Government of **Western Australia**
**Child and Adolescent Health Service**

Perth Children's Hospital

# Diabetes and schools

## Finding the balance

Endocrinology & Diabetes department
Perth Children's Hospital (PCH)

Nov 2018

# Module 3

## Management of Diabetes

## Pumps

Please download the appropriate Management and Action Plans from the Diabetes WA website.

These should be completed by parent/carer and an agreement reached between parents/carers and school.

Diabetes Management and Action Plans

Time: 40 minutes

# BGL checks

- Target range for BGL is 4-8 mmol/L
- *It is NOT uncommon to see levels outside of this range*
- Further action is required if BGL < 4 mmol/L or ≥ 15 mmol/L
- How to do a BGL check
- Routine BGL checking times are:
  - anytime, anywhere in the school
  - before food
  - anytime a hypo is suspected
  - before vigorous activity
  - before exams and tests.
- Please note: BGL's may be elevated for 2-3 hours after food as the insulin has not completed impacting on BGL's.

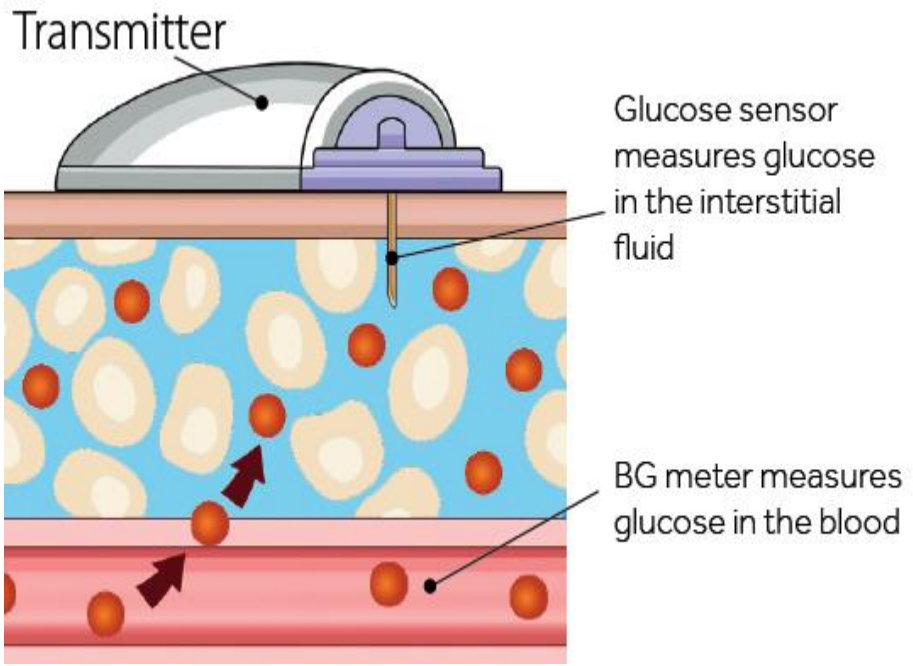
# Monitoring Glucose Levels at School

- BGL monitoring is necessary at school to determine if in or out of target range (4.0-8.0mmol)
- This is generally done by finger prick
- Details are included in Management Plan
- Action Plan shows how to address BGL's below and above target
- May also be supplemented by CGM (see following slides)
- Note: Parents use CGM to manage diabetes and make interventions in management. In a school setting, CGM is generally only used as a monitoring tool. Please see CGM Appendices for device in use. It is the parent's responsibility to provide the CGM Appendix but copies can be found at:

https://diabeteswa.com.au/professionals/training/diabetes-awareness-in-schools-2/diabetes-action-and-management-plans/

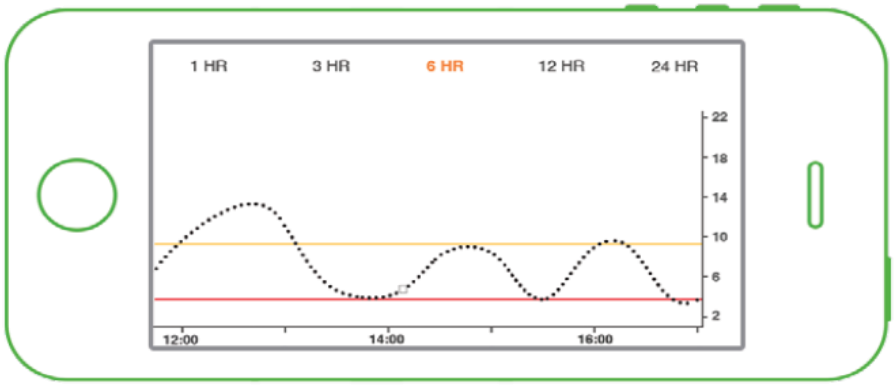
# What is Continuous Glucose Monitoring (CGM)?

- Measures interstitial glucose (fluid around the cells) constantly
- Transfers reading every five minutes
- Shows rate and direction of change
- Glucose information can be linked to a receiver, a smart phone app or pump.



