

Young Adult HbA1C Optimization at a Suburban FQHC

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Problem Description

The prevalence of diabetes mellitus (DM) in young adults has increased in recent years and is expected to continue to rise in the coming decades (K. Garvey & Laffel, 2018; Jensen & Dabelea, 2018; Lascar et al., 2018). Young adulthood, or ‘emerging adulthood’, is the developmental stage between adolescence and true adulthood, when individuals traditionally participate in work, marriage, or parenting, and have full self-determination (K. Garvey & Laffel, 2018). Emerging adulthood, which takes place largely in developed nations between ages 18-30, is particularly challenging for individuals with chronic conditions like DM that may require complex behavioral adaptation, medication management, and care coordination; these unique challenges for diabetic patients are well documented in the literature (K. Garvey & Laffel, 2018; Lascar et al., 2018; Sandler & Garvey, 2019). This period is further complicated by the transition from pediatric to adult health care settings. In some countries, such as Canada, the care transition is mandated at age 18; however, transition timing in the US is highly variable and may take place at any point between ages 18-30 (K. Garvey & Laffel, 2018).

Diverse factors throughout the transition period together contribute to significantly impaired glycemic control for emerging adult diabetic patients, leading to acute and chronic health problems and increasing overall healthcare costs (Commissariat et al., 2021; D’Amico et al., 2023). For example, rapid increases in autonomy related to one’s health and living situation, combined with changes in hormone balance, neurocognition, and school or employment status frequently results in DM care gaps exceeding six months (Commissariat et al., 2021; K. Garvey & Laffel, 2018). In the short term, patients with gaps in care and poor glycemic control are at higher risk for hyperglycemic crises, including diabetic ketoacidosis and hyperosmolar

syndrome, which are costly to treat and often managed in emergency and/or inpatient settings (Gosmanov et al., 2000; Sandler & Garvey, 2019). In the long term, these patients have an increased risk for mid-life microvascular and macrovascular complications of DM, such as neuropathy, retinopathy, hypertension, coronary artery disease, cardiovascular disease, and kidney disease (Bjornstad et al., 2023; Jensen & Dabelea, 2018).

This project took place at a Federally Qualified Health Center (FQHC) with seven clinic locations in suburbs surrounding Portland, Oregon. It consisted of a cross-sectional retrospective review of data from a 2022 Uniform Data System report which revealed disparities in hemoglobin A1C (HbA1C) control between diabetic patients aged 18-29 and diabetic patients of all other age groups. The review elucidated clinic-specific factors contributing to these disparities and identified ways clinicians may optimize and improve HbA1C control for emerging adult diabetic patients.

Available Knowledge

Despite the increasing prevalence of DM in young adults and the well-documented adverse effects of poorly controlled DM during emerging adulthood, a review of the literature revealed a dearth of validated interventions to optimize glycemic control for this younger population. The majority of patients that were included in our retrospective review have Type 2 DM (DM2), which has been historically less prevalent than Type 1 DM (DM1) among youth and young adults (Dabelea et al., 2021). A strong evidence base is lacking for management of both DM1 and DM2 throughout emerging adulthood, but there is a particular scarcity of studies on DM2 in this age range, as reflected in a recent review which found that adults with early-onset DM2 (ages 18-39) are severely underrepresented in research (Sargeant et al., 2020). For this reason, most existing recommendations stem from research on DM1 in youth and young adults

and DM2 across the lifespan, and Pubmed was searched with purposeful inclusion of both DM1 and DM2. The initial search was isolated to meta-analyses and systematic reviews published in the last five years and included the following MeSH terms: “transition to adult care”, “young adult”, “glycated hemoglobin”, “blood glucose”, “self-management”, “blood glucose self-monitoring”, and “diabetes mellitus”. Available systematic reviews and meta-analyses were inconclusive due to the overall low quality and heterogeneity of studies (ElSayed et al., 2023; Hanna & Woodward, 2013; O’Hara et al., 2017). The literature search was thus broadened to include wider age ranges, observational studies, pilot studies, and single RCTs. Themes extrapolated from the search included demographic factors, mental health, continuity of care, and multidisciplinary management.

