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# Toolkit for Medical Professionals Caring for Athletes with Diabetes

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## **Audience:**

- Medical professionals who care for athletes with diabetes.

## **Purpose:**

- This toolkit is designed to offer guidance and strategies for medical professionals who care for athletes with Type 1 diabetes.

## **Sections:**

1. Variables affecting blood glucose responses to exercise.
2. General bolus insulin reductions before aerobic activities.
3. Carbohydrate intake for aerobic activities.
4. Signs/Symptoms of Hypoglycemia
5. How to manage hypoglycemia
6. Post-exercise
7. AMSSM Position Statement

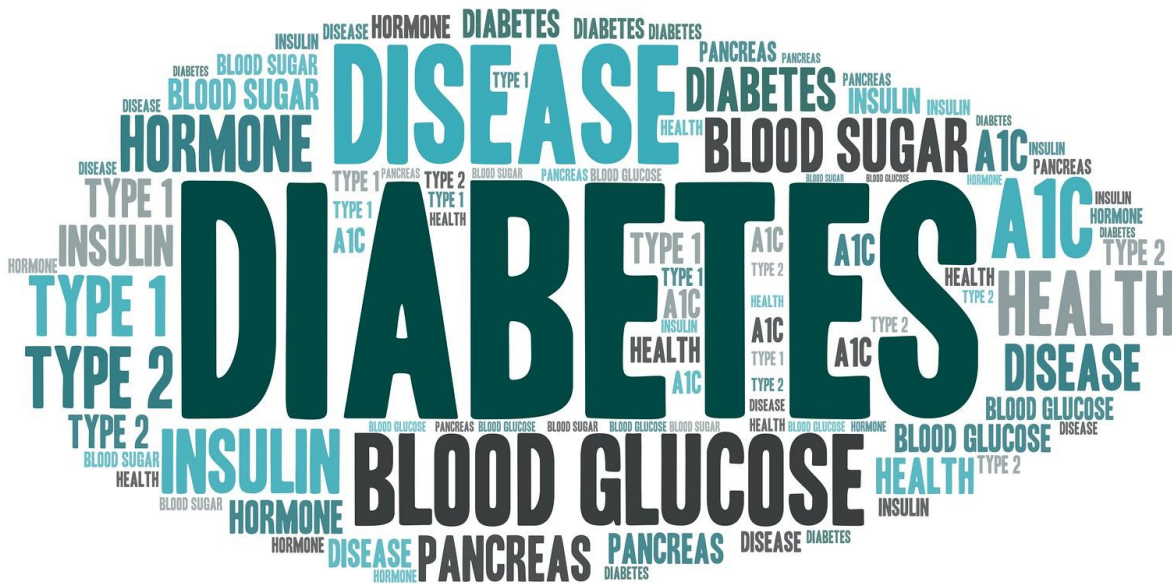


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## Variables Affecting Blood Glucose Responses to Exercise

Many factors can impact an athlete's blood glucose levels with activities. Below is a list of factors that should be considered when helping counsel an athlete regarding carbohydrate intake and insulin adjustments.

- Energy System used (exercise intensity and duration)
- Pre-exercises blood sugar levels
- Training Status (new vs usual activity)
- Prior exercise (same day or day before)
- Type of Insulin used.
- Timing of last meal and composition of meal
- Environmental factors (i.e. Temperature, humidity)
- Recent or current illness
- Type of exercise
- Time of day of exercise
- Previous episodes of hypoglycemia
- Timing of last insulin dose (circulating insulin levels)
- Other glucose-lowering medications
- Level of hydration
- Phase of menstrual cycle
- Pregnancy



## General Bolus Insulin Reductions Before Aerobic Activities Based on Duration and Intensity

Duration (Min)	Intensity (%)		
	Easy	Moderate	Vigorous
30	0-25 %	25-50%	50-75%***
60	25-50%	50-75%	50-100%
120	25-75%	50-100%	75-100%

CARBOHYDRATES



## Carbohydrate Increases for Aerobic Activities in Grams

Duration (Min)	Intensity	Pre-Exercise Blood Glucose Levels in mg/dL			
		< 100	100-150	150-200	> 200
30	Easy	5-10g	0-10g	0-5g	None
	Moderate	10-20g	10-20g	5-15g	0-10g
	Vigorous	15-30g	15-30g	10-25g	5-20g
60	Easy	10-25g	10-20g	5-15g	0-10g
	Moderate	20-50g	20-40g	10-30g	5-20g
	Vigorous	30-75g	30-60g	15-45g	10-30g
	Easy	10 to 20g of carbohydrate per additional hour of exercise			

>60	Moderate	20 to 40g of carbohydrate per additional hour of exercise
	Vigorous	30 to 60g of carbohydrate per additional hour of exercise



## Defining Exercise Intensity:



Exercise intensity can be defined in a number of ways. A quick and easy way to define exercise intensity is using the talk test.

## Talk Test

Medi-Share

Use the Talk Test to determine your physical activity intensity.

