



THE ROLE OF ARTIFICIAL INTELLIGENCE DURING NUTRITION ASSESSMENT & MEAL PLANNING

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DISCLOSURES

- I have no disclosures

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LEARNING OBJECTIVES

- Explain how artificial intelligence (AI) can aid in nutrition assessments and designing nutrition interventions
- Describe potential benefits of utilizing AI from a workflow standpoint
- Identify limitations of AI chatbots “nutrition knowledge”

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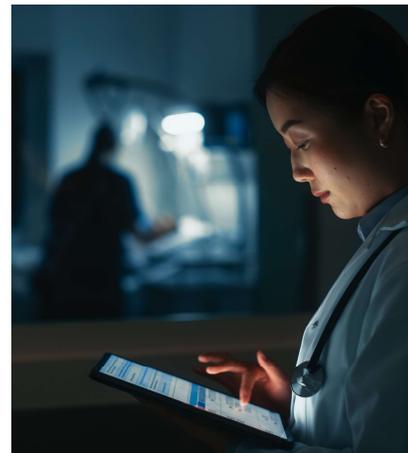
BACKGROUND

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AI IN HEALTHCARE: PHYSICIANS

- Patient relationships?
- Privacy at stake?
- Diagnostic ability
- Documentation and administrative tasks
- Clinical outcomes



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AI IN HEALTHCARE: NURSES

- Increase efficiency
- Patient-clinician relationship would be improved
- Robots!
- Student nurses - YES



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AI IN HEALTHCARE: PHARMACIST

- Trust issues...
- Improve efficiency
- Age is not just a number



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What about AI in
clinical nutrition?



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AI is a valuable tool for enhancing
the quality of nutrition consults.

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AI IN CLINICAL NUTRITION

- Dietetic students & AI
- LLMs in creating meal plans
 - LLMs' accuracy: most accurate with calories, least accurate with fat
 - Up to 40% error
- Disease specific meal planning
- In assessing digital images



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AI IN CLINICAL NUTRITION

AI vs RDN

AI: Significantly less time

RDN: More accurate with calories

AI: Competitive with RDN when low Na+, low fat, low carbohydrate is requested

RDN: More accurate with protein

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AI IN CLINICAL NUTRITION

Artificial Intelligence (AI) in Nutrition: A Case-Based Comparison of Conversational AI Platforms

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AI IN CLINICAL NUTRITION

- Four AI platforms: ChatGPT, OpenEvidence, Gemini, Copilot
- Five real-world cases covering chronic disease management, nutrient deficiencies, dietary interventions, and metabolic disorders
- Responses assessed by 5 expert clinicians using a 5-item evaluation tool

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A 71-year-old female with a history of **recurrent intermittent diarrhea for several years**, worsened in 2024, presents with significant weight loss and dysgeusia. Further evaluation showed findings suggestive of **multiple myeloma**, including skeletal lytic lesions, vertebral fractures, and dysproteinemia. Her stools vary from formed once daily to loose immediately after eating, influenced by food intake. **Dysgeusia** contributes to decreased taste, though she denies nausea, vomiting, or constipation. **Marked kyphosis leads to early satiety, limiting intake to 25% of meals.** Past interventions include vertebroplasties for fractures and ongoing rosuvastatin/Evenity therapy for osteoporosis, with her last injection in November. **She supplements with a daily multivitamin, vitamin D3, and occasional oral iron but does not take calcium.** Weight records document a **progressive decline from 44.4 kg in early 2023 to a nadir of 28.5 kg in late 2024**, with partial recovery to 32.1 kg in 2025. Recent labs **reveal critical electrolyte derangements**, including serum **phosphorus** of 0.8 mg/dL (reference 2.5–4.5 mg/dL), **potassium** of 2.8 mmol/L (reference 3.5–5.0 mmol/L), and **magnesium** of 1.3 mg/dL (reference 1.7–2.2 mg/dL). Nutrition support service has been consulted for further recommendations.

