Mapping the Precision Ketogenic Therapy Program

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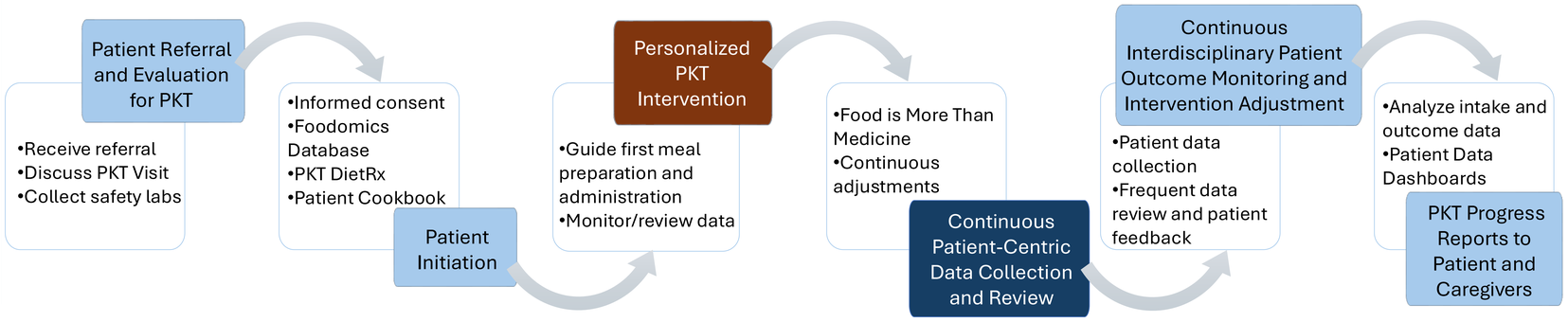
Abstract

More than one-third of individuals with epilepsy are refractory to standard therapies. Although seizure reduction through ketogenic diets has been documented for a century, variability in implementation and monitoring has limited reproducibility. To address this, we developed **Precision Ketogenic Therapy (PKT),** a structured, patient-centered approach aligned with precision medicine. PKT integrates personalized treatment design with food preferences to enhance adherence and efficacy across the lifespan.

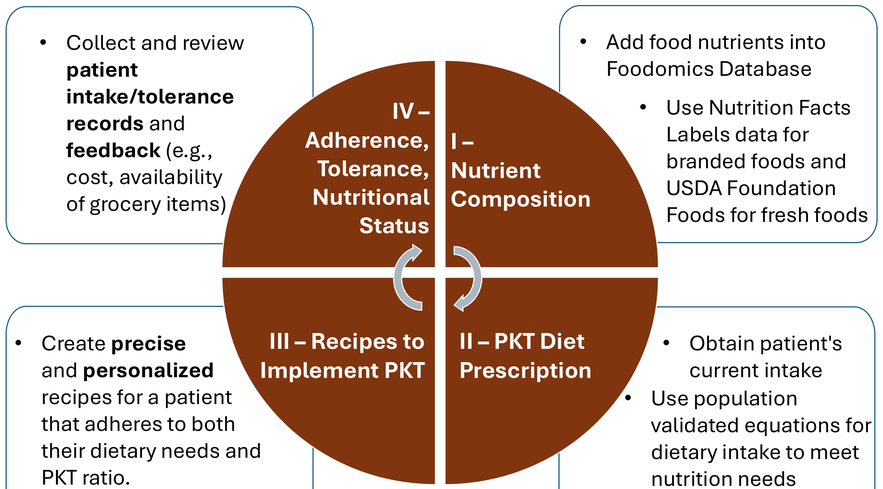
PKT systematically addresses gaps in therapy through standardized definitions, individualized implementation, and iterative adjustments based on patient-specific outcomes. Using NIH-recommended **Common Data Elements** and process-mapping, we are **developing a PKT toolkit for clinical** dissemination. Initial maps focus on refractory epilepsy and integrate seizure parameters with non-seizure outcomes. Using harmonized PKT process maps across multiple clinics is expected to **facilitate precise multicenter trials** and support the **development of robust, evidence-based guidelines for PKT** in epilepsy.

PKT Workflow

The PKT Workflow map provides a comprehensive **overview of Precision Ketogenic Therapy**, guiding patients from referral through long-term management. By utilizing telehealth and digital communication, PKT staff maintain a continuous feedback loop with families and epileptologists to proactively manage seizures, dietary adherence, and well-being. This **collaborative approach ensures the therapy remains responsive**, allowing for data-driven adjustments that tailor the prescription to the evolving needs of each patient.

