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ORIGINAL RESEARCH

Lessons Learned From a Patient-Centered, Team-Based Intervention for Patients With Type 2 Diabetes at High Cardiovascular Risk: Year 1 Results From the CINEMA Program

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BACKGROUND: The care for patients with type 2 diabetes necessitates a multidisciplinary team approach to reduce cardiovascular risk, but implementation of effective integrated strategies has been limited.

METHODS AND RESULTS: We conceptualized and initiated a patient-centered, team-based intervention called Center for Integrated and Novel Approaches in Vascular-Metabolic Disease (CINEMA) at University Hospitals Cleveland Medical Center. Patients with type 2 diabetes at high risk for cardiovascular events, including those with established atherosclerotic cardiovascular disease, elevated coronary artery calcium score >100, chronic heart failure with reduced ejection fraction, and/or chronic kidney disease stages 2 to 4 were included. Herein, we present the year 1 results for the program. From May 2020 through August 2021, there were 417 referrals. Among 206 eligible patients, 113 (55%) completed a baseline and ≥1 follow-up visit through December 2021, with mean (SD) time of 105 (34) days between baseline and first follow-up visits. Mean age was 59 years, with 49% women and 37% Black patients. Patients had significant reductions from baseline in glycosylated hemoglobin (–10.8%), total cholesterol (–7.9%), low-density lipoprotein cholesterol (–13.5%), systolic blood pressure (–4.0%), and body mass index (–2.7%) ($P \leq 0.001$ for all). In addition, among the 129 (63%) eligible patients not on sodium-glucose cotransporter 2 inhibitor or glucagon-like peptide-1 receptor agonist at baseline, 81% were prescribed evidence-based therapy with sodium-glucose cotransporter 2 inhibitor (n=66 [51%]) and/or glucagon-like peptide-1 receptor agonist (n=67 [52%]) to reduce the risk of cardiovascular disease in the initial 3-month follow-up period.

CONCLUSIONS: A team-based, patient-centered approach to high-risk disease management appears to be a promising paradigm for care delivery associated with greater use of evidence-based therapies and improved control of multiple cardiovascular risk factors.

Key Words: cardiometabolic clinic ■ cardiovascular disease ■ cardiovascular risk ■ type 2 diabetes

The care for patients with type 2 diabetes (T2D) necessitates a multidisciplinary team approach, requiring a high degree of engagement, education, and collaboration. The multiorgan involvement and complexities of treatment (including injectable medications) result in delayed, fragmented, and high-cost

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CLINICAL PERSPECTIVE

What Is New?

- The care for patients with type 2 diabetes necessitates a multidisciplinary team approach.
- We designed and implemented an integrated, patient-centered, team-based intervention for patients with type 2 diabetes at high risk for cardiovascular disease events, called Center for Integrated and Novel Approaches in Vascular-Metabolic Disease (CINEMA).
- In the first year, we found that the program was associated with improved use of evidence-based therapies (doubling of sodium-glucose cotransporter 2 inhibitor and glucagon-like peptide-1 receptor agonist prescription rates) and improved control of cardiovascular risk factors, including glycosylated hemoglobin, blood cholesterol, and body weight; and risk factor improvements generally continued with longer duration of program participation and were seen even among patients under the care of an endocrinologist.

What Are the Clinical Implications?

- Lessons learned will empower a greater number of cardiovascular specialists to address the implementation gap between the evidence and use for patients with type 2 diabetes at high risk for cardiovascular events in a centralized, specialized manner.
- The CINEMA program, and those like it, will continue to evolve and adapt to the changing landscape of medicine and society by leveraging new technology and refocusing on the value perceived by the patient, rather than by the physician.
- An integrated, team-based, patient-centered approach to high-risk disease management seems to be a promising paradigm for care delivery in the foreseeable future.

Nonstandard Abbreviations and Acronyms

CDCES	certified diabetes care and education specialist
GLP-1 RA	glucagon-like peptide-1 receptor agonist
SGLT2i	sodium-glucose cotransporter 2 inhibitor
T2D	type 2 diabetes

care delivery that necessitates an alternative model. Interventions, such as sodium-glucose cotransporter 2 inhibitor (SGLT2i) and glucagon-like peptide-1 receptor agonist (GLP-1 RA) therapy, may reduce not only cardiovascular events, but positively impact other organ systems as well, including the kidneys and adipose tissue. Thus, prompt identification of at-risk patients, with active administration of these evidenced-based therapies, may well signify an important singular step to reduce overall morbidity and mortality related to T2D.[1] However, widespread embracement of cardiometabolic interventions has been elusive for cardiologists given barriers, such as a lack of prior experience in T2D care, paucity of ancillary support (eg, certified diabetes care and education specialists [CDCESs]), a need for repeated provider-patient touchpoints to ensure adherence, high cost of the medications, and a frequent requirement for insurance preauthorization. By some estimates, only a small minority (<5%) of cardiologists report that they are comfortable prescribing these agents.[2] Although the greatest opportunity for widespread use remains with primary care providers, given that the number of cardiology outpatient encounters for patients with T2D outnumber those with endocrinology by a ratio of up to 4:1,[3] there is a cogent argument for cardiovascular specialists to implement these therapies.

To address these implementation opportunities, we conceptualized and initiated an integrated, patient-centered, team-based intervention for patients with T2D at high risk for cardiovascular disease events entitled the Center for Integrated and Novel Approaches in Vascular-Metabolic Disease (CINEMA) in the Harrington Heart and Vascular Institute at University Hospitals Cleveland Medical Center. On the basis of recommendations from the 2018 American College of Cardiology (ACC) Expert Consensus Decision Pathway on Novel Therapies for Cardiovascular Risk Reduction in Patients with Type 2 Diabetes and Atherosclerotic Cardiovascular Disease,[4] we aimed to improve cardiovascular risk factors and increase use of evidence-based therapies to eliminate defects in T2D care[5] in this high-risk patient population. Herein, we present the year 1 results for the CINEMA program and discuss its successes, limitations, and opportunities for improvement, as well as how our care model may be translated to other health systems.

