Diabetes Management in 2018

Amy Boynton

Professional credentials: MSN, MA, RN, PEL-CSN, NCSN

Life credentials:

Mom of T1D – 31 years, Diabetes Camp – 23 years, RN in Schools – 23 years

Objectives

- Learners will understand how diabetes management has changed over time.
- Learners can identify the legal mandates for diabetes management in the school setting.
- Learners will recognize the social/emotional impact of diabetes on students and their families.
- Learners will value the impact of rapidly changing technology on diabetes management.

Diabetes 101 – the Basics

- Management is different for everyone and has changed dramatically since the discovery of insulin in 1921
- Diabetes is a 24/7 disease, manageable but demanding
- Life altering and can be life ending
- Most children/adolescents are managed on the basal/bolus treatment philosophy using various types of insulin and varied modes of insulin delivery: syringes, pens, pods and pumps
- Management is not a perfect science and varies based on many factors:

42

Factors That Affect BG

Food

- ↑↑ 1. Carbohydrate quantity
- →↑ 2. Carbohydrate type
- →↑ 3. Fat
- →↑ 4. Protein
- →↑ 5. Caffeine
- ↓↑ 6. Alcohol
- ↓↑ 7. Meal timing
- ↑ 8. Dehydration
- ? 9. Personal microbiome

Medication

- →↓ 10. Medication dose
- ↓↑ 11. Medication timing
- ↓↑ 12. Medication interactions
- ↑↑ 13. Steroid administration
- ↑ 14. Niacin (Vitamin B3)

Activity

- →↓ 15. Light exercise
- ↓↑ 16. High-intensity and moderate exercise
- →↓ 17. Level of fitness/training
- ↓↑ 18. Time of day
- ↓↑ 19. Food and insulin timing

Biological

- ↑ 20. Insufficient sleep
- ↑ 21. Stress and illness
- ↓ 22. Recent hypoglycemia
- →↑ 23. During-sleep blood sugars
- ↑ 24. Dawn phenomenon
- ↑ 25. Infusion set issues
- ↑ 26. Scar tissue and lipodystrophy
- ↓↓ 27. Intramuscular insulin delivery
- ↑ 28. Allergies
- ↑ 29. A higher glucose level
- ↓↑ 30. Periods (menstruation)
- ↑↑ 31. Puberty
- ↓ 32. Celiac disease
- ↑ 33. Smoking

Environmental

- ↑ 34. Expired insulin
- ↑ 35. Inaccurate BG reading
- ↓↑ 36. Outside temperature
- ↑ 37. Sunburn
- ? 38. Altitude

Behavioral & Decision Making

- ↓ 39. Frequency of glucose checks
- ↓↑ 40. Default options and choices
- ↓↑ 41. Decision-making biases
- ↓↑ 42. Family relationships and social pressures

diaTribe®

A Short History with Diabetes

erday - 1975	Today - 2018
testing – clinitest/acetest	Blood glucose checked 4 – 6 times/day, Sensor glucose readings from interstitial fluid updated every 5 minutes
n – animal products, combinations, n that peaked	Rapid acting, long acting – no peak Humalog is only 13 years old!
to match insulin given, icted diet	Insulin to match food eaten/anticipated, Eat whatever you want but count carbs and cover
just a measurement, no established t based on research	A1C – 7.5% or below is ideal
e low – glucagon, glucose gel	Severe low – glucagon, glucose gel
e best you can ent severe hypoglycemia	Tight control Prevent severe hypoglycemia

Hemoglobin A1C

The gold standard of diabetes management

A1c and Blood Sugar

(%)	Average Blood Sugar (mg/dL)
	68
	97
	126
	152
	183
	212
	240
	269
	298
	326
	355

The **normal** range for people without diabetes: between 4% and 5.6%.

Levels between 5.7% and 6.4% mean you have a higher chance of getting diabetes.