Question: What is the next step in the patient's clinical nutrition management?

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RESPONSE #1

Given the patient's presentation with **refeeding syndrome**, multiple myeloma, and **significant electrolyte derangements**, the next steps in her clinical nutrition management should include **immediate correction of hypophosphatemia, hypokalemia, and hypomagnesemia through intravenous supplementation.** Nutrition support should be initiated cautiously to avoid exacerbating refeeding syndrome, starting with a low-calorie intake and gradually increasing caloric intake while closely monitoring electrolyte levels. Thiamine supplementation is essential before and during the refeeding process to prevent Wernicke's encephalopathy, typically administered at 200-300 mg IV or orally daily for the first few days. A multidisciplinary approach involving dietitians, hematologists, and endocrinologists is crucial to tailor the nutrition plan to her specific needs, considering her multiple myeloma and osteoporosis. Regular monitoring of her weight, intake, and biochemical markers (electrolytes, renal function, and glucose levels) is necessary to adjust the nutrition plan as needed. Also, strategies to manage dysgeusia and early satiety, such as offering small, frequent meals and using flavor enhancers to improve taste, should be implemented.

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RESPONSE #2

The patient's clinical presentation, marked by **significant weight loss, malnutrition, and electrolyte abnormalities consistent with refeeding syndrome, necessitates immediate and cautious nutritional intervention**. The next step is to initiate controlled caloric repletion with close monitoring of electrolytes, fluid balance, and metabolic parameters. Energy intake should begin at 10–15 kcal/kg/day, gradually increasing over 5–7 days to avoid exacerbating refeeding syndrome. Electrolyte repletion, particularly phosphorus, potassium, and magnesium, should be aggressively managed before and during nutrition support. Thiamine (100 mg daily) should be supplemented to prevent Wernicke's encephalopathy. Given her poor oral intake due to dysgeusia and early satiety, enteral nutrition with a nutrient-dense, high-protein formula may be required if oral intake remains insufficient. Close interdisciplinary coordination with hematology and nutrition support teams is essential to optimize her nutritional status while managing underlying multiple myeloma.

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RESPONSE #3

This 71-year-old woman with multiple myeloma is **critically ill due to severe malnutrition compounded by life-threatening refeeding syndrome**. Her lab results reveal dangerously low levels of phosphorus, potassium, and magnesium, making immediate initiation of cautious parenteral nutrition essential. This method allows for precise control over nutrient delivery and electrolyte correction, vital to avoid the potentially fatal consequences of refeeding syndrome. In addition to parenteral nutrition, her care plan must include aggressive electrolyte replacement and thiamine supplementation to prevent further complications like Wernicke's encephalopathy. Continuous cardiac monitoring and frequent electrolyte checks are crucial to ensure her stability. Furthermore, the medical team needs to investigate and manage the cause of her chronic diarrhea, which likely contributes to her malnutrition.

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RESPONSE #4

Given this patient's **severe malnutrition, critical electrolyte derangements, and risk of refeeding syndrome, the next step in clinical nutrition management is to initiate cautious and closely monitored nutrition support while aggressively correcting electrolyte imbalances**. Refeeding syndrome is a life-threatening condition that can occur when nutrition is reintroduced too rapidly in malnourished patients, leading to shifts in electrolytes and fluid balance. Therefore, nutrition support should begin at a low caloric level (e.g., 10–20 kcal/kg/day or ~50% of estimated energy needs) and gradually increase over 4–7 days as tolerated. Electrolytes (phosphorus, potassium, and magnesium) must be repleted aggressively before and during nutrition initiation, with frequent monitoring (every 6–12 hours initially) to prevent complications such as cardiac arrhythmias or respiratory failure.