METHODS

Transparency and openness promotion statement: The data that support the findings of this study are available from the corresponding author on reasonable request.

Programmatic Structure

The CINEMA program is housed at University Hospitals, a large health care network in Northeast Ohio, comprising 11 hospitals and 18 regional medical centers and an accountable care organization with

>500 000 lives with the intent of impacting the care of T2D with complex cardiovascular and renal disease. The CINEMA team consists of a program administrator; 5 cardiologists with a special interest focus on T2D, prevention, cardiovascular imaging, and vascular medicine; a nurse coordinator; a CDCES who is also a registered dietitian nutritionist to target diet and lifestyle and provide medical nutrition therapy; and a dedicated pharmacist to educate and manage pharmacologic therapies. The CINEMA team also partners with endocrinology and nephrology providers, but these providers are not routinely included in CINEMA care visits.

Patient Selection

Initial inclusion criteria for the CINEMA program consisted of patients with T2D (defined by self-report or physician report, prevalent medical care for T2D, and/or glycosylated hemoglobin [HbA1c] ≥6.5%) and, as defined by the 2021 American Diabetes Assocation (ADA) Professional Practice Committee pathway,[6] those with established risk or at high risk for atherosclerotic cardiovascular disease (ASCVD), chronic kidney disease, and/or chronic heart failure with reduced ejection fraction. These indicators of risk were used for patient selection and inclusion because ASCVD risk assessment using the pooled cohort equations is not routinely performed in this population with T2D and prevalent ASCVD. Because of high demand and patient interest, we broadened our criteria to also include patients with prediabetes (defined as HbA1c ≥5.7% but <6.5%), but these patients are not included in the present analysis. Patients with diagnosed type 1 diabetes or HbA1c <5.7% without an existing T2D diagnosis were excluded from the CINEMA program. The CINEMA registry was approved by the University Hospitals Cleveland Medical Center Institutional Review Board, and all participants in the registry provided written informed consent.

Visit Schedule

The CINEMA program is structured around 2 to 3 primary visits with additional follow-up as needed. Unlike the traditional model of care, where the patient travels to different providers in several locations over multiple time points to receive a comprehensive evaluation, CINEMA is unique in that the care team comes to the patient via an in-person or virtual platform in a single initial visit, and attempts to address all aspects of cardiovascular and T2D care. This integrated, team-based approach hybridizes expertise that has been traditionally siloed, by creating a single access point in space and time to engage the patient in his/her own environment (during virtual visits).

All patients undergo standardized assessment of body weight, height, and laboratory testing, including chemistries, lipids, and HbA1c using standard assays. Weight, height, and blood pressure are measured using standard clinic equipment, and body mass
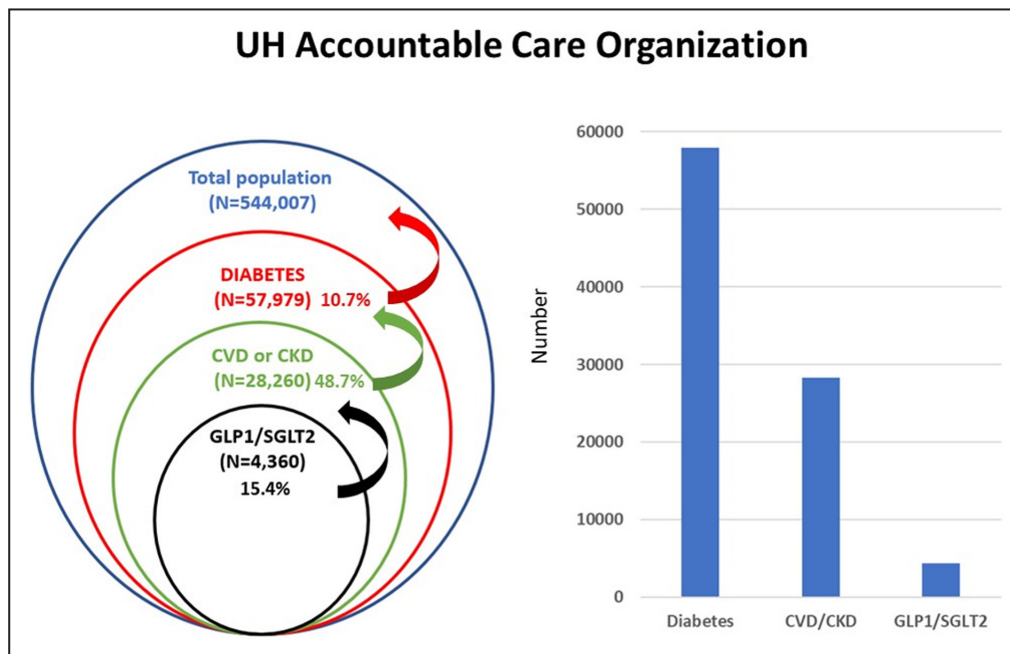

Figure 1. Number and proportion of patients in the University Hospitals (UH) Accountable Care Organization with diagnosed diabetes and cardiovascular disease (CVD) or chronic kidney disease (CKD) who are prescribed sodium-glucose cotransporter 2 (SGLT2) inhibitor or glucagon-like peptide-1 (GLP-1) receptor agonist.

index is calculated. Laboratory studies are performed for the initial visit and for each subsequent follow-up visit. Baseline laboratory studies are defined as those completed within 1 month before or during the initial visit. Follow-up laboratory studies are defined as those completed at the follow-up visit or up to 1 month after the follow-up visit. If laboratory tests are already available within this time frame, they are not repeated. Duplication of testing is minimized because all orders reside in a single electronic health record system and duplicate orders are not performed. Providers seek to determine the patient's overall risk for future cardiovascular events and formulate an optimal evidence-based T2D lifestyle and pharmacologic strategy (SGLT2i or GLP-1 RA) for reducing cardiovascular (including heart failure) and renal events by weighing several patient-specific factors. The team then works with the patient's insurance, pharmacy, and assistance programs to obtain the medication in the most affordable way. Subsequently, the nurse navigator and CDCES provide continued support, coordination of care, education, including weekly "podcast"-type educational sessions with video broadcast over a virtual meeting platform and peer-led support groups, and additional resources between physician visits. Serious adverse events leading to hospitalization related to the clinical interventions in the program are surveyed. Patients return ≈3 months later with repeated clinical and laboratory testing to discuss the patient's progress, review interval medical events, and discuss laboratory results. The patient maintains contact every 3 to 6 months with the nurse coordinator, CDCES, and physician (if required) using a combination of telephone and/or a virtual video telehealth platform to ensure continued support, engagement, and metabolic recovery. Patients continue their routine follow-up with primary care and specialty physicians, and CINEMA physicians and support staff partner closely with primary care providers to ensure continuity of care to prevent fragmentation and overcome barriers to communication.