Levels of 6.5% or higher mean you have diabetes.

https://www.niddk.nih.gov/health-information/diabetes/overview/tests-diagnosis/a1c-test#goal

ADA standards – less than 70 is hypoglycemia,
less than 54 is severe hypoglycemia

rovider Goals of Treating Diabetes

- Achieve metabolic normalcy – mimic the blood sugars in a person without diabetes
- Avoid acute complications – severe lows, significant hyperglycemia and diabetic ketoacidosis (DKA)
- Minimize risk of long-term micro and macrovascular complications – tight control
- **Assist child in achieving independence, self-management.**
- Ideal treatment team: endocrinologist, diabetes educator, nutritionist and mental health care provider

Mental Health Concerns

Diabetes management places a significant burden on the **child and family** - assess emotional well being

Developmentally appropriate family involvement contributes to successful management.

Premature transfer of diabetes care is associated with deterioration in glycemic control.

Students with diabetes - increased incidence of depression, anxiety, eating disorders, and learning disabilities.

Mental Health Concerns

- Diabetes Distress is REAL!
- Help them find ways to connect with the diabetes community.
  - Support groups for parents/caretakers
    - grief associated with the diagnosis
    - during adolescence.
  - Diabetes camp make diabetes the “NORM”
  - Membership in the American Diabetes Association
  - Participation in fundraising – JDRF and ADA
    - find support and work towards a common goal

Mental Health Concerns

When dealing with a student:

- Be cautious not to “judge” blood sugars
  - not good or bad
  - Black and white measurement, data, upon which we are making decisions.
  - Problem solve for cause/effect
- Skip the lectures or they’ll start to ignore you, have a conversation
- **Shared decision making can improve diabetes self-management, adherence to plan, and metabolic outcomes.**

Promoting Mental Health in School

- Offer a diabetes support group during/after the school day.
  - Parent approval
  - Student contract
    - Confidentiality
    - Accountability – academics over group
    - Co-facilitate with guidance counselor/social worker

Legal Aspects of Diabetes Management

Federal law affords people with diabetes specific rights and protections; they are entitled to a 504 plan.

- (105 ILCS 145/) Care of Students with Diabetes Act
  - http://www.ilga.gov/legislation/ilcs/ilcs3.asp?ActID=3284&ChapterID=17
- The school nurse is the most appropriate person in the school setting to oversee the care of students with diabetes.
- Need a team to stay current: Parent, CDE, websites

Legal Aspects of Diabetes Management

Diabetes Medical Management Plan (DMMP)

- Insulin, glucagon, activity restrictions
- DMMP indicates if parents/guardians are authorized to make adjustments to insulin

Current philosophy: allow capable students to manage their diabetes independently

- Develop an Individualized Healthcare Plan - IHP) with the parent/student. Basis for 504
- Develop an emergency plan as part of the IHP

Sample 504 Accommodations

Blood sugar testing/monitoring, insulin administration, and snacking/treating **low** blood sugars allowed during the day

This can be performed throughout the building in classrooms as well as the nurses' office.

Unlimited bathroom usage, unlimited visits to the nurse, access to water.

Alternate setting for standardized testing using stop-the-clock testing accommodations.

Sample 504 Accommodations

Allow retakes/extended time for classroom assessments if management of **high/low** blood sugars interferes with the ability to complete the assessment (blood sugar <70 or >350).

Time–and-a-half to make up any missed work due to missed class time/absences/illnesses related to diabetes

Clarification and repetition of directions during times of **high/low** blood sugars.

PE participation as directed by physician. No physical activity when blood sugars are outside of the designated parameters: BG < or >

Sample 504 Accommodations

- No participation in drivers ed or use of power tools if BG <70 or >350.
- Due to the possibility of impaired cognitive function, **NEVER** send a student that feels **"low"** to the nurse by themselves.
- Parents may request to accompany student on all field trips. If requested, a nurse will accompany the student on field trips
- If a student wears a continuous glucose monitor, they should have access to their monitoring device at all times.

Sample 504 Accommodations

tional notes:

- Students are expected to have treatment supplies with them at **all** times.
- A DMMP, completed by the HCP annually prior to the first day of school
- Testing and treatment supplies will be provided by parent.
- Student contract reviewed annually
- Release of information will be requested.