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Questions	Mean (SD)					p-Value
	ChatGPT	Copilot	DeepSeek	Gemini	OpenEvidence	
1 AI tool response missing recommendations that the experts thought of?	3.000 (0.400)	3.520 (0.867)	3.160 (0.767)	2.880 (0.576)	3.160 (0.623)	0.447
2 Clarity of Recommendations	3.920 (0.268)	3.720 (0.303)	3.800 (0.678)	4.160 (0.261)	3.660 (0.467)	0.343
3 Insights that the AI tool provided that experts did not consider	1.600 (0.245)	1.840 (0.329)	1.600 (0.245)	1.400 (0.283)	1.760 (0.167)	0.109
4 Overall Satisfaction with the AI Tool	3.360 (0.358)	3.080 (0.795)	3.440 (0.410)	3.840 (0.410)	3.360 (0.329)	0.233
5 Quality of Evidence Cited	3.240 (0.623)	3.360 (0.817)	3.040 (0.518)	3.040 (0.767)	3.280 (0.593)	0.773
6 Relevance of the response to the Case	3.840 (0.329)	3.480 (0.901)	3.720 (0.657)	4.040 (0.297)	3.760 (0.261)	0.543
7 The likelihood of experts following recommendations from the AI tool	3.440 (0.590)	3.200 (0.883)	3.320 (0.610)	3.720 (0.303)	3.480 (0.482)	0.722
8 The usefulness of Recommendations provided by the AI tool	3.480 (0.415)	3.160 (0.910)	3.320 (0.626)	3.800 (0.374)	3.360 (0.555)	0.552

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AI IN CLINICAL NUTRITION

- All AI tools performed equally well in answering complex clinical questions pertaining to nutrition
- No new insights provided by any AI tool
- Small sample size impacts analysis

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PERCEPTIONS OF RDNS

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ELECTRONIC SURVEY

23 items on Likert
scale



2 case scenarios on
confidence scale



4 open-ended

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ELECTRONIC SURVEY

23 items on Likert scale

+

2 case scenarios on confidence scale

+

4 open-ended

- ✓ General perception of AI
- ✓ Role of AI in improving efficiency
- ✓ Trust & reliability of AI
- ✓ Patient engagement & outcomes
- ✓ Ethical & practical considerations

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
General perception of AI					
1. AI is a valuable tool for enhancing the quality of nutrition consults.					
2. The integration of AI into dietetic practices aligns with the future of healthcare.					
3. I feel confident in AI's ability to provide accurate dietary recommendations.					
4. I believe AI can help address complex nutrition-related problems.					
Role of AI in improving efficiency					
1. AI can help reduce the time required for routine tasks in nutrition consults (e.g., meal planning, data analysis).					
2. Using AI in consults can reduce the workload of registered dietitians.					
3. AI can streamline the process of generating personalized dietary recommendations.					
4. AI can improve the overall productivity of dietitians in clinical settings.					
Trust and reliability of AI					
1. I trust the accuracy of dietary recommendations generated by AI systems.					

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ELECTRONIC SURVEY

23 items on Likert scale

+

2 case scenarios on confidence scale

+

4 open-ended

Not confident	Slightly confident	Neutral	Confident	Very confident
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If given the option to use an AI-based tool to generate this meal plan, which claims to save time, ensure nutrient accuracy, and allow for patient-specific customization, how confident would you feel using such a tool to create a save and effective meal plan for this patient?

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ELECTRONIC SURVEY

23 items on Likert scale



2 case scenarios on confidence scale



4 open-ended



- ✓ How do you think AI can be improved to better support dietetic professionals?
- ✓ What are your main concerns about integrating AI into practice?
- ✓ How clear & comprehensive do you find the content of this survey?
- ✓ What do you see as the biggest advantage of using AI in dietetic consults?