Health System Awareness

To develop and disseminate awareness across the health system, we systematized a referral method using a combination of electronic health record referral order sets for both outpatient and inpatient referrals along with dedicated telephone and e-mail contact information. We conducted team meetings with key referral sources, including both leadership and individual provider practices in primary care (internal and family medicine), cardiology (general and advanced heart failure), endocrinology, bariatric surgery, nephrology, and organ transplant. We conducted a series of webinars available to practitioners and the lay public to emphasize the relationship between T2D, cardiovascular disease, and kidney disease. Last, to focus on our employee population, we partnered with our health system leadership to offer "health points" to eligible employees who enroll in the program through which they can earn incentives by engaging in healthy behaviors.

Statistical Analysis

Prevalence rates in the University Hospitals Accountable Care Organization for relevant comorbidities and prescription rates for SGLT2i and GLP-1 RA were assessed. Descriptive statistics for the CINEMA patient population were calculated and reported. For analyses of clinical and laboratory cardiovascular risk factors, patients were analyzed with paired (initial to follow-up) testing using paired t test. Subgroup analyses were performed to assess changes in clinical and laboratory risk factors in patients: (1) with ≥2 CINEMA visits to evaluate risk factor changes with longer-duration program participation, (2) stratified by referral source (provider referred versus self-referred), (3) stratified by prior endocrinology care or no prior endocrinology care, and (4) not previously taking an SGLT2i or GLP-1 RA. We compared the differences between median changes in the above-mentioned subgroups using Mann-Whitney U test as the change in metabolic factors was not normally distributed, especially in the smaller subgroups. For all tests, $P<0.05$ was considered statistically significant. Statistical Package for Social Studies version 27 was used for analysis.

RESULTS

As of May 2020, there were 544 007 patients in the University Hospitals Health System Accountable Care Organization, among whom 57 979 (10.7%) had diabetes. Of those, 48.7% had either prevalent cardiovascular disease or chronic kidney disease, with only 15.4% currently prescribed an SGLT2i or GLP-1 RA (Figure 1). From May 2020 through August 2021, there were 417 referrals to the CINEMA program (Figure 2). Most referrals (53%) came internally from other cardiology providers. Other referral sources included internal/family medicine practitioners (26%), bariatric surgeons (6%), and "other," including self-referrals (12%); few referrals came from other sources, such as endocrinology and nephrology (Figure 3). Of those referred, 206 (49%) met initial inclusion criteria. A total of 113 (55%) completed a baseline and ≥1 follow-up visit through December 20, 2021, with mean (SD) time of 105 (34) days between the baseline and first follow-up visit. Mean age was 59 years, with 49% women and 37% Black patients (Table 1). There were no significant differences in baseline demographic and medical characteristics between patients with a follow-up CINEMA visit and those without follow-up (Table 1).
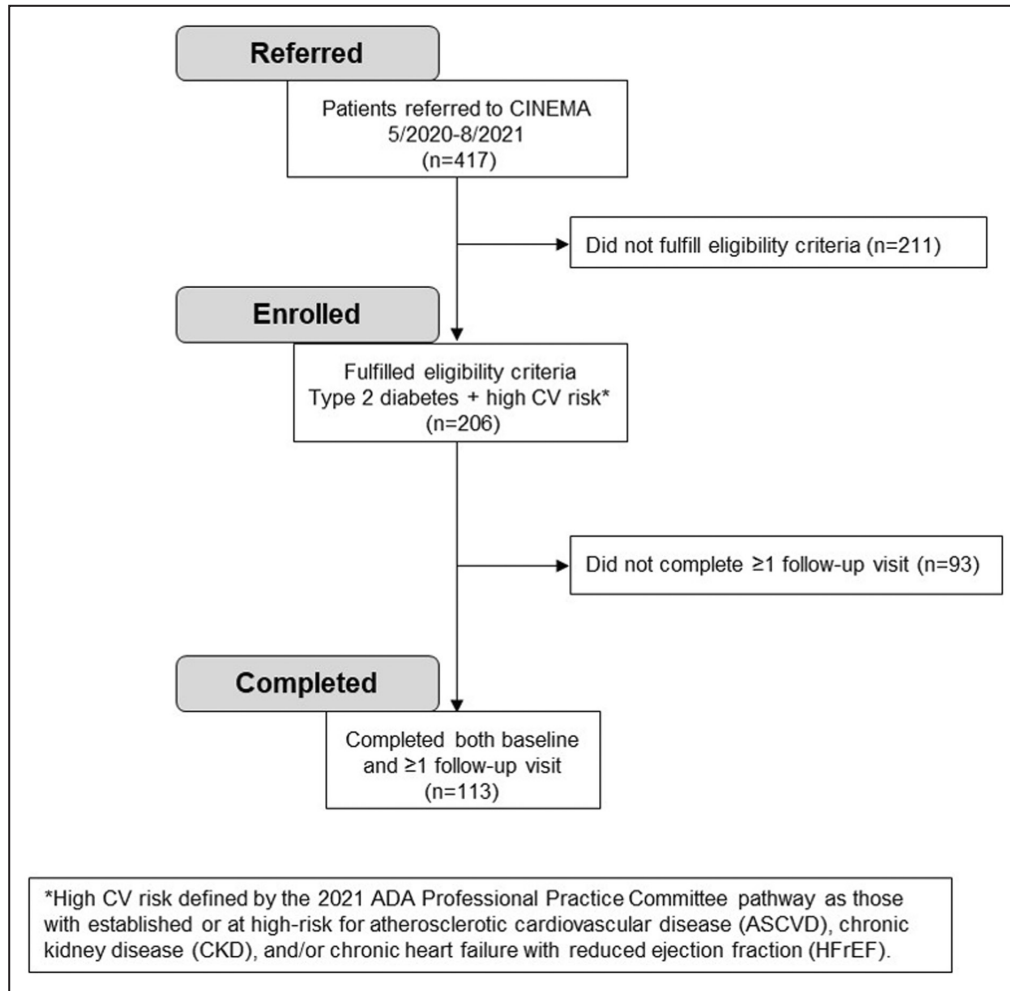
Figure 2. Patient flow diagram for Center for Integrated and Novel Approaches in Vascular-Metabolic Disease (CINEMA) year 1.
ADA indicates American Diabetes Association; CV, cardiovascular.