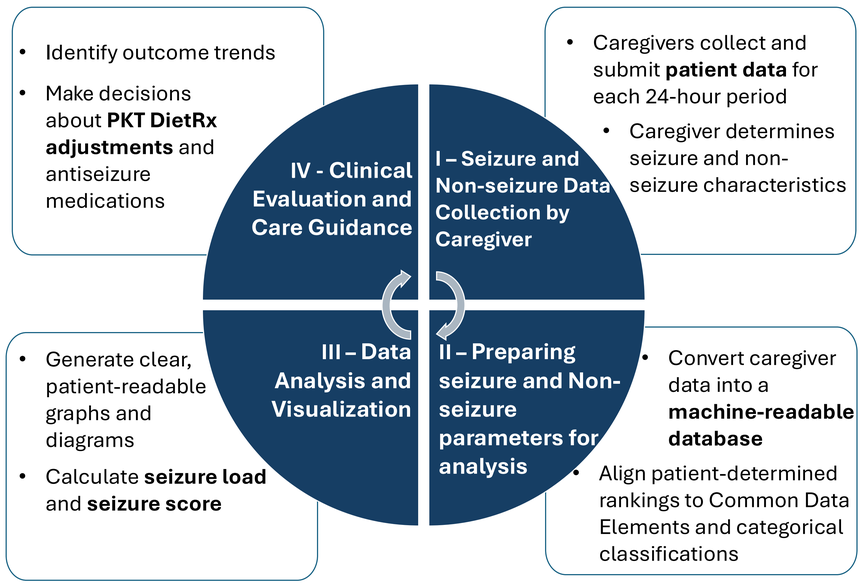


Personalized PKT Intervention



Precision medicine depends on a clearly defined, reproducible intervention. In PKT, that intervention is enabled by a continuously updated **Foodomics database** that captures the most accurate available nutrient composition of foods. The **PKT Diet Prescription** is individualized using each patient's PKT ratio *(g fat ÷ [g protein + g carbohydrate])*, current intake, and population-validated dietary intake equations. PKT is implemented through **prescribed recipes** that translate daily nutrient targets into meals families prepare by weighing foods to the nearest tenth of a gram. To support feasibility and adherence, **recipe design incorporates real-world constraints**—including cost, taste preferences, family customs, store proximity, and available equipment. Families maintain detailed logs of dietary adherence, and prescriptions and recipes are iteratively adjusted to reflect changing clinical needs and evolving preferences.

Continuous Patient-Centric Data Collection and Review



Since the impact on patients varies significantly across seizure types and individual occurrences of seizures, relying solely on seizure counts is insufficient for monitoring a patient's daily burden. PKT instead evaluates a **multidimensional set of seizure parameters,** including number, severity, duration, and postictal status to calculate the **Seizure Load** for a day and the **Seizure Score** that measures how seizure load has changed over time. **Patient-Centric Non-Seizure Parameters** capture the qualitative aspects of a patient's life. By defining "good" parameters to enhance and "bad" parameters to eliminate, patients and caregivers play an active role in measuring their progress. Rigorous monitoring and data analysis enable the therapy to be constantly adjusted to achieve the best possible outcomes for patients.

Discussion

Precision Ketogenic Therapy (PKT) is a structured, patient-centered approach designed to improve the reproducibility of ketogenic diet therapy in refractory epilepsy by **standardizing definitions while enabling individualized implementation and continuous adjustment**. PKT is mapped as an end-to-end workflow and is supported by telehealth/digital communication to sustain an active feedback loop with families and clinicians.

A key advance is **patient-centric outcome assessment beyond seizure counts**: caregivers capture seizure and non-seizure parameters daily, which are aligned with NIH-recommended Common Data Elements and converted to machine-readable data for dashboards, trend detection, and actionable therapy changes (diet and antiseizure medications).

Precision nutrition implementation is enabled by a continuously updated **Foodomics database** of food composition and **personalized prescriptions and/ recipes tailored to preferences and logistics**. Harmonized PKT process maps and a dissemination toolkit can **support multicenter trials and evidence-based guidelines**.

Acknowledgements

We **thank all our patients** for the multitude of things they have graciously taught us over the past 30 years.