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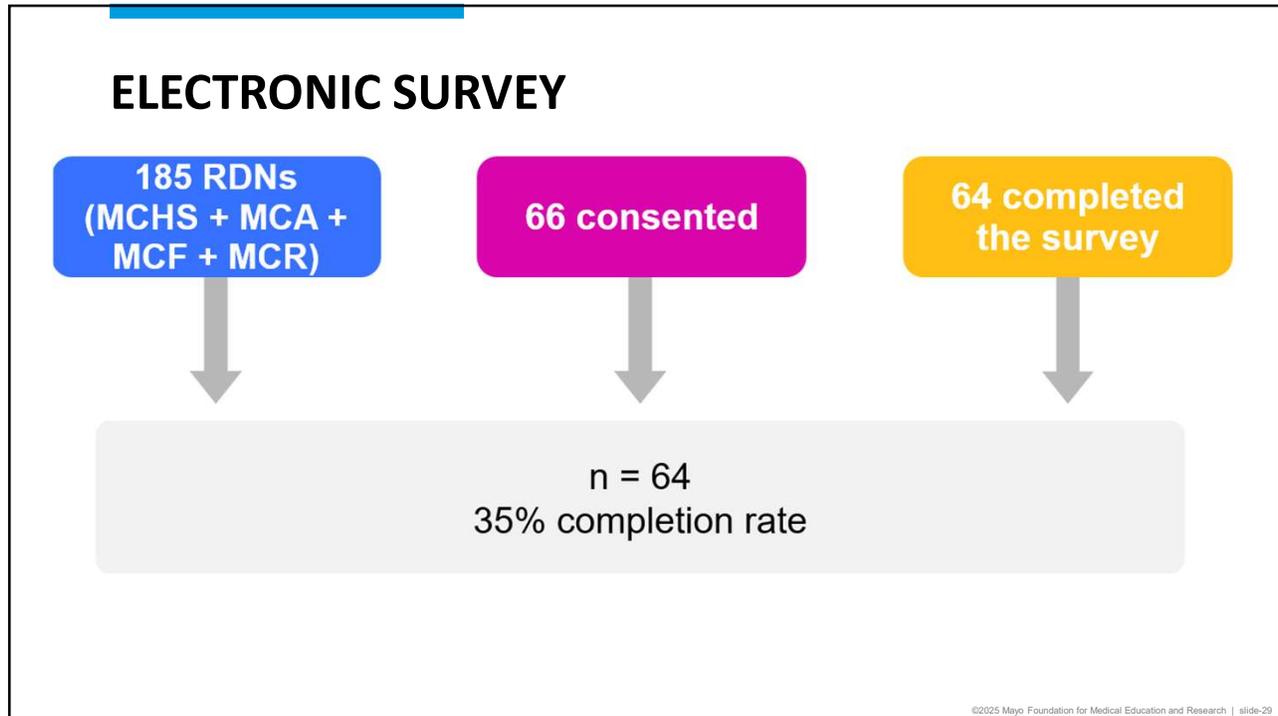