Results for key cardiometabolic risk factors among these patients are shown in Table 2. CINEMA patients had significant reductions from baseline in HbA1c (–10.8%), total cholesterol (–7.9%), low-density lipoprotein cholesterol (–13.5%), systolic blood pressure (–4.0%), and body mass index (–2.7%) ($P \leq 0.001$ for all). Results were generally similar for patients with ≥2 follow-up visits in CINEMA (Table 3). There were no significant differences in cardiometabolic risk factor improvements between patients who were referred by their providers compared with self-referred patients, although risk factor levels were generally better controlled at baseline in self-referred patients (Table 4). Similarly, cardiometabolic risk factors improved even among patients under the existing care of an endocrinologist, as there were no significant differences in risk factor improvements between those with an endocrinologist compared with those without an endocrinologist, except that patients without endocrinology care had more low-density lipoprotein cholesterol lowering in the first 3 months of the

CINEMA program compared with patients with an endocrinologist (–14 versus 2.5 mg/dL; Table 5), despite similar baseline low-density lipoprotein cholesterol.

Among all eligible CINEMA patients, rates of SGLT2i and GLP-1 RA prescriptions approximately doubled between the baseline and first follow-up visits (Figure 4). Among the 129 (63%) eligible patients not on SGLT2i or GLP-1 RA at baseline, 81% were prescribed evidenced-based therapy with SGLT2i (n=66 [51%]) and/or GLP-1 RA (n=67 [52%]) to reduce the risk of cardiovascular disease in the initial 3-month follow-up period. Improvements in key cardiometabolic risk factors were similar in SGLT2i/GLP-1 RA–naïve patients compared with the overall patient cohort (Table 6). Reasons for not initiating an SGLT2i or GLP-1 RA included a current prescription at the time of enrollment, contraindication to the medication, and inability to obtain the medication because of insurance/expense. There were no serious adverse events leading to hospitalization related to the clinical interventions in the program.
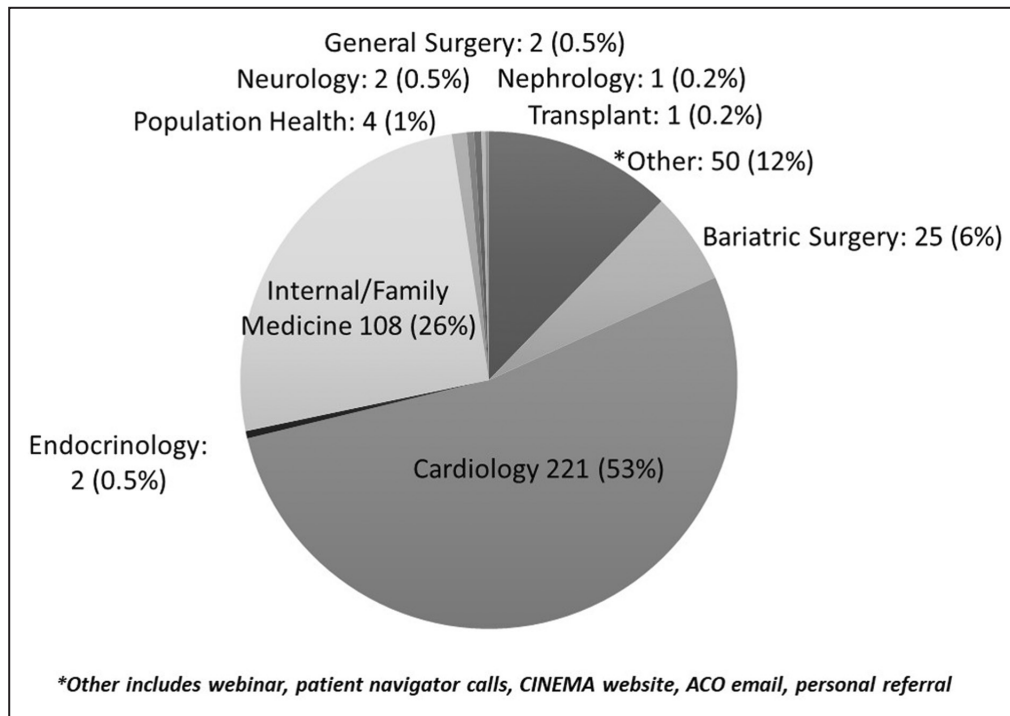
Figure 3. Referral sources to the Center for Integrated and Novel Approaches in Vascular-Metabolic Disease (CINEMA) program, May 2020 to August 2021.

Most referrals (53%) came internally from other cardiology providers. Other referral sources included internal/family medicine practitioners (26%), bariatric surgeons (6%), and "other," including self-referrals (12%); few referrals came from other sources, such as endocrinology and nephrology. ACO indicates accountable care organization.