Demographic Factors

Much of the available data on the demographic factors associated with glycemic control in emerging adulthood stems from the SEARCH for Diabetes in Youth study (SEARCH), an ongoing multicenter, longitudinal surveillance study initiated in 2000 that seeks to characterize the epidemiology of DM1 and DM2 in youth, including incidence, prevalence, and disease patterns over time, and to evaluate for disease-specific complications and comorbidities (Hamman et al., 2014). Various studies pulling data from SEARCH reveal that young females have a greater incidence of DM2 than males, and that racial minorities, those experiencing food insecurity, those without health insurance, and those with low income levels have worse glycemic control over time (Dabelea et al., 2021; Malik et al., 2022; Perng et al., 2023; Pihoker et al., 2023). These demographic factors are reflected in the population of the FQHC in question, which provides care for uninsured and historically marginalized individuals. In addition to these demographic factors, several studies note that higher BMI is associated with poor glycemic

control in young adults, and that weight loss over time is shown to improve multiple DM-specific outcomes (Candler et al., 2018; Chang et al., 2020; Marcus et al., 2017).

Mental Health

SEARCH data, in addition to several meta-analyses, one cohort-based study, and one community-based study, note that comorbid diagnoses of depression and anxiety are prevalent among emerging adult and adult diabetics across the lifespan and that these mental health disorders are associated with poor glycemic control, decreased diabetes-specific quality of life, and diabetes treatment non-adherence (Gonzalez et al., 2008; Hessler et al., 2011; Hood et al., 2014; Lustman et al., 2000; Mansyur et al., 2023; Rodríguez-Ramírez et al., 2023; Smith et al., 2020). Standards of care from the American Diabetes Association and the International Society for Pediatric and Adolescent Diabetes both stress the importance for early screening and interprofessional management of mental health disorders in diabetic patients, as engagement with behavioral health services, including psychiatric care and support groups, has been shown to improve glycemic control (Ali et al., 2020; ElSayed et al., 2023; Gregory et al., 2022; Markowitz & Laffel, 2012).

Continuity of Care

Maintaining continuity of care throughout emerging adulthood has a notable impact on glycemic control. One analysis of SEARCH data on Type 1 diabetic youth found that the odds of poor glycemic control were 2.5 times higher for individuals who transitioned to a new provider versus those who maintained care with their pediatric provider longer term (Lotstein et al., 2013). Qualitative research suggests that emotional attachment to pediatric providers and the more formal environment of the adult care setting may contribute to this disparity (K. Garvey & Laffel, 2018). Gaps in care also harm the transition; survey-based studies found that DM1

patients with gaps in care greater than six months and those with fewer than three pediatric diabetes visits in the year before transition reported lower overall preparedness (K. C. Garvey et al., 2012, 2017). In recent years, telehealth has emerged as a promising tool to maintain continuity of care. A recent systematic review and meta-analysis found that telehealth interventions, including telephone calls, text messages, web-based portals, and virtual visits are effective in improving glycemic control among Black and Hispanic individuals in particular (Anderson et al., 2022). These findings are applicable among emerging adults as well – a 2018 prospective cohort study found that telemedicine approaches increased engagement with care among diabetic young adults and increased adherence to American Diabetes Association guidelines for this population (Reid et al., 2018).

