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Background

Theranostics integrates molecular imaging with targeted radionuclide therapy, positioning nuclear medicine at the forefront of precision oncology. Major therapies include I-131 for thyroid disease, Lu-177 DOTATATE for neuroendocrine tumors, Lu-177 PSMA for metastatic prostate cancer, and Radium-223 for bone-dominant metastatic disease. These therapies require:

- home radiation precautions
- multi-cycle adherence
- lab-based dose adjustments
- medication timing (e.g., octreotide holds)
- hydration guidance
- Recognition of potential toxicities

Studies in oncology education consistently demonstrate that verbal-only instruction results in poor retention, particularly in older or medically complex populations. Digital oncology navigation applications and cancer care platforms have shown that structured digital tools improve engagement, adherence, and understanding in other cancer settings. However, no dedicated digital education system exists for nuclear medicine therapies. As radiology assumes a therapeutic role, modernizing patient education becomes a patient safety and quality-of-care imperative.

Assess Patient Knowledge → App Development → Education → Measure Impact → Refine/Update as necessary

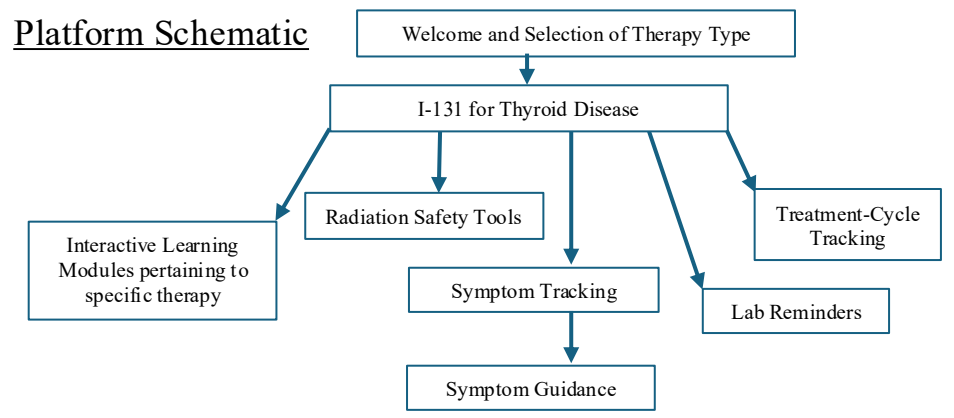
Aims

Aim 1 – Identify knowledge gaps in patients undergoing specific theranostic therapies, focusing on radiation precautions, side effects, monitoring, reproductive risks, and medication restrictions

Aim 2 – We will develop and evaluate a digital, modular patient education platform designed specifically for these theranostic therapies. Guided by evidence-based educational principles and digital oncology care models.

Aim 3 – Pilot test the platform and measure its impact using pre/post knowledge assessments and surveys of preparedness, confidence, and satisfaction.

Platform Schematic



Methods

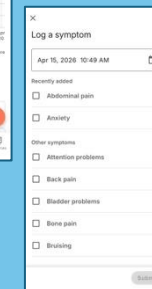
-Aim 1 will use a validated questionnaire to assess knowledge in radiation precautions, side effects, laboratory monitoring, medication restrictions, and treatment logistics among patients scheduled for theranostic therapy.

-Aim 2 will follow a structured app development framework: clinical content structuring by nuclear medicine faculty; user-centered design using low-literacy, visual-first principles; front-end and back-end application development; integration of modules including an education engine, timeline tracker, radiation safety recommendations tool, symptom monitor with journaling entry options, and lab reminder system including push notifications on personal devices. The development approach mirrors established oncology care applications that use modular education, reminders, and symptom tracking. Iterative alpha and beta testing will ensure all features work as intended, refine usability, and streamline the patient experience.

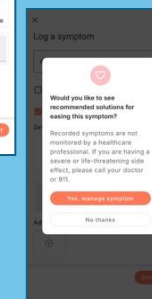
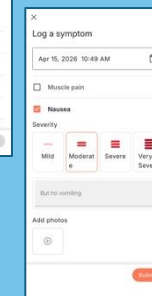
-In Aim 3, patients will receive standard education plus platform access. Knowledge scores will be compared pre- and post-use, with secondary outcomes including preparedness, confidence, and satisfaction. Data will be stored in HIPAA-compliant systems and limited to educational analytics.

Innovation

- (1) It introduces the first unified digital education platform spanning multiple nuclear medicine theranostic therapies
- (2) It shifts education from passive instruction to behavioral reinforcement of radiation safety and monitoring adherence
- (3) It positions radiology within digital health and patient-support research, an area traditionally dominated by medical oncology
- (4) It employs a modular architecture allowing future expansion to emerging radiopharmaceuticals. By adapting principles used in modern oncology navigation applications to the radiopharmaceutical setting, this project bridges nuclear medicine, patient education science, and digital health innovation.



*Images below are taken from Outcomes4Me, a cancer care planner, to illustrate possible layout of Symptom Tracker



Conclusion / Future Directions

This project creates a digital education tool to help cancer patients safely manage nuclear medicine treatments involving targeted radioactive drugs. The tool provides easy-to-understand guidance on radiation safety, side effects, lab monitoring, and treatment schedules. We will study whether this improves patient understanding and confidence.

As time passes, the app will need revision and maintenance of educational tools, with room for expansion of content based upon available theranostic therapies and future innovation in the field of nuclear medicine.