# What CGM shows you

- Real-time continuous sensor glucose readings every five minutes
- Provides readings that can help find trends and patterns in glucose levels
- Allows you to see where glucose levels have been, which direction they are headed, and how fast they are rising or falling.



# Mobile phones for CGM

- Most students will require a mobile phone to be used as the receiver
- The mobile phone will need to be within six metres of the student for the CGM to work via Bluetooth
- Often parents are ‘following’ their child’s BGL remotely on their own mobile phone and therefore mobile data is necessary
- Teachers may follow the student (however it should not be an expectation from parents)
- Students often need access to their CGM data during exams so an agreement between school and the family will need to be discussed prior.

# What is Flash Glucose Monitoring (FGM)?

Abbott Libre Sensor (FGM) is a small sensor that is inserted into the upper, outer arm.

The sensor tip sits under the skin, and measures glucose levels in the fluid surrounding the cells (interstitial fluid). The sensor measures glucose every minute and stores this glucose data every 15 minutes.

When scanned, the sensor will provide the wearer with the most current glucose reading, a glucose trend arrow and data from the previous eight hours.

# Insulin replacement

## Insulin Pump (continuous insulin infusion)

- Uses rapid acting insulin only. A child of any age can use an insulin pump.
- Given before meals.

**Insulin is given into the subcutaneous tissue (fat)**

# Insulin pump therapy models





# How the Pump works

Insulin delivery system aims to mimic normal pancreatic function for people with T1DM.

A reservoir is filled with rapid-acting insulin and inserted into the pump.

Tubing is attached to the reservoir, insulin is pumped down the tubing to a cannula which is inserted into the subcutaneous tissue (fat layer) of the child/adolescent.

# The infusion set / cannula

- The cannula can be inserted with an insertion device or may be manually inserted
- The cannula is affixed to a dressing which holds it in place once inserted
- The cannula should be changed every 2-3 days to ensure optimal insulin absorption.

# Insulin delivery on a Pump

Insulin is delivered in two ways:

**Basal Rate**: Delivery of insulin as a constant infusion of rapid-acting insulin at variable rates throughout the day (background insulin).

**Bolus dose:** Rapid burst of insulin programmed by the child/adolescent prior to meals or for a correction if the BGL is above the target range. These are often combined.

# Hypoglycaemia ‘Hypos’
## Low BGL < 4 mmol/L

Most common causes of hypos:

- too much insulin
- not enough carbohydrate at meals or snacks
- delayed or missed meals or snacks
- increased activity
- illnesses like gastroenteritis which cause decreased oral intake.

# Signs of mild / moderate Hypoglycaemia

- Tiredness
- Hunger (ravenous)
- Pallor (pale skin)
- Shakiness/trembling
- Sweating (cold and clammy)


- Confusion
- Poor coordination
- Poor concentration
- Behaviour/mood change
- Dizziness
- Headache
- Slurred speech
- Blurred vision
- Irritability

# Signs of severe Hypoglycaemia

- Drowsiness
- Unable to swallow
- Loss of consciousness
- Seizure

# Treatment of Hypoglycaemia

## Pump therapy

Check BGL, if it is **between** 2.0 mmol/L & 4.0 mmol/L

Step 1: Sit down and rest under supervision

Step 2: **Immediately give fast-acting glucose** which is the fastest and safest option.

The amount will depend on age and weight as per PCH Diabetes Team recommendation:

- Children ≤ 5years old will require 5g
- 6-12 year old children will require 10g
- Children over 12 will require 15g

See school management plan for specifics for each child.

Some examples for fast-acting glucose are (choose one):

- Lemonade - 5g per 60mls
- Glucose tablets which include:
  - Glucodin - 1.5g per tablet
  - Trueplus - 4g per tablet

# Treatment of Hypoglycaemia

## Pump therapy

Step 3: Re-check the BGL in 15 minutes. Rest until all symptoms are gone. If the level is still below  4 mmol/L, then repeat steps 2.

Step 4: If BGL >4 mmol/L, no follow up carb required. Child may resume normal activities.

# Treatment of Hypoglycaemia

## Pump Therapy if BGL <2.0 mmol/L

**If BGL is < 2.0 mmol/L** or if symptoms progress to confusion, dizziness, headache, irritability, drowsiness

Step 1: **Suspend or disconnect pump** (parents to demonstrate how) and sit down and rest under supervision.

Step 2: **Immediately give fast-acting glucose** which is the fastest and safest option.

The amount will depend on age and weight as per PCH Diabetes Team recommendation:

- Children ≤ 5years old will require 5g
- 6-12 year old children will require 10g
- Children over 12 will require 15g

See school management plan for specifics for each child.

Some examples for fast-acting glucose are (choose one):

- Lemonade - 5g per 60mls
- Glucose tablets which include:
  - Glucodin - 1.5g per tablet
  - Trueplus - 4g per tablet

# Treatment of Hypoglycaemia

## Pump Therapy if BGL <2.0 mmol/L

Step 3: Re-check the BGL in 15 minutes. Rest until all symptoms are gone. If the level is still below 4 mmol/L, then repeat Step 2.

