

# Team Clinic: Group Approach to Care of Early Adolescents With Type 1 Diabetes

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The American Diabetes Association (ADA) recommends routine diabetes education and interaction with all members of the diabetes team, including diabetes nurse educators, dietitians, and mental health professionals, for pediatric patients with type 1 diabetes (1). The ADA also specifies that education and support for youth with type 1 diabetes should include families/caregivers. However, there is uncertainty in how to address these needs efficiently, effectively, and satisfactorily. Studies have confirmed difficulty incorporating behavioral specialists into diabetes care, with ~30% of diabetes teams reporting no access to mental health professionals (2). Even centers with access to mental health providers struggle to efficiently incorporate them into routine care. Additionally, despite advances in diabetes management, A1C values increase during adolescence, and poor glycemic control begins earlier (in pre-adolescence) and lasts longer (until patients approach 30 years of age) than previously expected (3).

Shared medical appointments, also known as group appointments, were initially designed to meet increasing demands on provider time and improve patient access to care. These appointments have also been found to successfully increase patient and provider satisfaction, strengthen follow-up rates, and improve outcomes in multiple patient populations (4–6). Shared medical appointments have been cited as an effective

tool for empowering patients and have been recommended as a successful method for providing more patient-focused care (7). These findings have resulted in an expansion of shared medical appointments into the care of children and adolescents with type 1 diabetes, with positive findings (8–12). When considering the adolescent population with type 1 diabetes, increasing peer support has been suggested as an avenue to improve mental health and adherence with diabetes self-care (13–15), and group visits may be an efficient way to incorporate peer support into routine medical care while also meeting the goal of patients routinely seeing all members of the diabetes team.

Specifically reviewing group appointments in pediatric patients with diabetes, Rijswijk et al. (8) found that more diabetes-related topics were covered in shared medical appointments with children and adolescents with diabetes than in individual patient follow-up appointments. When focusing on patient and provider communication, Noordman and van Dulmen (9) found that almost all patient cues were addressed by providers during shared medical appointments for pediatric patients with diabetes, and almost all cues missed by the provider were addressed by other patients in the group. When focusing specifically on the value of shared medical appointments in children and adolescents with type 1 diabetes, Mejino et al. (10) found that patients and parents primarily valued

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the presence of other patients. Shared medical appointments completed by Floyd et al. (11) in 12- to 16-year-old patients with type 1 diabetes found stabilization of glycemic control and improved quality of life.

Our recent pilot study of a shared medical appointment model, Team Clinic, was found to be feasible and acceptable in adolescent patients with type 1 diabetes between the ages of 13 and 18 years.

Over a 9-month time period, 92 patients participated in the older adolescent Team Clinic appointments. Group clinics were successfully scheduled in a busy pediatric diabetes center without affecting routine clinic flow. Participants received increased education when compared to standard visits, and providers were able to provide education to a greater number of patients in a more effective and efficient manner when compared to their usual clinic time. Patient and family satisfaction with the Team Clinic model was also high (12).

The purpose of this study was to assess the feasibility of adapting our innovative group medical appointment model used in high school patients with type 1 diabetes, Team Clinic, to a middle school cohort of young adolescents with type 1 diabetes with the goal of meeting the ADA's recommendation for routine appointments with all diabetes team members (11). Based on the positive findings in our high school pilot, the model was adapted to the middle school population with type 1 diabetes. The adaptation included more developmentally appropriate, middle school-focused components in the individual patient exam, patient group activities, and family group discussion. These adjustments were made based on review of development literature, expertise from members of our team (specifically experienced psychologists focusing on pediatric diabetes), previous clinic experience of our team, and qualitative feedback from patients and families. For patients, this new format resulted in

the incorporation of more kinetic and structured activities when compared to the high school intervention.