DISCUSSION

Herein, we report on our experience in year 1 of a multifaceted intervention for patients with T2D and high risk for cardiovascular disease that involved an interdisciplinary care team. We found that the CINEMA program was associated with improved use of evidence-based therapies with rates of SGLT2i and GLP-1 RA prescriptions approximately doubling between the baseline and first follow-up visits. Participation in the program was associated with improved control of multiple cardiovascular risk factors, including HbA1c, blood cholesterol, and body weight. Cardiometabolic risk factor improvements generally continued with longer duration of program participation and were seen even among patients under the care of an endocrinologist. Findings were also similar in SGLT2i/GLP-1 RA–naïve patients compared with the overall patient cohort. Although we hypothesized that self-referred patients would be more adherent to lifestyle and medication recommendations, because of greater motivation for program participation, we did not observe any differences in trends of risk factor improvements between self-referred and provider-referred patients, although risk factor levels were generally better controlled at baseline in self-referred patients.

The cardiometabolic care team model concept for aggressive secondary cardiovascular risk reduction in patients with T2D and ASCVD has been gaining recognition in recent years. However, implementation of the care model in clinical practice has been sparse. The Cardiometabolic Center Alliance was formed in 2020 with the goal to deliver a patient-centered, collaborative model of care for high-risk patients.[7] Our institution, University Hospitals Cleveland Medical Center, joined as a key strategic partner and charter member in 2020. Initial reports from the founding Cardiometabolic Center Alliance site, St. Luke's Mid-America Heart Institute, demonstrated that the use of guideline-directed medical therapies for eligible patients (N=129) was improved using the cardiometabolic clinic model compared with usual care, including higher rates of SGLT2i and/or GLP-1 RA use.[8] The findings herein (N=206) demonstrate that our experience has been similar, with early results showing significantly greater improvement in cardiovascular risk markers and higher rates of guideline-directed medical therapy for patients with T2D and ASCVD. As the Cardiometabolic Center Alliance continues to develop and other institutions join to harmonize clinical processes and evaluate aggregated data from a larger and more geographically diverse number of patients, additional results will

Table 1. Demographic and Medical Characteristics of CINEMA Patients at Baseline, Overall and Stratified by Follow-Up Status

Characteristic	All (n=206)	Follow-up (n=113)	No follow-up (n=93)	P value
Age, y	58.7±11.8	59.5±11.2	57.8±12.6	0.30
Women	101 (49)	53 (47)	48 (52)	0.50
Race				0.08
White	111 (54)	69 (61)	42 (45)	
Black	77 (37)	38 (34)	39 (42)	
Other (not self-identifying as white or black)	7 (3)	2 (2)	5 (5)	
Unknown	11 (5)	4 (4)	7 (8)	
Myocardial infarction	45 (22)	23 (20)	22 (24)	0.57
Dyslipidemia	187 (91)	103 (91)	84 (90)	0.84
Hypertension	189 (92)	103 (91)	86 (93)	0.73
Coronary artery disease	133 (65)	71 (63)	62 (67)	0.57
Heart failure	86 (42)	44 (39)	42 (45)	0.37
Prior endocrinology visit	88 (43)	50 (44)	38 (41)	0.63
Medications				
DPP4 inhibitors	15 (7)	7 (6)	8 (9)	0.51
GLP-1 RA	38 (18)	18 (16)	20 (22)	0.30
Insulin	89 (43)	46 (41)	43 (46)	0.43
Metformin	41 (20)	19 (17)	22 (24)	0.22
SGLT2i	48 (23)	24 (21)	24 (26)	0.44
Sulfonylurea	19 (9)	9 (8)	10 (11)	0.49
Statin	70 (34)	35 (31)	35 (38)	0.32
ACE inhibitor	37 (18)	18 (16)	19 (20)	0.40
ARB	41 (20)	22 (20)	19 (20)	0.86
Weight, lbs	230.3±63.6	227.5±57	231.3±72.7	0.68
Body mass index, kg/m^2	37.5±9.5	36.9±8.1	37.7±10.6	0.55
Systolic blood pressure, mmHg	133.8±22.2	132.9±21.5	134±22.6	0.71
Diastolic blood pressure, mmHg	77.0±11.7	77.9±11.1	76.4±12.8	0.36
HbA1c, %	8.3±2.0	8.4±2	8.3±2.2	0.88
Total cholesterol, mg/dL	159.2±44.4	162.3±47	162.2±50.4	0.99
HDL cholesterol, mg/dL	42.9±12.0	43.3±12.5	40.8±9.7	0.12
LDL cholesterol, mg/dL	86.8±36.7	85.6±35.8	89.8±42.8	0.47
Triglycerides, mg/dL	156.7±96.3	173.4±140	159.1±90.6	0.41

Data represent mean±SD or number (proportion), as appropriate. ACE indicates angiotensin-converting enzyme; ARB, angiotensin receptor blocker; CINEMA, Center for Integrated and Novel Approaches in Vascular-Metabolic Disease; DPP4, dipeptidyl peptidase-4; GLP-1 RA, glucagon-like peptide-1 receptor agonist; HbA1c, glycosylated hemoglobin; HDL, high-density lipoprotein; LDL, low-density lipoprotein; and SGLT2, sodium-glucose cotransporter 2.

become available to help prove the (both clinical and economical) value of this model.