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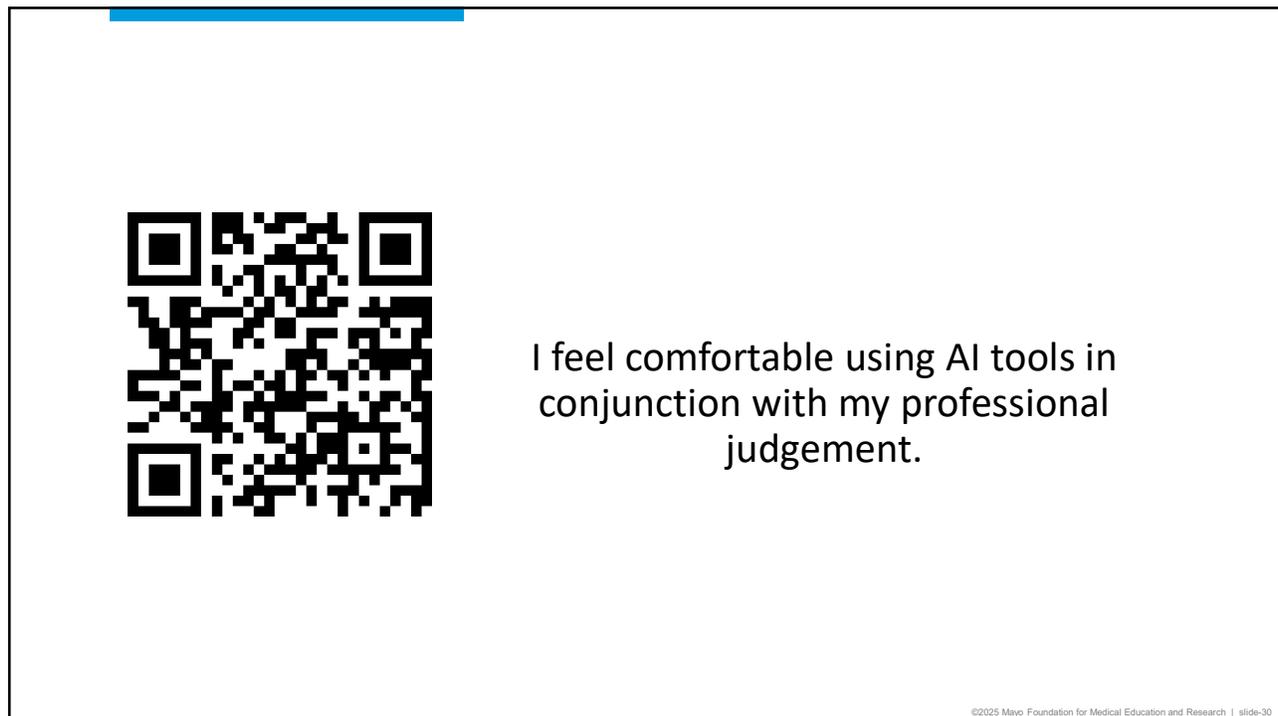


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RESULTS

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DEMOGRAPHICS

- Age
 - 14-17% of respondents in each age category
 - ≤30, 31-40, 41-50, ≥51
- Years of experience
 - **37% with ≥21 years experience**
 - ≤5, 6-10, 11-15, 16-20, ≥21
- Work setting
 - 52% inpatient; 56% outpatient; 2% private practice

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RESULTS

Optimism Regarding AI Usage

Skepticism About AI Implementation

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RESULTS

Optimism Regarding AI Usage

- Neutral level of optimism
 - 17 items loaded
 - Mean \pm SD = 0.1 ± 0.6

Skepticism About AI Implementation

- Moderate level of skepticism
 - 5 items loaded
 - Mean \pm SD = 1.0 ± 0.6

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Optimism Regarding AI Usage

"I feel confident in AI's ability to provide accurate dietary recommendations."

"AI can help reduce the time required for routine tasks in nutrition consults (e.g. meal planning, data analysis)."

"AI systems can be relied upon to provide evidence-based nutrition advice."

"I believe patients would prefer consults that integrate AI technology."

"I believe AI can help address complex nutrition-related problems."

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Optimism Regarding AI Usage

"I feel confident in AI's ability to provide accurate dietary recommendations."

Strongly Disagree: 8%
Disagree: 27%
Neutral: 46%
Agree: 19%
Strongly Agree: 0%

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Optimism Regarding AI Usage

"I believe AI can help address complex nutrition-related problems."

Strongly Disagree: 6%
Disagree: 31%
Neutral: 34%
Agree: 23%
Strongly Agree: 6%

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Skepticism About AI Implementation

"I am concerned about the potential for AI to make errors in dietary recommendations."

"It is important that AI systems provide clear and understandable explanations for the recommendations provided."

"I believe the cost of implementing AI systems is a barrier to their adoption."

"I believe there is a need for more research on the impact of AI in dietetics."

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Skepticism About AI Implementation

"I am concerned about the potential for AI to make errors in dietary recommendations."

Strongly Disagree: 2%
 Disagree: 6%
 Neutral: 11%
Agree: 50%
Strongly Agree: 31%

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Skepticism About AI Implementation

"It is important that AI systems provide clear and understandable explanations for the recommendations provided."

