



# **Pediatric Nutrition and Managing Children with type 1 and type 2 diabetes (obesity)**

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# Disclosure

- I have no relevant financial or nonfinancial disclosures for this presentation.



*“I’m Diabetes, and these are my constant companions: Stereotype, Ignorance and Rudeness.”*

Diabetic is an adjective not a noun. They are a person first. They are not defined by their disease.

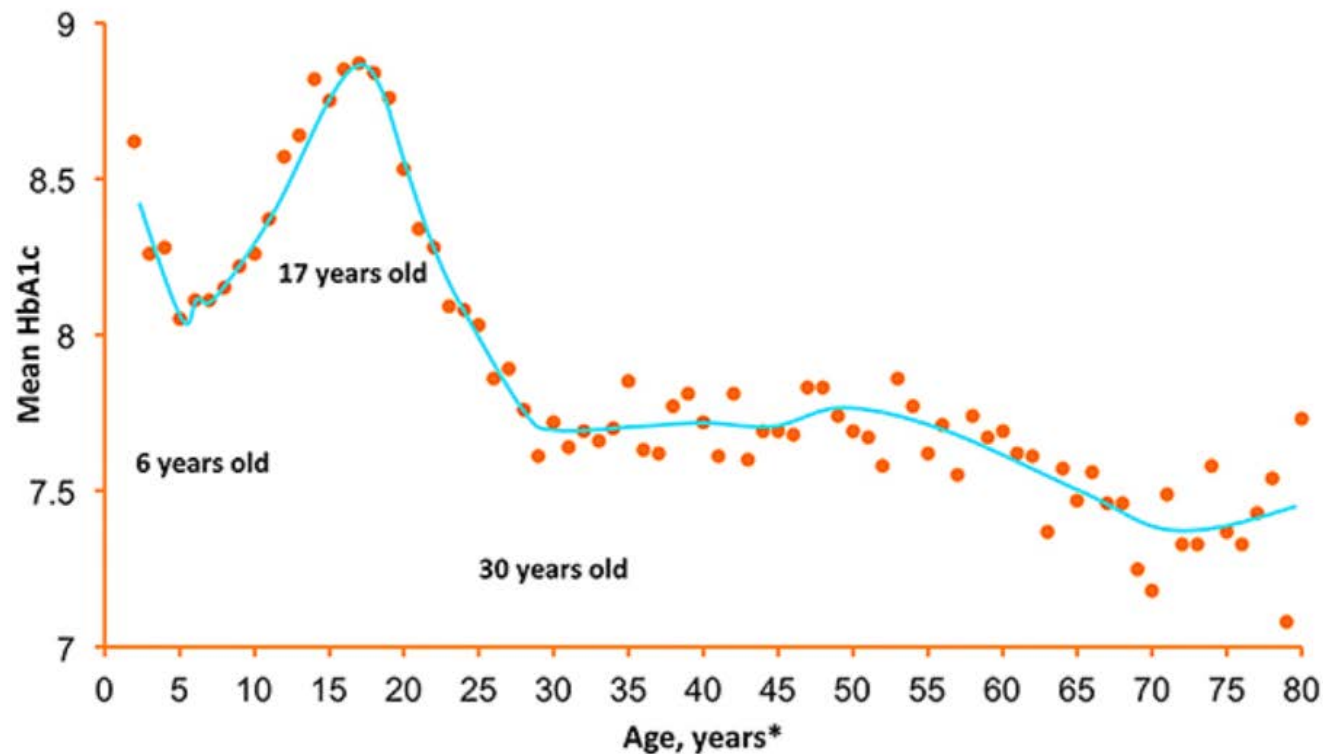
**THE APPROPRIATE TERM IS  
SOMEONE WITH DIABETES,  
NOT DIABETIC.**

# Overview

- Type 1 education and how it evolves
  - Advanced education for management
- Low carbohydrate diets
- Diet and exercise recommendations for type 1 and type 2 diabetes
- Education focus for type 2 diabetes
- Extreme measures for managing type 2
- Inclusion for children

# Pediatric Hemoglobin A1c goal

- The American Diabetes Association Hemoglobin A1c goal is  $<7.5\%$ .