Multidisciplinary Management

Multidisciplinary management of DM, with care delivery by occupational therapists (OT), clinical pharmacists, and registered dietitians (RD) has been shown to improve glycemic control. Pyatak et al. (2019) conducted an RCT evaluating the efficacy of a structured and individualized occupational therapy intervention on glycemic control among young adults with low socioeconomic status from ethnically diverse backgrounds. The authors found overall improvement in glycemic control and psychosocial wellbeing among the intervention group, with a mean reduction in HbA1C of 0.57% (Pyatak et al., 2019). Although the study had a relatively small sample size, it included participants that are historically understudied and underrepresented in research, similar to the patient population of this FQHC (Pyatak et al., 2019). Findings suggest that occupational therapy interventions may be useful for improving glycemic control among these populations in particular.

Pousinho et al. (2020) conducted a systematic review looking to characterize the impact of clinical pharmacy interventions in the management of DM2. They included 39 studies involving 5,474 total participants and found 0.5-2.1% reductions in HbA1C with the inclusion of clinical pharmacy care (Pousinho et al., 2020). They also found improvements in medication adherence and overall diabetes-specific quality of life, which points to expansive benefit from inclusion of clinical pharmacy in DM2 management.

A systematic review by Franz et al. (2017) evaluated the efficacy of medical nutrition therapy (MNT) in the treatment of DM2. They studied numerous factors related to DM2 health outcomes, including glycemia, cardiovascular disease risk factors, weight management, medication use, and overall quality of life (Franz et al., 2017). Among 18 studies, including 14 RCTs, they found HbA1C decreases of up to 2.0% at 3 months, up to 1.8% at 6 months, and up to 1.6% at 12 months of ongoing MNT support (Franz et al., 2017). HbA1C decreases were most significant among newly diagnosed patients and those with HbA1C readings >8%, which suggests that MNT is particularly useful at initial DM2 diagnosis and for those patients whose HbA1C is poorly controlled (Franz et al., 2017).

Rationale

This project investigated possible contributing factors to poor HbA1C control among diabetic patients aged 18-29 at an FQHC in suburban Oregon. Six Sigma methodology guided its planning and implementation. Six Sigma, initially developed by executives at Motorola in 1986, is a management strategy utilized to improve the quality and efficiency of processes. It has been adapted for use in healthcare in recent decades to help maintain patient-centeredness in care delivery, quantify results, and provide overall quality improvements (Schweikhart & Dembe, 2009). Six Sigma methodology, which consists of the concepts “Define, Measure, Analyze,

Improve, and Control,” was chosen to guide this project with the intent to improve the quality of care delivered to emerging adult diabetic patients at this FQHC, who were noted to have much worse HbA1C control overall than any other age group in the year 2022.

Specific Aims

- This project consisted of a cross-sectional retrospective review of data in Fall 2023 to identify clinic-specific factors impacting HbA1C control among emerging adult diabetic patients transitioning to adult care.
- Findings from this review were synthesized into a presentation for clinic leaders and care providers that detailed the data analysis and offered suggestions for interventions to improve HbA1C control in this age group. This better equipped clinicians to optimize care for these vulnerable patients, improve patients’ quality of life and health span, and decrease healthcare costs for the clinic.

Methods

Context

This project took place at a FQHC in suburbs surrounding Portland, Oregon. The clinic was originally founded in 1975 to serve migrant farmworkers, and has expanded over the years to serve approximately 52,000 patients annually at five primary care clinics and pharmacies, six dental clinics, a Women’s Clinic, and five school-based health centers. Its mission today is to provide high quality, holistic, culturally welcoming care to all patients, with a special emphasis on migrant and seasonal workers throughout Oregon who might otherwise have difficulty accessing health services. This mission informed the research and implementation of this project, with the overarching goal of providing equitable care across all patient demographics. The

project was completed by a DNP student, with guidance from the clinic's Director of Quality and statistical analysis support from the clinic Data Scientist.