We have learned several lessons while designing and implementing this program that can hopefully serve to educate others who plan to embark on similar programs in the future. These can be categorized into patient factors, provider factors, and environment/system factors. From a patient standpoint, individual engagement and participation may be of paramount importance in a focused, short-term program, such as CINEMA. Unlike long-term disease management, where the patient-provider relationship develops over time along with the level of engagement, the success of this type of program is predicated on immediate engagement. Indeed, we observed significant improvements in cardiometabolic risk factors in the first 90 days following the baseline visit. Near-continuous communication between patient and the nurse coordinator was another aspect that may have helped to maintain patient involvement and improve motivation, adherence, and progress.[9] Anecdotally, patients tended to describe feeling more supported with

Table 2. Results for Key Cardiometabolic Risk Factors Among All Eligible Patients Participating in the CINEMA Program Year 1

Risk factor	Baseline, mean±SD	First follow-up visit, mean±SD (n=113)	% Change in risk factor	P value*	Last follow-up visit, mean±SD (n=113)	P value*
Weight, lbs (n=174)	230.3±63.6	218.7±63.2	−5.0	0.011	216.5±59.6	0.002
Body mass index, kg/m^2 (n=172)	37.5±9.5	36.5±9.3	−2.7	<0.001	35.7±8.8	<0.001
Systolic blood pressure, mm Hg (n=172)	133.8±22.2	128.5±19.2	−4.0	0.001	130.7±20.5	0.09
Diastolic blood pressure, mm Hg (n=172)	77.0±11.7	77.7±10.9	0.9	0.43	74.5±10.7	0.015
HbA1c, % (n=171)	8.3±2.0	7.4±1.5	−10.8	<0.001	7.4±1.6	<0.001
Total cholesterol, mg/dL (n=121)	159.2±44.4	146.7±41.8	−7.9	0.001	145.4±38.6	<0.001
LDL cholesterol, mg/dL (n=119)	86.8±36.7	75.1±35.8	−13.5	0.001	73.6±34.0	<0.001
HDL cholesterol, mg/dL (n=118)	42.9±12.0	42.3±10.4	−1.4	0.47	42.7±10.7	0.85
Triglycerides, mg/dL (n=120)	156.7±96.3	148.8±87.7	−5.0	0.23	155.9±106.8	0.92

Data represent mean±SD and percentage change between baseline and follow-up CINEMA visits. Last follow-up visit column indicates the most recent follow-up visit data through December 20, 2021, including both individuals with multiple follow-up visits and individuals with only a single follow-up visit. CINEMA indicates Center for Integrated and Novel Approaches in Vascular-Metabolic Disease; HbA1c, glycosylated hemoglobin; HDL, high-density lipoprotein; and LDL, low-density lipoprotein.

*Paired *t* test compared with baseline values.

weekly updates/contact touchpoints with the nurse coordinator to discuss progress and setbacks in real time, rather than the traditional practice of waiting for the patient to initiate contact if something is amiss (ie, the "call if you have any concerns" method). Provider-related factors also created challenges to successful implementation of the program. Perhaps the most difficult challenge was to obtain "buy-in" from other stakeholders in the cardiometabolic field. These included specialist providers, such as endocrinologists, nephrologists, and CDCESs, and business practice managers. These barriers were overcome through periodic operational meetings open to all stakeholders and creation of an Internal Advisory Board with multidisciplinary constituents to ensure harmonization of

protocols and discussion of management approaches. Investment from varied clinician "champions" has also been identified as a key element for successful implementation of the cardiometabolic care team model by other groups.[8] Finally, environmental factors influenced programmatic success and created challenges to implementation. The COVID-19 pandemic began almost simultaneously with the launching of the CINEMA program; this certainly created an initial barrier to referrals, but more widespread use of telehealth services made it more acceptable and familiar to patients, which increased engagement.

A major concern from the primary care perspective is that the specialist-driven cardiometabolic clinic care model may devalue or otherwise further fragment the

Table 3. Results for Key Cardiometabolic Risk Factors Among Eligible Patients Participating in the CINEMA Program Year 1 With ≥2 CINEMA Visits

Risk factor	Baseline, mean±SD	First follow-up visit, mean±SD (n=103)	% Change in risk factor	P value*	Last follow-up visit, mean±SD (n=103)	P value*
Weight, lbs (n=103)	228.3±56.5	222.8±57.9	−2.4	0.26	213.1±53.8	0.008
Body mass index, kg/m^2 (n=103)	37.2±8.1	36.0±8.1	−3.2	<0.001	35.1±7.5	<0.001
Systolic blood pressure, mm Hg (n=101)	132.9±21.9	128.6±19.0	−3.2	0.048	132.0±20.3	0.72
Diastolic blood pressure, mm Hg (n=101)	77.8±11.4	77.2±9.4	−0.7	0.66	75.4±10.9	0.09
HbA1c, % (n=99)	8.3±2.0	7.4±1.5	−10.8	<0.001	7.3±1.6	<0.001
Total cholesterol, mg/dL (n=88)	158.0±43.5	144.0±42.2	−8.9	0.002	142.0±36.7	<0.001
LDL cholesterol, mg/dL (n=87)	85.4±35.9	71.5±35.0	−16.3	<0.001	69.3±31.8	<0.001
HDL cholesterol, mg/dL (n=88)	43.9±12.8	42.8±10.9	−2.5	0.25	43.1±11.7	0.42
Triglycerides, mg/dL (n=89)	155.9±100.4	150.6±93.7	−3.4	0.50	152.6±99.9	0.67

Data represent mean±SD and percentage change between baseline and follow-up CINEMA visits. Last follow-up visit column indicates the most recent follow-up visit data through December 20, 2021, including individuals with multiple follow-up visits. CINEMA indicates Center for Integrated and Novel Approaches in Vascular-Metabolic Disease; HbA1c, glycosylated hemoglobin; HDL, high-density lipoprotein; and LDL, low-density lipoprotein.

*Paired *t* test compared with baseline values.

