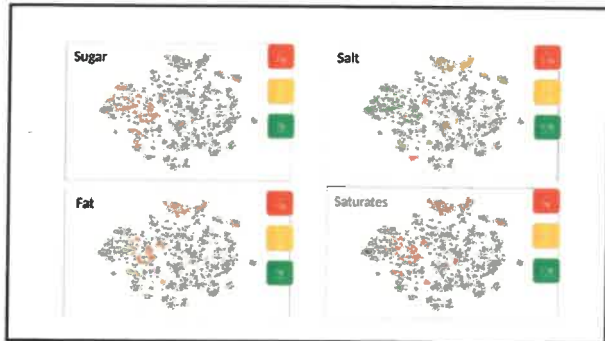
Ingredients

- 3 lbs salmon
- 1 tablespoon 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.

Joint embedding



What does this mean for RDs?

- Fear of job replacement
- More education
- Ai competence
- Pt listening to Ai more
- More research



Smart X Lab Sensors

"Smart X Lab uses a cutting edge sensor technology to develop a non-contact 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

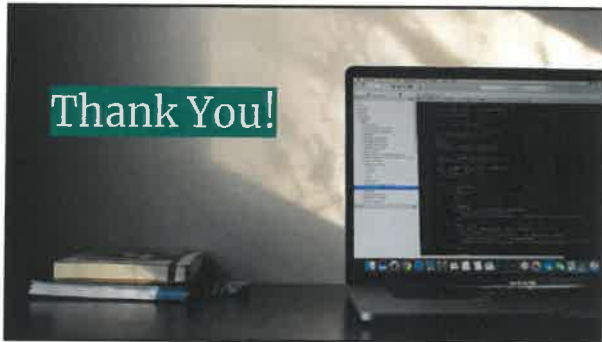
- Growing business
- HIPAA?
- Discern good and bad Ai
- ???

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

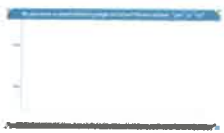


- Use: smart garden that grow 24 plants in hydroponic pods; ready-to-harvest foods and herbs 5X faster with LED lights
- Technology: WiFi enabled, smartphone app that sends reminders
- Nutrition Implication: fresh produce available year-round at home
- Cost: \$454.96

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



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

The diagram illustrates the IDDSI (International Dysphagia Diet Standardisation Initiative) criteria. It features two inverted triangles. The left triangle is labeled 'FOODS' and is divided into four levels: 1 (Regular), 2 (Soft & Bite-Sized), 3 (Mashed & Liquidy), and 4 (Pureed). The right triangle is labeled 'DRINKS' and is divided into three levels: 5 (Slightly Thick), 6 (Moderately Thick), and 7 (Very Thick). Each level is represented by a different color and includes a small icon representing the food or drink consistency.

Poll Question #3

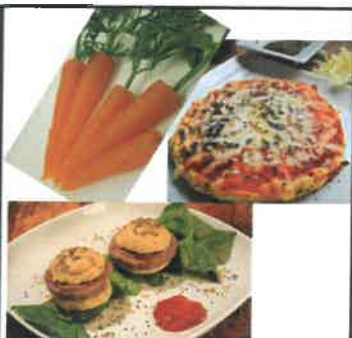
The image shows a poll question interface. On the left, there is a dark blue area with the text 'Poll Question #3'. On the right, there is a white area with a blue progress bar at the top and a question text below it. The question text is partially obscured but appears to be 'Question 3: What is the most common...'. Below the question, there are two horizontal lines representing answer options.

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




NUTRITION INFORMATICS ENCOMPASSES:

- Electronic health records
- Personal health records
- Secure messaging
- Health information

MEMBERSHIP BENEFITS:

- Collaborative community and resource sharing
- Virtual course communication
- A searchable member directory to identify fellow members
- Leadership, education & professional development
- CPEU, webinar, trainings, educational tools and activities
- Ability to act as an



ARE YOU INTERESTED IN ADVOCATING FOR CAREER GROWTH IN NUTRITION INFORMATICS?

Direct your questions to it@nutritioninformatics.org

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

References

- <https://www.mayoclinic.org/diseases-conditions/dysphagia/symptoms-causes/syc-20372028>
- <https://www.nidd.nih.gov/health/dysphagia>
- <https://www.energy.gov/articles/how-3d-printers-work>
- <https://www.aulodesk.com/redshift/history-of-3d-printing/>
- <https://bioint.ssha.org/2017/05/31/can-3d-printed-food-provide-an-appaling-alternative-for-people-with-dysphagia/>
- <http://www.3ders.org/articles/20170530-3d-printed-food-could-soon-help-dysphagia-sufferers.html>
- <https://www.3ders.org/articles/20180202-deakin-university-experiments-with-customized-3d-printed-food-for-eating-disorders.html>

References

- <https://www.postscapes.com/connected-kitchen-products/>
- <https://store.supermechanical.com/collections/range-dial/products/range-dial-kitchen-ox>
- <https://www.housebeautiful.com/shopping/home-edgers/a22826031/smart-kitchen-appliances/>
- <https://www.consumerreports.org/cro/meat-thermometers/buying-guide/index.htm>
<https://www.agoodlife.com/farm-plus.html>

References

- 1 <http://getthefarm.com/>
- 2 <https://www.tastebook.com/#recipes>
- 3 <http://techcouncil.com/2017/07/20/mil-it-bu-ai-ic-a-system-that-can-sterilify-a-recipe-using-pictures-of-food/>
- 4 <https://www.foxnews.com/2018/04/24/advance-artificial-intelligence-sees/#5d9f8c6c7190>
- 5 <https://techcouncil.com/2017/08/28/food-is-a-polio-ai-to-automate-rutik-ehring/>
- 6 <https://www.esquire.com/food/drink/10-1007978-5-310-18478-0-52>
- 7 <https://www.youtube.com/watch?v=Jd1aV20Ms>
- 8 <https://www.bbc.com/news/health-2018-04-24-ai-robot-cook-recipe-170901>
- 9 <https://www.foxnews.com/2018/04/24/advance-artificial-intelligence-sees/#5d9f8c6c7190>
- 10 in.sagepub.com
- 11 <https://www.researchprotocols.org/2018/1/e28021.html>