### Research Design and Methods

Beginning in May 2014, eligible patients with type 1 diabetes seen in a pediatric diabetes center were recruited through various mechanisms, including clinical or research staff discussion during routine appointments and clinic-posted information. Information about Team Clinic was posted in the diabetes center to inform patients and families about the clinical care option, regardless of whether they wanted to participate in the research portion of the study. Eligible patients had type 1 diabetes duration >6 months, were in the sixth to eighth grade, were able to speak and understand English (multilingual families were eligible), and were clinically determined (by provider and through family discussion) to be mentally and emotionally able to participate in a group appointment. Of note, grade in school versus age was used for recruitment to ensure patients were matched based on daily experiences versus actual age. Before recruitment, institutional review board approval was obtained, and all patients completed informed assent/consent before participation. Recruitment occurred over 6 months, and the study duration was 18 months. Patients and families self-selected to participate in the Team Clinic pilot, and an age-matched control population was recruited from the standard clinic. Given the pilot nature of the study, patients were allowed to self-select to participate. This step allowed for assessment of true feasibility and acceptability of the intervention. The same recruitment process was used for all patients. Patients were approached for participation in the study in the intervention cohort or control cohort. Both groups were offered a small monetary incentive in return for completing research questionnaires.

It was recommended that patients in both groups follow up every 3

months, per ADA guidelines (1). Families in both groups provided consent to participate, and youth were assented, per institutional review board protocol. All participants had A1C measurement, diabetes device downloads, and vital sign measurements at each visit, per clinic protocol. Each participant's insulin regimen was recorded, and both groups completed baseline questionnaires and satisfaction surveys. Team Clinic participants completed an additional form ensuring confidentiality during group discussions.

Team members, consisting of certified diabetes educators (nurses, dietitians, and social workers), rotated as facilitators. Two providers (physician, nurse practitioner, or physician's assistant) staffed each Team Clinic and scheduled two to three patients each, resulting in four to six patients scheduled per clinic. Team Clinic appointments were offered on three to four afternoons per month, and insurance was billed as per clinic protocol. All patients and parents participating in Team Clinic arrived at the same time and completed standard clinic check-in.

After check-in was completed, all patients and families went to the Team Clinic room for orientation, which included a description of the clinic format, patient and family expectations, and questions. After orientation, parents went to a separate, facilitator-led, group session. During this time, facilitators guided parents through a discussion of challenges encountered during normal adolescent development and how diabetes can complicate expected developmental milestones. The behavioral health professionals on the team designed the family curriculum and received feedback from all diabetes providers. The behavioral health professionals also functioned as the facilitators for the sessions.

Concurrently, adolescents completed individual physical exams with their provider, giving providers the opportunity to discuss

high-risk activities with youth and adolescents without parents present. Patients spent about 10 minutes with their provider alone. If patients had concerns needing additional time, patients met with the provider again after the group portion of the visit.

After meeting their medical provider, adolescents gathered for their group. After an icebreaker activity, Team Clinic moved to a semi-structured, activity-based, learning format with an overall goal of patient-driven learning and discussion. Activity-based learning examples include 1) physical activity and diabetes: outdoor obstacle course with interval glucose checks, discussion of last insulin dosing and carbohydrate consumption, and learning points for patients to “teach” their families about activity and diabetes; 2) “A day in the life...”: problem-solving daily obstacles in life with of a young person with type 1 diabetes; 3) Jeopardy: form teams and answer questions on sick-day management, diabetes myths/facts, nutrition, blood glucose, and Diabetes 101; and 4) skills and technology: patients demonstrated and taught skills to one another, including injections, glucagon administration, insulin pump insertion, and continuous glucose monitor use. The group time lasted 45–60 minutes. Curriculum was designed by the entire diabetes care team with attention to patient development, interest, barriers to care, and diabetes self-management education needs.

The visit concluded with each patient and family meeting individually with their provider. The provider reviewed the plan, reviewed individual goals for parents and patient, and answered questions. Goals were established in a collaborative manner with each member of the team (patient, family, and provider) participating in the design of achievable and meaningful goals. Each family was provided with a visit summary and their goals for the visit, per diabetes center protocol. If a patient was

waiting to see his or her provider, the diabetes team would address other clinical needs during this time (e.g., ordering laboratory tests, refilling medications, or meeting with additional staff). Total visit time for patients and families was about 2 hours.