# Initial education with new diagnosis

- Focus on
  - what is a carbohydrate (sources)
  - how to carb count
  - Foods that have little/small affect on BG
  - how to measure
  - planned meal and snack times, less grazing
- Diagnosis is a scary time and the focus should be more of survival and how to modify their current life
  - Trying to change food choices at first can be too much

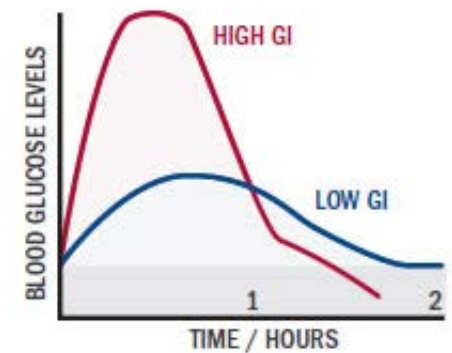
# Advanced nutrition education



- Complex carbohydrates vs simple
  - Teaching families which foods are higher in whole grain, higher fiber, and low in sugar
  - Complex carbs take longer to digest, keeps satiated longer, and tends to have less of a blood glucose excursion
- Protein pairing
  - Lean protein with carbs to help with fullness and bg excursion
  - Heart healthy



- Glycemic Index- helping guide carbohydrate choices
  - Value assigned to foods based on how slowly or how quickly those foods cause increases in blood glucose levels.
  - High GI value- quicker spike; full digestion
  - Low GI value- gradually supplying glucose to bloodstream thus continuous insulin release to cause increase; partial digestion



Phelan et al. Pediatric Diabetes (2018)

Glycemic Index and Diabetes

Glycemic Index and Glycemic Load for 100+ Foods

*Pumping Insulin: Everything for Success on an Insulin Pump and CGM*

# Glycemic index

- Starches tend to have a higher glycemic response because they are hydrolyzed into only glucose
- Sugars such as sucrose and lactose are hydrolyzed into half glucose and half fructose/galactose

# Glycemic index

- Healthy fat and fiber tend to lower GI of a food
- *Often* more cooked and processed foods tend to have a higher GI
- Combining a high GI food with a low one, can help balance out the effect on blood glucose levels

Bell et al. Diabetes Care (2015)

Phelan et al. Pediatric Diabetes (2018)

Glycemic Index and Diabetes

Glycemic Index and Glycemic Load for 100+ Foods

*Pumping Insulin: Everything for Success on an Insulin Pump and CGM*

# Glycemic index

- Lower glycemic foods tend to be higher in fiber which the ADA does recommend
- Some studies show it can lower A1c by 0-0.43% (0.5% decrease in A1c can decrease microvascular complication risk by 20%)
- Could be used as a tool to help with continual BG optimization

# Glycemic index

- May be more beneficial for type 2/obese patients
  - decrease insulin secretion/demand (less meds)
  - greater weight loss in obese compared to *control* diet (probably higher fiber)
  - improve lipid level
  - Of note, one study (*Visuthranukul et al.*) found that low GI and low fat diets had similar effects on BMI and fat mass

Brand-Miller et al. Diabetes Care (2003)  
Thomas et al. British Journal of Nutrition (2010)  
Visuthranukul et al. Pediatric Research (2015)  
Wang et al. Primary Care Diabete (2015)



**BUT WHAT ABOUT USING  
LOW CARB DIET TO IMPROVE  
DIABETES ?**

# Low carbohydrate diet

- Now commonly known as the “keto” diet
- No set definition of “low carb”
  - Often  $\leq 20$ -40 grams net carbs daily
- Foods often avoided: pasta, rice, cereal, all fruit except small amounts of berries, beans, legumes, root veggies (carrots, sweet potatoes, etc), sugar sweets, alcohol