Sample 504 Accommodations (notes continued)

- Teachers will be notified annually of signs and symptoms of high and low blood sugars.
- Glucagon will not be taken on field trips unless parent/ nurse accompanies the student on the field trip.
- ADA – sample 504 plan available at: http://www.diabetes.org/living-with-diabetes/parents-and-kids/diabetes-care-at-school/written-care-plans/section-504-plan.html

Student Contract

___ I have reviewed my diabetes health care plan with e school nurse.

___ I have reviewed the importance of carrying eatment supplies at all times.

___ I have reviewed the bloodborne pathogen concerns lated to testing.

___ I will not carry ***exposed sharps*** at any time.

Student Contract (continued)

___ I will dispose of my sharps properly.

___ I will keep my diabetic supplies in a secure location; backpack, nurses' office, locker or purse.

__-_ I will not allow peers to touch my diabetes supplies.

___ I will test before driving during drivers ed

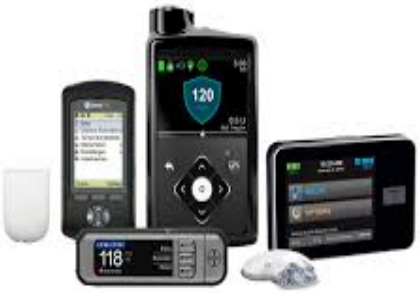
udent signature:

hool Nurse Signature:

te:

Pump/Pod Basics

- Machines programmed with settings to deliver fast acting insulin to subcutaneous tissue.
- Programmed information:
  - Insulin to carbohydrate ratios
  - Correction factors (Insulin sensitivity factor (ISF)
  - Basal rate(s)
  - Target blood sugar(s)
- Programmed information changes depending the hour of the day.
- Provides downloadable information to the HCP, student and family, Which allows for ongoing treatment plan changes to improve control.



Pump/Pod Technology

	Cons
racy and precision of insulin delivery, .0001 units/hr	Skin integrity
to make adjustments, stop delivery, delivery time	Rapid acting insulin used, if technology malfunctions can easily get out of control
istency of delivery – better absorption	Equipment can interfere with activities, constant reminder of diabetes
l mathematical mistakes due to rogrammed settings	Cost – much more expensive
nloading the pump provides data to yze and drive settings	

Continuous Glucose Monitoring (CGM)

The benefits

- real-time glucose information enhances the safety of the student
- Seeing glucose trends allows improved management

Alarms used sparingly

- Set alarms for levels that require an immediate action/ response.
- Avoid unnecessary disruption to learning
- avoid alarm fatigue
- Train staff to understand alarms

https://www.dexcom.com/get-started-cgm/40?sfc=701f30000018vibAAA&gclid=EAIaIQobChMIj4vDqbz03QIVDLjACh0cAgISEAAYASAAEgKPevD_BwE&dclid=CKW63au89N0CFQJZwQod4F0DGQ

Continuous Glucose Monitoring (CGM)

- Remote monitoring of the CGM in the school/childcare setting by staff is generally not required. Student is supervised by trained staff and alarms are used to identify urgent levels requiring action.
- Certain unique cases (e.g. preschool age, non-verbal, impaired cognition, severe hypoglycemia unawareness) monitoring/remote monitoring may be appropriate.
- Not everyone wants their glucose monitored - privacy

Continuous Glucose Monitoring (CGM)

Whenever remote monitoring is used a plan to address management of the information should be developed and incorporated into the students 504 plan.