### Satisfaction

Patient, family, and provider satisfaction with their clinical care was assessed using a brief survey, which asked respondents to rate how much they agreed or disagreed with statements about the clinic model on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree). All surveys included additional questions asking for open-ended answers. The patient and family survey contained eight statements focusing on support, learning new information, comfort in clinic, and duration of the appointment. All participants in the study (both Team Clinic and Standard Clinic patients and families) answered these eight questions. Patients and families participating in Team Clinic answered an additional two questions assessing their interest in attending another Team Clinic appointment and whether they would recommend Team Clinic to others. The open-ended questions on the patient and family surveys for participants in both Team Clinic and Standard Clinic asked what helped them the most during clinic, what changes should be made, and any other suggestions or recommendations they had. The provider satisfaction survey included eight statements regarding Team Clinic’s quality of care, benefit to patients, creativity of delivery, ability to meet educational needs, provider and patient enjoyment, inclusion of a multidisciplinary team, and interest in participating again. The open-ended questions for the providers included their highlight of the clinic, what changes could be made to improve the process for patients and families, what changes could be made to improve the process for the staff and

clinic, and any other suggestions or recommendations they had.

### Statistical Analysis

Patients included in the analysis had two or more visits during the 18-month study that were at least 6 months but no more than 18 months apart. The Team Clinic cohort included patients who completed at least 50% of their clinic appointments during the study period in Team Clinic. The Standard Clinic cohort included patients who completed at least 50% of their clinic appointments during the study period in Standard Clinic. All patients and families initially recruited were included in the satisfaction data analysis completed at baseline. Providers were also asked about their satisfaction with the intervention.

Demographic and clinical characteristics were summarized using means and SDs or counts and proportions. Outcomes were compared by  $\chi^2$  tests and two-sample independent *t* tests. All hypothesis tests were two-sided with significance set at 0.05. R version 3.1.1 software was used (R Foundation for Statistical Computing, Vienna, Austria; <http://www.R-project.org>).

### Results

Ninety-one patients initially consented for the study. Eighty-six patients completed the baseline visit, including satisfaction surveys, and were included in the satisfaction data analysis according to their group selection at enrollment. A total of 64 patients attended two or more clinic visits (Team Clinic or Standard Clinic visits) during the 18-month study period that were between 6 and 18 months apart and were eligible for inclusion in the final analysis. Twenty-six of the 64 eligible patients met inclusion requirements for the Team Clinic cohort analysis ( $\geq 50\%$  of appointments in Team Clinic). Thirty-eight patients met requirements to be included in the Standard Clinic cohort ( $\geq 50\%$  of appointments in Standard Clinic). Demographic and clinical character-

**TABLE 1. Patient Demographics and Clinical Characteristics**

	Included Patients (n = 64)	Excluded Patients (n = 27)	P	Team Clinic (n = 26)	Standard Clinic (n = 38)	P
Female	40 (62%)	9 (33%)	0.02	17 (65%)	23 (61%)	0.9
Age (at first visit), years	11.8 (1)	11.7 (1.2)	0.97	12.1 (1)	11.5 (1)	0.01
BMI (at first visit), kg/m <sup>2</sup>	20 (3)	19.9 (3)	0.82	20.4 (2.6)	19.8 (3.2)	0.44
Total visits	3.5 (1.2)	3 (1.9)	0.21	3.8 (1.2)	3.3 (1.1)	0.10
At least one Team Clinic visit	31 (48%)	8 (30%)	0.15	26 (100%)	5 (13%)	<0.001
At least one Standard Clinic visit	57 (89%)	27 (100%)	0.17	19 (73%)	38 (100%)	<0.001
Duration of diabetes (at first visit), years	4.3 (3.1)	3.6 (2.6)	0.27	4.5 (3.4)	4.3 (2.8)	0.79
Time in study, months	9.9 (3.5)	9.5 (8)	0.81	11.2 (3.6)	9.1 (3.2)	0.02
CESD (at first visit)	14.2 (11.1)	11 (9.4)	0.18	12.1 (9.5)	15.6 (12)	0.22
Insulin regimen (at first visit)			0.99			0.99
CSII	40 (62%)	17 (63%)		16 (62%)	24 (63%)	
MDI	24 (38%)	10 (37%)		10 (38%)	14 (37%)	
Tests per day (at first visit)	5.1 (2.2)	5.6 (2.2)	0.38	4.9 (2.2)	5.3 (2.2)	0.49
A1C (at first visit)	8.9 (2.1)	8.3 (1.6)	0.22	9 (2.4)	8.8 (2)	0.69
A1C (at last visit)	9.0 (1.8)	—	—	8.9 (1.8)	9.1 (1.8)	0.67