Exercise Intensity	Talk Level	Examples	
<b>Light</b> 	Normal breathing rate - can sing or talk	<ul style="list-style-type: none"> <li>• Slow Walking</li> <li>• Stretching</li> <li>• Light Housework</li> </ul>	

Exercise Intensity	Talk Level	Examples	
<b>Moderate</b> 	Breathing getting faster- can carry on a conversation but not sing	<ul style="list-style-type: none"> <li>• Brisk Walk</li> <li>• Cricket</li> <li>• Leisurely Swimming</li> </ul>	

Exercise Intensity	Talk Level	Examples	
<b>Vigorous</b> 	Gasping for breath - can't hold a conversation	<ul style="list-style-type: none"> <li>• Jogging</li> <li>• Soccer</li> <li>• Dancing</li> </ul>	

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## Symptoms of Hypoglycemia

- Buzzing in Ears 🦻
- Cold or clammy skin
- Dizziness or lightheadedness 🌀
- Double or Blurred Vision
- Elevated pulse rate
- Fatigue
- Hand Tremors
- Headache
- Inability to do basic math
- Insomnia
- Irritability 😡
- Mental Confusion ?
- Nausea 🤢
- Nervousness
- Nightmares
- Poor Physical Coordination
- Restlessness
- Shakiness
- Slurred Speech
- Sweating 💧
- Tingling of hands or tongue
- Tiredness 😴
- Visual spots
- Weakness

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## How to manage hypoglycemia

- The first step is always being prepared for hypoglycemic events.
  - Always having fast acting glucose available is imperative. This can be in the form of glucose tablets or gels, hard candies, and sports drinks. Think high glycemic foods.
  - Have an Emergency Action Plan (EAP).
- Recommendations for treating hypoglycemia
  - If the athlete is alert, treat hypoglycemic events with small amounts (4 to 15 grams) of rapidly digested carbohydrates. Wait 5-10 minutes and recheck blood glucose levels. Repeat as necessary until hypoglycemia has resolved.
  - If an athlete is not alert, administer glucose using a glucagon pen.
    - It is important to note that many athletes may have glucagon pens but they may be expired. Always ensure athletes, ATCs or medical professionals have an unexpired glucagon pen.
    - This is why having an EAP is important.



The Glucagon Emergency Kit

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## Post-exercise Considerations

Following exercise there is a **biphasic** increase in carbohydrate requirements to prevent hypoglycemia due to increased insulin sensitivity.

1. The **30 to 120 minutes after exercise** is a time when your muscles are primed to take up glucose without the need for much insulin. This is a time to refuel and replenish your glycogen stores within your muscles.
  - a. Eating a snack with approximately 15 grams of carbohydrate after strenuous activity within 30 minutes to 2 hours can help restore glycogen levels in muscle and prevent post-exercise lows.
    - i. Consuming protein and fat with this snack will also help prevent hypoglycemia which can occur later due to its slower absorption in the digestive track.
2. Additionally, approximately **7 to 11 hours after exercise** is when athletes can experience hypoglycemia.
  - i. This is particularly important when working out in the evening when monitoring for nighttime lows is essential!
3. Post-Exercise Hyperglycemia
  - a. Glycogen uptake into muscles is important for muscle recovery for recurrent bouts of exercise.
  - b. Generally after exercise muscles can take up glucose easier with less insulin; however, if your blood glucose runs high this may hamper glucose uptake into muscles resulting in quicker muscle fatigue the next time you exercise.
  - c. Therefore maintaining as normal glucose levels as possible after exercise can restore muscle glycogen more efficiently/effectively allowing you to train harder more frequently.

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## AMSSM Position Statement

The American Medical Society for Sports Medicine (AMSSM) developed a position statement in 2022 on the care of the athlete and athletic person with diabetes to “assist physicians and other health professionals in the management of athletes and active people with diabetes.” Their key points are noted below:

1. The number of athletes with type 1 diabetes participating in high school and college sport is not well known, but seems to be the same as the percentage of individuals with type 1 diabetes in the general population.
2. Medical evaluation is not needed before low to moderate exercise in patients with diabetes who receive regular care.
3. Resistance exercise in patients with type 1 diabetes lowers A1c levels.
4. Reduction in basal insulin is needed with vigorous exercise.
5. Newer medications for type 2 diabetes generally do not need an adjustment with exercise.
6. Every school should have an emergency action plan (EAP) for athletes with diabetes and possible hypoglycemia. A sample EAP is available in the Appendix 1, Supplemental Digital Content 1, <https://links.lww.com/JSM/A254>.

To see the full position statement on the care of the athlete or athletic person with diabetes please visit: [https://journals.lww.com/cjsportsmed/fulltext/2022/01000/american\\_medical\\_society\\_for\\_sports\\_medicine.4.aspx](https://journals.lww.com/cjsportsmed/fulltext/2022/01000/american_medical_society_for_sports_medicine.4.aspx)