Expectations vary based on student's age/ability

- Alarms set to vibrate
- Receiver/phone placed on desk as a signal that the blood sugar is out of range
- Urgent low – below 55, nurse to check on student
- Thumbs up if already treated and feeling ok
- Finger stick to verify blood sugar before retreating

CGM Issues

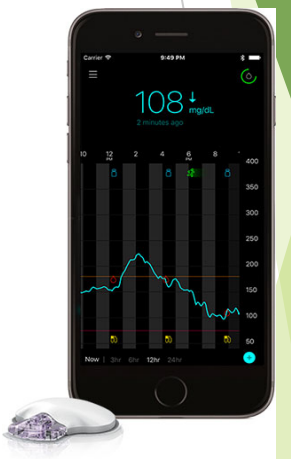
Not used for treatment decisions in hospitals, allowed to wear but finger sticks are used for decision making

Privacy

- The Ipad has to be visible to watch for patterns
- More than one student, so must have name of sharer visible
- Access to personal receiver device when treating student in the classroom (more accurate than the shared device)

Interference in the building

- Loss of signal
- Many apps interfere with reception of the wireless signal



https://www.medtronicdiabetes.com/products/guardian-conne
continuous-glucose-monitoring-system?
medium=tsa&utm_source=google_ppc&utm_medium=text&utm
aign=Guardian%20Connect%202.0%20-
%20Brand&gclid=EAIaIQobChMIo7v-8rz03QIVhLrACh1iVgc0EAAYA
L17fD_BwE&gclsrc=aw.ds

Cutting Edge Technology

Integrated System

- T:slim X2/Dexcom G6 – predicts low, turns back on as soon as CGM returns to set low
- Doesn't adjust basal rate automatically

Closed Loop Systems

- Medtronic 670g - mimics some of the functions of a healthy pancreas
  - Automode – adjusts basals with microboluses every 5 minutes based on CGM readings keeping levels in target range – fewer lows/highs (less variability)
  - Algorithms reset every 24 hours (takes information from previous 6 days)

Both systems help prevent lows and rebound highs

Diabetes Highlights on the Horizon

Non-Invasive Glucose Monitoring in the Works at Apple?

- https://beyondtype1.org/non-invasive-glucose-monitoring-in-the-works-at-apple/

Ready to use Glucagon – Xeris G-pen

- https://beyondtype1.org/ready-to-use-glucagon-rescue-pen/

Intranasal Glucagon administration

- https://myglu.org/articles/lilly-asks-fda-to-approve-nasal-glucagon-for-use-with-people-with-type-1-diabetes

Diabetes Highlights on the Horizon

Standardized protocols for treatment of moderate/large ketones

Guardian Connect app for shared followers

- https://diatribe.org/medtronic-announces-fda-approval-guardian-connect-mobile-cgm

Pens with large quantities of insulin

Closed loop systems with automatic correction bolus capabilities

- https://diatribe.org/tandems-hybrid-closed-loop-pivotal-study-control-iq-and-dexcom-g6

Resources

https://www.niddk.nih.gov/health-information/diabetes/overview/tests-diagnosis/a1c-test#goal

https://www.webmd.com/diabetes/guide/glycated-hemoglobin-test-hba1c

American Diabetes Association Diabetes Care 2017 Jan; 40(Supplement 1): S105-S113. https://doi.org/10.2337/dc17-S015

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3714061/

https://diatribe.org/42factors

Conversations with, edited by Nancy Cuzman RN, BSN, CDE (September 2018)

https://www.niddk.nih.gov/health-information/communication-programs/ndep

https://s3.amazonaws.com/medtronic-hcp/Getting%20Started%20with%20MiniMed%20670G%20Smartguard%20Auto%20Mode.pdf

Helpful Web Sites

- American Diabetes Association www.Diabetes.org
- JDRF http://www.jdrf.org
- Colorado Kids with Diabetes www.coloradokidswithdiabetes.org
- Beyond Type 1 www.beyondtype1.org
- Children with Diabetes https://www.childrenwithdiabetes.com
- American Assoc. of Diabetes Educators www.aadenet.org
- Diabetes Monitor www.diabetesmonitor.com
- Insulin Pumpers ww.insulin-pumpers.org
- National Diabetes Info www.niddk.nih.gov/health/diabetes/ndc.httm
- Diabetes Interview www.diabetesinterview.com
- Diabetes Mall www.diabetesnet.com
- Carbohydrate Amounts in Food www.calorieking.com
- Joslin Diabetes Center www.Joslin.org
- diaTribe Learn https://diatribe.org