Numbers are means (SD) for continuous variables and counts (proportions) for categorical variables. \*Patients were excluded from the final analysis if they did not complete a final visit (n = 4) or if their final visit was <6 or >18 months from their baseline visit (n = 23).

istics are summarized for the Team Clinic and Standard Clinic cohorts, as well as the included and excluded patients in Table 1. There were no baseline clinical differences between patients who were included versus excluded in the study; however, a higher percentage of those included were female compared to those excluded (62 vs. 33%; *P* = 0.02).

The Team Clinic cohort attended a mean of 2.8 (SD 1.2) Team Clinic visits. Most patients (73%) in the Team Clinic cohort attended at least one Standard Clinic visit during the study period. Of individuals in the Standard Clinic cohort, only 13% attended at least one Team Clinic visit. On average, individuals in the Team Clinic cohort were in the study longer than individuals in the Standard Clinic cohort (mean [SD] 11.2 months [3.6] vs. 9.1 [3.2]; *P* = 0.02). There were no baseline differences in sex (female 65 vs. 61%; *P* = 0.90) or duration of diabetes (mean [SD] 4.5 [3.4] vs. 4.3 [2.8] years; *P* =

0.79) in Team Clinic versus Standard Clinic cohorts, respectively. However, Team Clinic patients were slightly older than Standard Clinic patients (mean [SD] 12.1 [1] vs. 11.5 [1] years; *P* = 0.01).

There were no differences in baseline A1C (mean [SD] 9% [2.4] vs. 8.8% [2]; *P* = 0.69) in the Team Clinic versus Standard Clinic cohort. Although there were also no differences in A1C at the end of the study (mean [SD] 8.9% [1.8] vs. 9.1% [1.8]; *P* = 0.67), during the study, A1C decreased in the Team Clinic cohort and increased in the Standard Clinic cohort. The average number of visits over the study period was slightly higher for the Team Clinic cohort than for the Standard Clinic cohort, but did not reach statistical significance (mean [SD] 3.8 [1.2] vs. 3.3 [1.1]; *P* = 0.1).

All patients participating in Team Clinic spent time with a diabetes educator (social worker, nurse, or dietitian) at each visit, meeting

ADA standards for multidisciplinary appointments. Families participating in Team Clinic also received additional diabetes education, psychosocial support, and information about normal adolescent behavior/development. In comparison, only 59% of Standard Clinic patients reported seeing other diabetes team members during appointments. Seventy-three percent of Team Clinic patients reported learning new information compared to 71% of Standard Clinic patients.

When specifically examining satisfaction with Team Clinic, patient data completed after the first visit was analyzed. The first visit was selected to decrease possible bias, since patients attending Team Clinic at their final visit had opted to continue Team Clinic. Of Team Clinic patients, 59% reported feeling more comfortable asking questions, 81% liked being with peers during their appointment, and 65% felt they understood more when compared to

**TABLE 2. Patient Satisfaction of Team Clinic and Standard Clinic Visit**

Variable	Team Clinic Visit (n = 37)	Standard Clinic Visit (n = 49)
I saw other providers	100% (n = 37)	59% (n = 29)
I learned new information	73% (n = 27)	71% (n = 35)
I liked being with other kids	81% (n = 29, total n = 36)	—
I understood more than a normal visit	65% (n = 24)	—
I felt more comfortable asking questions	59% (n = 22)	—
I would recommend group visits to others	86% (n = 32)	—
I would like to do another group visit	86% (n = 31, total n = 36)	—

Data are percentage reporting "agree" or "strongly agree." Questions not applicable to Standard Clinic visit are not included in this data summary.