Strongly Disagree: 2%
 Disagree: 0%
 Neutral: 8%
Agree: 53%
Strongly Agree: 38%

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...Is age just a number?



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RESULTS

Optimism Regarding AI Usage

- Neutral level of optimism
 - Mean \pm SD = 0.1 ± 0.6

No significant findings across age categories OR years of experience.

Skepticism About AI Implementation

- Moderate level of skepticism
 - Mean \pm SD = 1.0 ± 0.6

No significance across age categories BUT lowest amount of skepticism found in those with ≥ 21 years of work experience.

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CASE SCENARIO

58 year old male s/p total pancreatectomy with vascular resection and reconstruction for pancreatic cancer. He has a jejunostomy feeding tube and has required prolonged tube feeding due to post-operative delayed gastric emptying. While he is now able to consume some solid foods, he is unsure about appropriate dietary choices and requests a 3-day meal plan meeting the following criteria: 2000 calories, 80 grams of protein, diabetic-friendly, low fiber, and low-fat.



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CASE SCENARIO

If you have the option to use an AI-based tool to generate this meal plan, which claims to save time, ensure nutrient accuracy, & allow for patient-specific customization, how confident would you feel using such a tool to create a safe & effective meal plan for this patient?

Not Confident	Slightly Confident	Neutral	Confident	Very Confident
13 (20%)	24 (38%)	10 (16%)	12 (19%)	5 (8%)

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So...what can I do?

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MEAL PLANNING

- ✓ Meal plan content – yes!
- ✓ Need to review for accuracy
- ✓ Possibly engaging for patient



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BTF RECIPE CREATION

Patient is a 60 year old female (anthropometrics: 65 kg, 165.1 cm, BMI 23.8) with a 20 French PEG tube. She has a nut allergy and intolerance to soy products. Create a blenderized tube feeding recipe to provide 1600 calories, 65 grams protein.

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OPEN EVIDENCE

create a blenderized tube feeding recipe for a patient with a 20 French PEG tube with a nut allergy and intolerance to soy products to provide 1600 calories, 65 grams protein

✓ Finished thinking

The following document outlines a sample blenderized tube feeding (BTF) recipe for a patient with a 20 French percutaneous endoscopic gastrostomy tube, nut allergy, and soy intolerance, targeting 1600 kcal and 65 g protein daily. The approach is grounded in consensus recommendations from the American Society for Parenteral and Enteral Nutrition (ASPEN), which emphasize safe food handling, appropriate tube size, and dietitian involvement to ensure nutrient adequacy and minimize risks such as tube occlusion and microbial contamination.^[1-2] The recipe is constructed using whole foods, avoiding nuts and soy, and is designed to meet the specified macronutrient targets, consistent with published practice recommendations and recent literature.^[1-3]

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☰ Blenderized Tube Feeding Recipe 📄 ⬇️ 🖨️

Patient Context:

- 20 French PEG tube
- Nut allergy
- Soy intolerance
- Target: 1600 kcal, 65 g protein

Clinical Rationale:

Blenderized tube feedings (BTF) are increasingly used in home enteral nutrition, offering improved feeding tolerance and patient satisfaction when prepared and administered safely.^{[2][4-6]} The American Society for Parenteral and Enteral Nutrition (ASPEN) recommends BTF only for patients with mature gastrostomy sites and proven bolus tolerance, using tubes ≥14 Fr, and with strict adherence to food safety protocols.^[1-2] Dietitian involvement is essential to ensure nutrient adequacy and minimize risks of tube occlusion and microbial contamination.^[1-2]

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Sample BTF Recipe (1600 kcal, 65 g protein, nut- and soy-free):

This recipe is intended as a template and should be individualized by a registered dietitian. All foods should be prepared using safe food-handling techniques, blended to a smooth consistency, and strained if needed to reduce viscosity and risk of tube occlusion.^[1]