Table 4.   Results for Key Cardiometabolic Risk Factors Among Eligible Patients Participating in the CINEMA Program, Stratified by Referral Source

Risk factor	Referred by providers					Self-referred					P value†
	No.	Baseline, mean±SD	First follow-up visit, mean±SD	% Change in risk factor	P value*	No.	Baseline, mean±SD	First follow-up visit, mean±SD	% Change in risk factor	P value*	
Weight, lbs	131	227.6±65.8	218.9±66.7	−3.8	0.01	43	238.7±56.1	218.3±51.6	−8.5	0.02	0.85
Body mass index, kg/m^2	130	37.6±9.7	36.8±9.4	−2.1	0.001	42	36.9±8.8	35.6±8.7	−3.5	<0.001	0.27
Systolic blood pressure, mmHg	130	134.1±23.2	128.0±19.1	−4.5	0.002	42	133.2±19.1	130.0±19.6	−2.4	0.24	0.36
Diastolic blood pressure, mmHg	129	76.7±12.6	77.6±11.3	1.1	0.41	34	77.8±8.3	77.9±9.9	0.1	0.93	0.58
HbA1c, %	118	8.4±2.1	7.5±1.6	−10.7	<0.001	34	7.9±1.7	6.8±0.8	−13.9	0.001	0.80
Total cholesterol, mg/dL	91	162.3±47.5	149.9±44.8	−7.6	0.006	30	149.5±32.0	137.1±29.4	−8.3	0.09	0.54
LDL cholesterol, mg/dL	90	88.8±39.4	77.1±38.6	−13.2	0.004	29	80.6±26.2	68.8±24.8	−14.6	0.06	0.69
HDL cholesterol, mg/dL	88	43.2±12.5	42.2±11.0	−2.3	0.31	30	41.8±10.4	42.5±8.7	1.7	0.51	0.15
Triglycerides, mg/dL	90	158.3±92.1	151.5±81.7	−4.3	0.37	30	151.9±109.6	140.9±105.0	−7.2	0.40	0.30

Data represent mean±SD and percentage change between baseline and follow-up CINEMA visits. CINEMA indicates Center for Integrated and Novel Approaches in Vascular-Metabolic Disease; HbA1c, glycosylated hemoglobin; HDL, high-density lipoprotein; and LDL, low-density lipoprotein.

*Paired *t* test between pre-CINEMA and post-CINEMA values.

†Mann-Whitney *U* test comparing median change in values between the conditions (provider referred vs self-referred).

role of primary care providers in managing comorbid T2D and ASCVD. Concerns include the following: (1) fragmentation of care and other health conditions going unaddressed, as patients may not have capacity to see multiple clinicians at the same time; (2) high costs of care[10]; and (3) worsening health disparities,[11] because patients with financial and socioeconomic barriers to care will have more difficulties accessing these specialized pathways. We acknowledge these valid concerns. To address them, our clinicians work closely with primary care colleagues and seek to directly address the fragmentation of care and multiple health conditions by working as a partnership. It is in the context of this partnership that all clinicians, as a team, jointly care for the patient. Indeed, recent evidence points toward aggressive secondary prevention of ASCVD as being a cost-effective intervention to prevent and control diabetes.[12] A key element of this secondary prevention, increasing use of SGLT2i for intensification of T2D care, appears to be both efficacious and cost-effective.[13] As our experience demonstrates, rates of SGLT2i and/or GLP-1 RA use in patients with T2D and ASCVD continue to be relatively low, despite routine primary and endocrinology specialist care, demonstrating an unmet need for aggressive secondary prevention, which cardiometabolic specialty programs can provide. As our

results demonstrate, cardiovascular risk factor levels can be further improved using our cardiometabolic clinic model. Although the cost-effectiveness of our approach cannot be evaluated at this early stage, we hope to provide cost-effectiveness data in future reports with increased program size and duration.

We recognize that this initial report has limitations. First, we used an observational study design so we cannot confirm a causal relationship between the CINEMA intervention and improved outcomes. Second, we implemented the intervention in a single academic health system and, as such, our results may not be generalizable to other health settings. Further research into similar programs across diverse geographic areas is warranted. Third, our follow-up duration was relatively short (≈3 months) and, therefore, we are unable to comment on associations with event-related outcomes, such as myocardial infarction, stroke, or cardiovascular death, in these patients. Fourth, we did not systematically assess or survey other providers to obtain their feedback about the program goals and outcomes. We plan to implement a more systematic implementation science approach to obtaining patient and provider feedback going forward, such as CINEMA Studio, a patient-led advisory group aimed at iterative program quality improvement. Fifth, we did not initially use the

Table 5. Results for Key Cardiometabolic Risk Factors Among Eligible Patients Participating in the CINEMA Program, Stratified by Prior Endocrinology Care

Risk factor	Prior endocrinology care					No prior endocrinology care					P value†
	No.	Baseline, mean±SD	First follow-up visit, mean±SD	% Change in risk factor	P value*	No.	Baseline, mean±SD	First follow-up visit, mean±SD	% Change in risk factor	P value*	
Weight, lbs	80	241.2±68.2	225.2±67.7	−6.6	0.03	94	221.0±58.2	213.2±58.9	−3.5	0.17	0.36
Body mass index, kg/m²	79	39.5±10.1	38.8±9.9	−1.8	0.04	93	35.7±8.6	34.6±8.3	−3.1	<0.001	0.32
Systolic blood pressure, mmHg	81	134.0±22.4	129.1±21.0	−3.6	0.03	91	133.7±22.1	127.9±17.6	−4.3	0.02	0.63
Diastolic blood pressure, mmHg	81	78.1±11.4	79.5±11.7	1.8	0.24	90	76.0±11.9	76.1±10.0	0.1	0.96	0.36
HbA1c, %	74	8.9±2.1	7.8±1.6	−12.4	<0.001	78	7.7±1.8	7.0±1.2	−9.1	<0.001	0.14
Total cholesterol, mg/dL	57	163.9±43.1	156.2±44.2	−4.7	0.17	64	154.9±45.4	138.3±37.9	−10.4	0.002	0.26
LDL cholesterol, mg/dL	54	88.5±36.5	84.6±40.5	−4.4	0.44	65	85.3±37.1	67.2±29.4	−21.2	<0.001	0.04
HDL cholesterol, mg/dL	56	43.6±12.0	41.7±10.7	−4.4	0.07	62	42.2±12.0	42.9±10.3	4.0	0.57	0.16
Triglycerides, mg/dL	58	169.8±111.7	158.6±93.7	−6.6	0.32	62	144.4±78.2	139.7±81.4	−3.3	0.49	0.78

Data represent mean±SD and percentage change between baseline and follow-up CINEMA visits. CINEMA indicates Center for Integrated and Novel Approaches in Vascular-Metabolic Disease; HbA1c, glycosylated hemoglobin; HDL, high-density lipoprotein; and LDL, low-density lipoprotein.

