

2. Specific Aims: Several large epidemiologic studies show that <25% of adolescents with type 1 diabetes (T1D) achieve targeted levels for glycosylated hemoglobin promulgated by the American Diabetes Association ($\leq 7.5\%$) or International Society of Pediatric and Adolescent Diabetes ($\leq 7.0\%$). Adolescents' self-management of T1D requires daily insulin replacement by multiple injections or insulin pump, blood glucose monitoring 4-6 times/day, regulation of dietary carbohydrate intake and physical activity, prevention/correction of glucose fluctuations and perhaps use of a continuous glucose monitor. This regimen places substantial and pervasive affective, behavioral, cognitive and social demands on them and their families and their success in T1D self-management is heavily impacted by psychosocial variables. Struggling with maintenance of adequate glycemic control is essentially normative among adolescent patients, suggesting that conventional systems of care are falling short of meeting the needs of this population. There is a substantial and growing literature that provides an empirical evidence base for a variety of psychological and behavioral intervention strategies targeting improved coping with the demands of T1D, but this evidence base has not fully penetrated into routine clinical care for adolescents with T1D and their families. Systematic integration of this evidence into routine care for T1D could yield many benefits. Behavioral barriers to effective care are major concerns of all stakeholders, but conventional care falls short on these issues. At the same time, the current and projected supply of board-certified pediatric endocrinologists is not keeping pace with the growth of the T1D patient population, amplifying the need to develop and validate alternative delivery systems that multiply the effective workforce of T1D health professionals. The ubiquitous sub-optimal T1D outcomes in this group therefore warrant testing of novel care models. We will develop and test a novel approach to improve adolescents' treatment adherence and glycemic control and provide justification for a larger randomized controlled trial (RCT). First, crowdsourcing methods will engage youths with T1D, parents and health care providers (HCP) in planning a feasible, acceptable, safe and effective trans-disciplinary model of T1D care (TC) that prioritizes meeting youths' and families' psychosocial needs and that capitalizes on the expertise of advanced practice nurses collaborating directly with psychologists and dietitians. The TC team will learn each discipline's skills in T1D management, screen for potentially modifiable psychological impediments to T1D care, facilitate appropriate services for complex problems, enhance family-centered communication, and implement empirically validated behavioral interventions with youth and parents. Then, a rigorous RCT will compare the effects of UC and of telemedicine delivery of TC on glycemic control and treatment adherence (primary outcomes) as well as quality of life and other psychosocial variables (secondary outcomes). Qualitative and cost-effectiveness analyses will follow the RCT, providing perspectives on mechanisms of TC effects and its economic viability. A mixed qualitative/quantitative methods approach will validate an innovative model of T1D care for adolescents that could then be tested in a future definitive, multi-site RCT. These specific aims will be addressed:

SPECIFIC AIM 1. In Year 1, with methods used effectively in our ongoing DP3 study of parents of children <6 with T1D, we will engage separate "crowds" of youth with T1D, parents, and HCPs in planning/refining a feasible, safe, acceptable and effective Trans-Disciplinary care model (TC) for T1D in adolescence. A smaller panel of stakeholders (parents, youth, HCPs, researchers) will guide the planning, implementation, analysis, dissemination and refinement of the TC model. This crowdsourcing effort should yield a TC model that meets the needs of key stakeholders, ensuring its feasibility and acceptance.

SPECIFIC AIM 2. In Years 2 through 4, a rigorous Randomized Controlled Trial (RCT) will compare the efficacy of Trans-Disciplinary Care (TC) and Usual Care (UC) in two Nemours pediatric diabetes practices (in Orlando, Florida and Wilmington, Delaware) on glycemic control, treatment adherence, health care use, psychological well being, family adaptation, social support, quality of life, and treatment satisfaction. This trial will yield substantial information that could justify a definitive future test of this model and yield precise effect size estimates for facilitating power analyses and sample size estimation for subsequent studies.

SPECIFIC AIM 3. Qualitative interviews of adolescents, parents, and health care providers completed at the midpoint and end of the RCT will identify mediators or moderators of TC efficacy and guide refinements to the model. We will also interview representatives of third party payers about the feasibility of dissemination of the TC model into practice and capture health care cost data. These analyses will strengthen the justification for a future, more ambitious trial of TC, and guide refinements to the TC model to further enhance its efficacy.