- **Cooked chicken breast (skinless, boneless):** 200 g (~44 g protein, ~330 kcal)
- **Cooked quinoa:** 100 g (~4 g protein, ~120 kcal)
- **Cooked lentils:** 100 g (~9 g protein, ~120 kcal)
- **Olive oil:** 30 mL (~270 kcal)
- **Whole milk (or lactose-free if needed):** 400 mL (~14 g protein, ~260 kcal)
- **Banana:** 100 g (~90 kcal)
- **Carrots (cooked):** 100 g (~35 kcal)
- **Spinach (cooked):** 50 g (~12 kcal)
- **Apple juice (100%):** 200 mL (~90 kcal)
- **Water:** Add as needed to achieve desired consistency (typically 200–400 mL)

Estimated Nutrition (per batch):

- **Calories:** ~1600 kcal
- **Protein:** ~65 g
- **Fat:** ~60–70 g (from chicken, olive oil, milk)
- **Carbohydrate:** ~150–180 g (from grains, fruits, vegetables, milk)

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RDN Oversight Needed!!

Sample BTF Recipe (1600 kcal, 65 g protein, nut- and soy-free):

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What it actually
provides per
USDA Database:

1279 kcals, 92
grams protein

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CHATGPT

create a blenderized tube feeding recipe for a patient with a 20 French PEG tube with a nut allergy and intolerance to soy products to provide 1600 calories, 65 grams protein

Here's a **blenderized tube feeding recipe** designed for a patient with a **20 French PEG tube, nut allergy, and soy intolerance**, providing ~1600 calories and ~65 g protein.

Recipe (Makes ~1 Day Supply: ~1500–1600 mL)

- ✓ Nut-free
- ✓ Soy-free
- ✓ Smooth consistency for 20 Fr PEG

Ingredients

- **Cooked chicken breast, skinless** – 150 g (1 cup, diced) → 330 kcal, 62 g protein
- **Cooked quinoa** – 1 cup (185 g) → 220 kcal, 8 g protein
- **Cooked carrots** – 1 cup (130 g) → 50 kcal, 1 g protein
- **Cooked spinach** – 1 cup (180 g, packed) → 40 kcal, 5 g protein
- **Cooked sweet potato** – 1 cup (200 g, mashed) → 180 kcal, 4 g protein
- **Olive oil** – 4 Tbsp → 480 kcal, 0 g protein
- **Whole milk (lactose-free if needed)** – 1 cup (240 mL) → 150 kcal, 8 g protein
- **Greek yogurt, plain, nonfat** – ¾ cup (180 g) → 100 kcal, 18 g protein
- **Banana** – 1 medium (120 g) → 105 kcal, 1 g protein

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Nutrition (Approx.)

- Calories: ~1,655 kcal
- Protein: ~67 g
- Carbs: ~150 g
- Fat: ~65 g
- Fiber: ~18 g

Preparation

1. Cook all grains, vegetables, and meats thoroughly.
2. Place all ingredients in a **high-powered blender**.
3. Add enough **water or broth** to reach ~1500–1600 mL total volume.
4. Blend until **completely smooth** (strain through a fine mesh if needed for tube safety).
5. Divide into 4–6 portions. Refrigerate and use within 24 hours.

Feeding Notes

- Flush PEG tube with **30–60 mL water** before and after each feeding.
- Deliver in boluses (e.g., 4 × 400 mL) or continuous via pump depending on tolerance.
- Adjust fluids separately to meet hydration needs.

Would you like me to also create a **variation that's dairy-free** (in case lactose intolerance is also a concern), or should we stick with the milk/yogurt base?

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RDN
Oversight
Needed!!

Nutrition (Approx.)

- Calories: ~1,655 kcal
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What it actually
provides per
USDA Database:

1591 kcals, 93
grams protein

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DISCUSSION & CONCLUSION

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OUR PROFESSION



- Compares and contrasts vs other disciplines
- Age is just a number?
- Trust issues...
- AI tool creation will continue
- Clinical judgement is paramount!

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Will AI
replace
dietitians?

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How will it
actually
help me?

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QUESTIONS?



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