*Paired *t* test between pre-CINEMA and post-CINEMA values.

†Mann-Whitney *U* test comparing median change in values between the conditions (endocrinology vs no endocrinology).
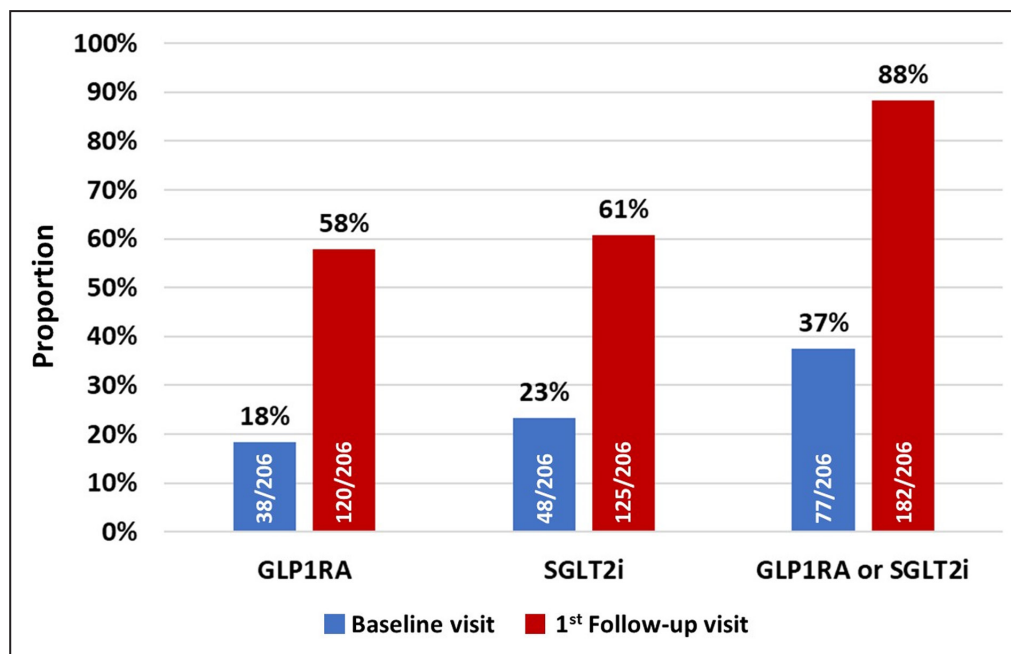

Figure 4. Referral sources to the Center for Integrated and Novel Approaches in Vascular-Metabolic Disease (CINEMA) program, May 2020 to August 2021.
Among all eligible CINEMA patients, rates of sodium-glucose cotransporter 2 inhibitor (SGLT2i) and glucagon-like peptide-1 receptor agonist (GLP-1 RA) prescriptions approximately doubled between baseline (blue) and the first follow-up (red) visits.

Table 6.   Results for Key Cardiometabolic Risk Factors Among SGLT2i/GLP-1 RA–Naïve Patients Participating in the CINEMA Program Year 1

Risk factor	Baseline, mean±SD	First follow-up visit, mean±SD (N=109)	% Change in risk factor	P value*	Last follow-up visit, mean±SD (N=109)	P value*
Weight, lbs (n=109)	228.9±62.5	217.1±64.7	−5.2	0.04	216.5±59.9	0.02
Body mass index, kg/m² (n=108)	37.2±9.0	36.1±8.7	−3.0	<0.001	35.3±8.4	<0.001
Systolic blood pressure, mm Hg (n=106)	135.1±21.4	130.3±19.7	−3.6	0.03	132.5±20.1	0.27
Diastolic blood pressure, mm Hg (n=106)	77.0±12.0	77.8±11.4	1.0	0.52	74.1±10.9	0.02
HbA1c, % (n=96)	8.2±2.0	7.4±1.6	−9.8	<0.001	7.4±1.7	<0.001
Total cholesterol, mg/dL (n=76)	167.7±45.2	150.4±43.2	−10.3	<0.001	149.3±39.6	<0.001
LDL cholesterol, mg/dL (n=75)	93.5±37.3	77.4±37.0	−17.2	<0.001	76.6±34.0	<0.001
HDL cholesterol, mg/dL (n=74)	44.9±13.1	43.0±11.0	−4.2	0.05	43.3±11.3	0.10
Triglycerides, mg/dL (n=76)	161.0±102.0	154.0±96.2	−4.3	0.39	163.1±120.5	0.86

Data represent mean±SD and percentage change between baseline and follow-up CINEMA visits. Last follow-up visit column indicates the most recent follow-up visit data through December 20, 2021, including both individuals with multiple follow-up visits and individuals with only a single follow-up visit. CINEMA indicates Center for Integrated and Novel Approaches in Vascular-Metabolic Disease; GLP-1 RA, glucagon-like peptide-1 receptor agonist; HbA1c, glycosylated hemoglobin; HDL, high-density lipoprotein; LDL, low-density lipoprotein; and SGLT2i, sodium-glucose cotransporter 2 inhibitor.

*Paired t test compared with baseline values.

pooled cohort equations ASCVD score for patient selection into the program but may plan to incorporate this in the future. Finally, because these data represent the initial experience of the program, we are unable to provide a full implementation evaluation of the program using rigorous assessment tools. These methods will certainly be added in subsequent evaluations of the program.

We hope these lessons learned will empower a greater number of cardiovascular specialists to address the implementation gap between the evidence and use for patients with T2D at high risk for cardiovascular events in a centralized, specialized manner. The CINEMA program, and those like it, will continue to evolve and adapt to the changing landscape of medicine and society by leveraging new technology and refocusing on the value perceived by the patient, rather than by the physician. An integrated, team-based, patient-centered approach to high-risk disease management seems to be a promising paradigm for care delivery in the foreseeable future.

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