**Member Risk Stratification Prototype – Detailed Plan**

**1. Objectives**

* **Identify high-risk members early** using predictive analytics.
* **Deploy targeted interventions** to prevent costly complications and hospitalizations.
* **Enable proactive care management** that improves health outcomes and reduces overall healthcare costs.

**Explanation:** The aim is to move from a reactive care approach to a proactive system where high-risk members are identified before deterioration occurs, allowing timely intervention and better resource allocation.

**2. Problem Statement**

* **Cost Concentration:** Around 5% of Medicare members account for 50% of total healthcare costs.
* **Reactive Systems:** Current care management approaches often intervene **after** complications occur.
* **Lack of Accurate Prediction:** Without precise risk prediction, care teams cannot efficiently allocate resources, leading to higher costs and poorer outcomes.

**Need:** A **risk stratification platform** that can:

* Predict health deterioration with ≥85% accuracy.
* Recommend personalized interventions for members based on their risk.
* Integrate with care management workflows to ensure timely action.

**Explanation:** The platform addresses the core challenge of identifying high-risk members in advance and providing actionable insights for care teams, enabling better health outcomes and cost savings.

**3. Proposed Solution**

**Risk Stratification Platform**

* **Technology Stack:** Built using **React** (frontend) and **Flask** (backend) for a seamless, interactive experience.
* **Data Ingestion:** Supports uploading CSV files or connecting to databases to process member information dynamically.
* **Predictive Modeling:**
  + **Two-phase approach:**
    1. **Pretraining on synthetic data** to learn general deterioration patterns safely.
    2. **Fine-tuning on real member data** to adapt to actual behaviors and trends.
  + **Temporal Windows:** Predicts risk over **30, 60, and 90-day windows**.
  + **Model Structure:** LSTM models capture temporal sequences; XGBoost classifiers combine embeddings with static features to generate risk scores.
  + **Output:** Members stratified into **five risk tiers**: Very High, High, Moderate, Low, Minimal.
* **Frontend Visualization:**
  + Shows **risk tier distribution** and population trends.
  + Displays **key predictors** influencing risk (feature importance / SHAP values).
  + Tracks **member-level risk trajectories** over time.
  + Demonstrates **conceptual interventions** per risk tier.
  + Simulates **ROI** to show potential cost savings and intervention impact.

**Explanation:** The platform allows care teams to **analyze member risk dynamically**, understand contributing factors, and visualize how targeted interventions could prevent deterioration and reduce costs.

**4. Prototype Scope**

* **Focus:** Demonstrate predictive capabilities and actionable insights, rather than integrate with real care management systems.
* **Conceptual Interventions:** Show which interventions could be applied to each risk tier and estimate potential ROI.
* **Features Included:**
  + Risk scoring for **30/60/90-day windows**
  + Member stratification into **five risk tiers**
  + Dashboard visualization of risk trends and intervention impact

**Explanation:** The prototype prioritizes **demonstration and usability** for stakeholders, showing the value of predictive analytics in care management without the complexity of live system integration.

**5. Expected Outcomes**

* **Early Detection:** Identify high-risk members before deterioration occurs.
* **Actionable Insights:** Provide clear visualizations for care teams to prioritize interventions.
* **Cost Savings:** Demonstrate potential reduction in hospitalizations and healthcare costs via ROI simulation.
* **Stakeholder Value:** Illustrate how predictive analytics and stratification can improve decision-making and resource allocation.
* **Prototype Readiness for Production:** The LSTM + XGBoost structure provides a **solid foundation for future deployment** in real-world care management systems.

**Why 5% of Members Account for 50% of Medical Costs**

* In healthcare, a **small proportion of patients often incur the majority of costs** due to chronic conditions, frequent hospitalizations, or complex care needs.
* For Medicare members, research shows that **roughly 5% of members are “high-cost”**, meaning they require intensive medical services, specialized treatments, or repeated interventions.
* These high-cost members drive a disproportionate share of total expenditures — in this case, **50% of overall healthcare costs**.
* **Implication for care management:** By identifying and monitoring this small group early, care teams can **target interventions where they will have the most impact**, potentially reducing hospitalizations, complications, and overall costs.

**Plain analogy:** Think of it like traffic on a highway — **a few congested roads cause most delays**. If you manage those key roads well, the system as a whole runs smoother.