A Program to Decrease Diabetic Ketoacidosis (DKA) Admissions: *Diabetes Wellness Program (DWP)*

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Introduction

- Pediatric DKA admissions rose by 40% in the US from 2006 to 2016 with vulnerable subgroups having the highest risks [1] .
- Non-Hispanic Black, Hispanic groups, and those with public insurance have the highest rates of DKA [1,2] .
- DKA admissions are costly (>$20,000 per hospitalizations) [1,3] .
- These studies [1,2,3,4] and others underscored the crucial need to study and overcome the barriers that lead to inequities in the care and outcomes of people with type 1 diabetes to decrease DKA admissions

Objective

- The purpose of this quality initiative project was to identify youth at high risk for DKA and the aim was to develop a diabetes program (DWP) with a set curriculum to prevent DKA.

Methods

- A needs assessment for the DWP:

1. Nineteen patients had at least two or more DKA admissions from Aug 1, 2019 – Aug 1, 2020.
2. Seventeen patients has at least two or more DKA admissions from August 2, 2020- August 2, 2021.
3. Patients with frequent ER visits, sustained A1c ≥14%, or frequent outpatient calls for hyperglycemia in association with ketonuria.

- Two intervention cohorts of 16 patients each were created.
- An enrollment process was followed (Figure 1).
- A diabetes care and education curriculum was created (Figure 2).
- Demographic variables were obtained (Table 1).
- Clinical outcomes such as A1c and DKA admissions were tracked in the participants that completed the DWP and comparted to a group of non-completers ("returned to usual care") and an age matched control group not enrolled in the program (Table 2)
- Mean change in A1c and DKA admissions were compared between DWP completers, DWP non-completers, and not enrolled control group (Table 3).
- The T1 Diabetes Quality of Life (T1DAL) questionnaires were administered to DWP completers before and after the intervention.
- A satisfaction survey was administered to those that completed the program (Table 4).

References

1. Everett EM et al. *J Clin Endocrinol Metabl 2021; 106:2343-2354.*
2. Majidi et al. *Clin Diabetes 2021; 39:278-283.*
3. Desai D et al. *Diabetes Care 2018; 41:1631-1638.*
4. Lipman and Hawkes. *Diabetes Care 2021; 44: 14-16.*
5. Hilliard et al. *J Pediatr Psychol 2019.*

Figure 1. Enrollment Process

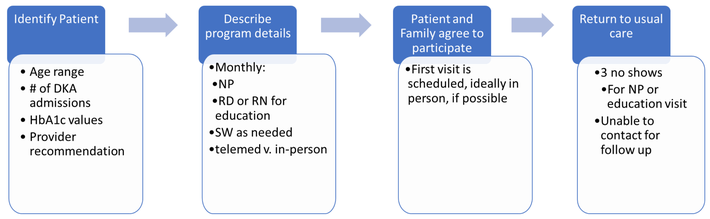

Figure 2. Education Curriculum

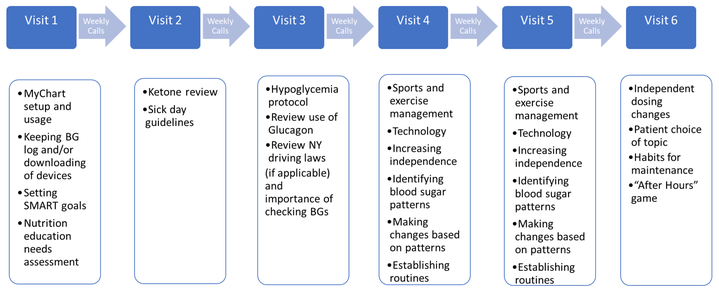

Table 1. Demographics

	Completed DWP	Returned to Usual Care	Not Enrolled	Total
N	18	14	81	113
Age, mean ± SD	15.2 ± 2.9	16.8 ± 2.2	15.4 ± 4.1	15.5 ± 3.8
Female %	44.4	64.3	51.2	53.1
Race				
White %	66.7	64.3	80.2	76.1
Black %	27.8	28.6	11.3	15.9
American Indian %	0	0	1.3	0.9
Mixed Race %	5.6	0	1.3	0.9
Other %		7.1	6.3	6.2
Insurance				
Public %	88.9	71.4	64.2	69.0

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Clinical Outcomes (Tables 2,3,4)

Table 2.

	Completed DWP	Returned to Usual Care	Not Enrolled	Total
A1c, mean ± SD				
Pre	12.7 ± 2.0	11.8 ± 2.6	9.9 ± 2.3	10.5 ± 2.5
Post	11.3 ± 2.5	12.0 ± 3.6	9.5 ± 2.2	10.0 ± 2.4
DKA admissions, mean ± SD				
Pre[1]	3.28 ± 3.1	2.21 ± 1.6	1.44 ± 1.1	1.83 ± 1.8
Post[2]	0.89 ± 1.1	0.25 ± 0.5	0.52 ± 1.4	0.56 ± 1.3
CGM User %	77.8	64.3	58.0	61.9

[1]August 2018 – August 2020; [2] Since the end of each cohort

Table 3.

	Completed DWP	Not Enrolled	P-value
Mean change in A1c ± SD	-1.49 ± 2.4	-0.54 ± 1.98	0.05
Mean change in DKA admissions ± SD	-2.39 ± 3.5	-0.94 ± 1.62	0.009

Table 4.

Post Participation Survey	YES	NO
Did the Diabetes Wellness Program helped you learn how to prevent DKA admissions?	100%	0
Do you feel the program helped with your diabetes related quality of life overall ?	100%	0
After completing the program, do you feel more confident in independently managing your diabetes?	100%	0

Type 1 Diabetes and Quality of Life (T1DAL) Measures [5]

77% of the participants who completed the program had an improvement in quality-of-life scores as shown by their pre- and post-T1DAL surveys

Conclusions

- This DKA prevention program was effective in improving a1c and preventing DKA admissions in a group of youth with type 1 diabetes at high risk for DKA who completed the program.
- A limitation of the program was the relatively large percentage of non-completers who returned to usual care (50%).

To improve retention, glycemic status, and quality of life, we plan:

1. To identify and address SDOH that are barriers to care
2. Increase access by providing flexibility in scheduling, televisits at school or home, rolling admissions

- Involvement of social work & case management
- Increase hybrid closed loop insulin pumps
- Child life involvement