Study Goal and Objective

**Overarching goal:** To improve health and equity in type 2 diabetes (T2D) by integrating social care into the clinical care of T2D, which will lead to a necessary paradigm shift in US health care delivery.

**Objective:** To develop **i2SOAR** (Intelligent and individualized social risk management in type 2 diabetes), an EHR-based platform including personalized social risk management algorithms that can support the social care during clinical care of T2D.

Recourses and Methods

- **OneFlorida** network, collating EHR data from 17 million (or 65%) residents in Florida, 2.1 million in Georgia, and 9,800 in Alabama, and linked with various other data sources such as Medicaid & Medicare claims and national death index.
- **External exposome database** with ~9,000 contextual social determinants of health (SDoH).
- Natural language processing (NLP) extracting person-level SDoH from clinical narratives in EHRs. The NLP pipeline is powered by GatorTron – the largest clinical language model trained on our state-of-the-art computing infrastructure – HIPerGator – features $50M new hardware from Nvidia customized for AI and deep learning.
- **Sate-of-the-Art causal AI causal** models developed by the study team.

![Image](image.png)

**Fig. 1.** 1-year hospitalization risk by iPsRS decile. X axis: iPsRS, stratified by top 1%, 2-5%, and 6-10%, and (deciles); Y axis: actual hospitalization rate.

**Fig. 2.** A causal DAG and with significant pathways (red, blue, and green) leading to racial disparities in the hospitalization risk.

**Fig. 3.** Subgroups CATE (i.e., heterogeneous effects) of housing instability on the hospitalization risk in T2D.

**Fig. 4.** Predicted ITE at person level of housing instability on the hospitalization risk in T2D.

**Fig. 5.** An initial design of the key features in i2SOAR.

- **Clinical Implications**
  - Through developing machine learning algorithms to build **i2SOAR**, our work will lead to the integration of social risk management into the clinical care of T2D:
    - Screen for patients’ unmet social needs via the iPsRS
    - Quantifying the SDoH effects on disparities
    - Identifying SDoH targets for interventions to mitigate identified social risks (informed by SDoH causal effect estimates)
    - Support the shared decision-making between the care team and patients on personalized intervention strategies to manage T2D patients’ social risk

**Deliverables**

- A fair machine learning-based individualized polysocial risk score (iPsRS) that considers both contextual and person-level SDoH (Fig.1).
- Identifying and quantifying the contributions of significant SDoH causal pathways that lead to T2D disparities (Fig.2).
- Using causal-principled AI methods to estimate the causal, heterogeneous effects of key actionable SDoH (e.g., housing instability, Fig.3 and Fig.4).
- An EHR-based i2SOAR platform that guides social risk management through user-centered design (Fig.5).

The initial user interface for the i2SOAR prototype developed based on a patient case: female, 53 y/o, White/Hispanic, 3-year history of T2D, medical history of diabetes retinopathy, hypertension, and obesity.