Interventions & Study of the interventions

- The first two components of the Six Sigma methodology, “Define” and “Measure” were completed prior to the initiation of this project by the clinic data scientist and Director of Quality, who conducted an analysis of Uniform Data System reporting looking at diabetes-related outcomes in the year 2022. This analysis “defined” and “measured” the problem of statistically higher rates of poorly controlled HbA1C among patients aged 18-29. The latter components of Six Sigma were conducted throughout this project, first through a deeper “analysis” of potential root causes for disparities noted in the initial report. “Improvement” strategies were offered through a powerpoint presentation to clinic staff. These informed greater “control” over future process performance in patient care for this vulnerable population of emerging adults with DM.
- A retrospective review was conducted of patients w/diagnosis of DM aged 18-29 who received care at VG in 2022. The retrospective review searched for associations between poorly controlled DM (HbA1C > 9) and independent variables associated w/poor glycemic control that were identified via the literature review (see “Measures”).
- A presentation was created that synthesizes findings from the retrospective review and elucidated potential practice changes clinicians may make to improve HbA1C control among young adults with DM will be given to clinic staff and leadership in early 2024.

Measures

- The retrospective review included variables identified during the literature search that have been shown to impact glycemic control. These variables had an emphasis on glycemic control among emerging adults, but also encompassed best practices for glycemic control across the lifespan. Demographics such as patient race, sex, body mass index, language, health insurance status, food insecurity, and income level were assessed. Additional variables included comorbid depression and anxiety, engagement with behavioral, telehealth, occupational health, dieticians, and clinical pharmacists, and the presence of continuity of care drawn from total patient visits..
- Tentative outcome measure [pending final analysis results in 12/2023]: Rate of poorly controlled HbA1C among clinic patients aged 18-29 in 2022.
- Tentative process measure: Percentage of young adult patients with poorly controlled HbA1C who had greater than or equal to 3 (?) telehealth visits in 2022.
- Balancing measure:

Analysis

- Analysis is ongoing by VG data scientist and will be completed by 12/2023.
- Possible sources of bias: screening, management, and treatment of comorbid anxiety and depression has been identified as a significant factor impacting HbA1C control. This review will pull data regarding engagement with behavioral health services only within the clinic; it is possible that some patients may access behavioral health services elsewhere, which cannot be accounted for in this analysis.

Ethical considerations

- Data collected during the retrospective review were de-identified per HIPPA guidelines.
- IRB deemed not human subjects research.

Results

Tentative findings from ongoing data analysis revealed greater HbA1C control for individuals with >1 and <6 PCP visits in 2022. There was also greater HbA1C control among patients who had more telehealth visits overall. This points to a significant connection between continuity of care and improved DM outcomes for young adults. *Final analysis is pending.*

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Appendices

Appendix A

[Tentative] Project Timeline

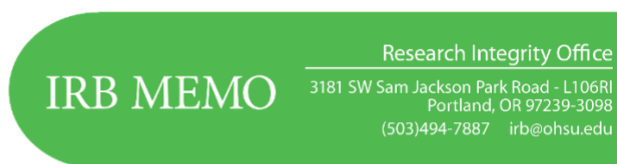
Spring 2023 – site placement determined, topic chosen, beginning of literature review
Summer 2023

- June-August: completion of literature review, finalization of project design
- September-December 2023: retrospective review of chart data

Winter 2024

- Synthesis & organization of findings into PPT presentation
- Presentation of findings given to clinic leaders & care providers

Appendix B



NOT HUMAN RESEARCH

September 13, 2023

Dear Investigator:

On 9/13/2023, the IRB reviewed the following submission:

Title of Study:	Young Adult HbA1C Optimization at a Suburban FQHC
Investigator:	Jonathan Soffer
IRB ID:	STUDY00026231
Funding:	None

The IRB determined that the proposed activity is not research involving human subjects. IRB review and approval is not required.

Certain changes to the research plan may affect this determination. Contact the IRB Office if your project changes and you have questions regarding the need for IRB oversight.

If this project involves the collection, use, or disclosure of Protected Health Information (PHI), you must comply with all applicable requirements under HIPAA. See the [HIPAA](#)