Standard Clinic patients. The majority stated they would recommend Team Clinic to others (86%,  $n = 32$ ) and would like to attend again (86%,  $n = 31$ ) (Table 2).

Parent and provider satisfaction was also high. Approximately 92% of parents wanted to attend another Team Clinic and would recommend Team Clinic to others. The same percentage also reported feeling more supported and more comfortable asking questions. All Team Clinic providers (100%) felt the format helped meet education needs, allowed for more creativity, and was enjoyed by patients. All providers ( $n = 15$ ) also stated they would like to participate in Team Clinic again.

### Conclusion

Team Clinic was feasible in the early adolescent population with type 1 diabetes. It was successfully instituted in a busy pediatric clinic in a format appreciated by patients, families, and providers. Although not statistically significant, patients in Team Clinic trended toward increased visit frequency and improved glycemic control with high satisfaction. Notably, the model met ADA standards for regular appointments with all members of the diabetes team in a format enjoyed by both patients and staff meeting the goals of the intervention.

All stakeholders in patient care (patients, parents, and providers) viewed the Team Clinic model

positively, as documented in the satisfaction assessments. Potentially of greater importance, after the completion of the study, patients, families, and providers all requested Team Clinic continue as an available clinical appointment model outside of the research setting. This finding is a significant statement of the impact and benefit of the Team Clinic model for patients, families, and team members in a busy diabetes center. Diabetes care is time-consuming, emotionally taxing, and burdensome for all involved. Even in settings where all team members are available, members are often unable to meet the competing clinical demands. Using a model that meets clinical care needs while improving patient satisfaction, in addition to increasing staff satisfaction, may be one avenue to positively address family and medical team diabetes burnout.

There are limitations to interpreting these results. Self-selection without randomization could result in only highly motivated patients open to alternative clinical models participating in Team Clinic, which would limit generalizability. Additionally, patients who started with Team Clinic were not required to continue. This concern was addressed by limiting final analysis to patients who completed  $\geq 50\%$  of their appointments in Team Clinic, but caution is still required when

interpreting the data. Of note, almost all patients reported they would like to attend an additional Team Clinic appointment, but the same percent age did not continue in Team Clinic. Barriers to continuation included the inconvenience of visits only occurring on set days and times, and patients and families reported that this limited their ability to routinely be seen in Team Clinic. Scheduling challenges, for patients and diabetes providers, need to be considered with expansion and replication of the model. Notably, concerns for overwhelming clinic staff with patients arriving at the same time were addressed by beginning Team Clinic before the first afternoon clinic patients arrived and/or starting clinic toward the end of the afternoon. This step allowed the medical assistant team to focus on Team Clinic patient check-in when they were not at their busiest. Additionally, as in most clinic experiences, patients arrived slightly before or after their assigned check-in time, which decreased the clinic flow burden, too. Also of importance, from a clinic feasibility standpoint, no concerns related to billing were encountered. Assessing additional outcome measures, completing a more scientifically rigorous study, and implementation of Team Clinic in larger populations are all future goals of this line of research.

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## Duality of Interest

No potential conflicts of interest relevant to this article were reported.

## Author Contributions

M.R.M. participated in the intervention and collaborated on writing the manuscript. G.J.K. and B.A. provided oversight to the project and reviewed/edited the manuscript. C.B. and C.C. participated in the design and delivery of the intervention and reviewed/edited the manuscript. J.S. researched data and participated in the intervention. K.C. and L.P. completed data analysis, review, and summaries and also reviewed/edited the manuscript. J.K.R. wrote the manuscript, designed the research study, and researched data. J.K.R. is the guarantor of this work and, as such, had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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