Step 4: If BGL>4mmol/L, reconnect or resume pump. Sustaining carbs (15g) need to be given without bolus. Child may resume normal activities.

Examples of sustaining carbs:

- piece of fruit
- muesli bar
- glass of milk

# Severe Hypoglycaemia

Occasionally the child will become too drowsy to eat or drink safely or will not be able to swallow. This is known as severe hypoglycaemia. If this occurs, **DO NOT** put anything in their mouth as they are at risk of choking.

A severe hypo can also cause a seizure (fit) or the child becoming unconscious. Place the child in the recovery position and check DRSABC:

- Danger
- Response
- Send for help
- Airway
- Breathing
- Circulation (pulse)


✓ Put the child in coma position
✓ Call an ambulance and parent

The current recognised National Training Requirement Unit in first aid and the expected level of competency to be achieved is HLTAID-003 Provide first aid.

All employees responsible for first aid are required to undertake this training and update it every three years thereafter.

# Hyperglycaemia ‘Hyper’
## **High** BGL ≥15.0 mmol/L

A high glucose level in the blood.

Possible causes of hyperglycaemia:

1. Too little insulin
2. Too much carbohydrate food
3. Inactivity
4. Stress
5. Illness

These are not always evident.

# Hyperglycaemia (≥ 15.0 mmol/L)

## Pump Therapy

Possible causes of hyperglycaemia are:

- not enough insulin (basal or bolus)
- flow of insulin interrupted – air bubble, kink, pump disconnected or suspended
- site not absorbing
- illness
- stress
- too much carbohydrate food
- inactivity.

# Hyperglycaemia

## Pump Therapy – Positive Ketones

If BGL ≥ 15mmol/L  ketones must be checked.

Ketones are positive when:

Blood ketones ≥ 0.6 mmol/L or the urine ketones are pink or purple.
Positive ketones require immediate treatment.

- Contact parent / carer for advice
- May need injected insulin and line change
- This is the responsibility of the parent / carer.

# Signs of Diabetic Ketoacidosis (DKA)

If the build-up of ketones is not addressed, they can rise to life-threatening levels. This is called Diabetic Ketoacidosis (DKA). The build-up of acids in the blood causes a dangerous internal imbalance of electrolytes and fluids and severe dehydration. DKA requires **urgent medical attention, as soon as possible** as a child can deteriorate and become extremely unwell very quickly.

Signs and symptoms include:

- dehydration
- abdominal cramping
- nausea and vomiting
- ketones in the urine or blood
- sweet smelling breath (acetone)
- rapid laboured breathing
- change in conscious state.

# Hyperglycaemia

## Pump Therapy – Negative Ketones

Ketones are negative when the blood ketones are <0.6

Do a correction bolus with the pump to bring blood glucose down (calculator).

Student can return to normal activities if blood ketones are negative, there are no symptoms of Hyperglycaemia and he/she feels well.

Re-check BGL and ketones in two hours.

# Illness and Diabetes

Things to do if a child complains they feel unwell:

- take a blood glucose level
- check for ketones
- contact the parents
- do not leave the child unattended
- send home to be cared for by their parents.

Vomiting is a diabetes emergency so contact parents or diabetes clinic immediately.

# PCH Diabetes Department

## PCH Diabetes Triage Nurse

Contact details:
Phone: (08) 6456 1111

Hours:
Monday - Friday
8.30am – 4.30pm

Press '2' – please leave a clear message
*Consent will be required if discussing a specific child/adolescent.*
*General information can be given if required.*

Email: pchdiabetestriage@health.wa.gov.au

## School Special Educational Needs:
## Medical and Mental Health Diabetes Liaison Teachers

Contact details:
Phone: (08) 6456 0383
Email: ssenmmh@education.wa.edu.au
Website: ssenmmh.wa.edu.au

## PCH Diabetes Doctor On Call

Contact details:
Phone: (08) 9483 6959
PCH Switchboard: (08) 6456 2222
24 hours, emergencies only!

### Helpful websites

- pch.health.wa.gov.au
- diabetes.telethonkids.org.au
- Diabetes Management and Action Plans

# Module 3 Quiz
## Management of T1DM - Pumps

| # | Question | True | False |
|---|---|---|---|
| 1 | An insulin pump is a delivery system that aims to mimic normal pancreatic function for people with T1DM. | | |
| 2 | A positive ketone reading is 0.6 or above and requires follow up if a student is on an insulin pump? | | |
| 3 | A blood glucose level below 2mmol/L requires disconnection or suspension of the insulin pump? | | |
| 4 | An injection may be necessary if a student has high glucose levels and is on pump therapy? | | |
| 5 | Honey should be put in the mouth if someone with T1DM is unconscious or unresponsive. | | |
| 6 | Increased thirst and extra toilet visits are signs/symptoms of hypoglycaemia? | | |

# Module 3
## Quiz answers

1. True
2. True
3. True
4. True
5. False
6. False