# Why individuals may go low-carb and possible benefits

- Weight loss
  - Obese population
- Decrease glycemic variability
- Decrease insulin resistance
  - Obese population
  - Decrease insulin needs/less medications
- Improve A1c

Krebs et al. Asia Pac J Clin Nutr (2016)

Leow et al. Diabetic Medicine (2018)

Neilsen et al. Diabetology and Metabolic Syndrome (2012)



# Risks with low carb diet and possible negative effects

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- Deficiencies (calcium, thiamin, iron, B6)
- Growth/anthropometric deficits
- Poor concentration/fatigue
- Dyslipidemia
- Higher number of hypoglycemic episodes
- Encouraging disordered eating/food behaviors

# Can there be a middle ground



- Keeping to lower carbs but not considered keto
  - Some research showed that having <100g/day improved glycemic control, improved a1c without increased lipid levels and without increased hypoglycemic episodes
  - Focus on lower GI foods, higher fiber, and lower saturated fats



# WHAT DOES THE AMERICAN DIABETES ASSOCIATION RECOMMEND?

# What does the ADA recommend?

- Most recent data suggests that there is no ideal dietary distribution of calories among carb, fat, protein for someone with diabetes

- calculated an acceptable macronutrient distribution ranges
  - carbohydrate 45%-65% of energy
  - protein 10%-35% of energy
  - fat 20%-35% of energy (limit saturated and trans fats)

# Healthy goals ADA recommends

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- Carbohydrates should be from veggies, fruits, legumes, whole grains, dairy, along with focus on higher fiber and lower in glycemic load
  - Avoid sugar beverages to control weight
  - Non nutritive sweeteners- potential to reduce overall calorie and carb intake

# Healthy goals ADA recommends

- No ideal total dietary fat content
  - emphasize elements of Mediterranean diet (rich in mono and poly unsaturated fat)
  - Foods rich in omega 3 (fish, seeds, nuts)
- As general population, limit sodium to <2300mg/day

# Heart health

- American Heart Association categorizes children with type 1 in highest tier for cardiovascular risk
  - Diet with <7% total calories from saturated fat, <200mg dietary cholesterol
- Data from SEARCH study found that improved glucose control improved lipid profile (though did not normalize it with just that change)



# What does the ADA recommend



- Mediterranean Diet and Dietary Approaches to Stop Hypertension (DASH), and plant based diet are examples of healthful eating patterns that have shown positive results in research.
  - however should focus on individualized meal planning to meet patient needs

**ARE THESE  
RECOMMENDATIONS MEANT  
FOR TYPE 2 INDIVIDUALS?**

# Type 1 vs Type 2 recommendations

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- Yes recommendations are the same
- However, there is focus on losing weight
  - Goal of 7-10% decrease in excess weight
- Evidence suggests that there is more rapid decline in beta cell function and accelerated development of diabetes complications in type 2 youth

Children and Adolescents: Standards of Medical Care in Diabetes. Diabetes Care (2019)

Lifestyle Management: Standards of Medical Care in Diabetes. Diabetes Care (2019)

Obesity Management for the Treatment of Type 2 Diabetes Standards of Medical Care in Diabetes. Diabetes Care (2019)

Zeitler et al. Pediatric Diabetes (2014)

# Type 1 vs type 2 recommendations

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- For type 2 individuals, may consider giving carb range to help reduce insulin resistance
- Type 2 usually need more counseling on healthy eating/lifestyle changes
  - However if someone with type 1 is overweight/obese, nutrition goals/recommendations will likely be similar

Children and Adolescents: Standards of Medical Care in Diabetes. Diabetes Care (2019)

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Zeitler et al. Pediatric Diabetes (2014)

# 2019 ADA lifestyle management

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- In most recent recommendations, ADA stated that low carbohydrate diets may result in improved glycemia and potentially reduced diabetes medications in type 2
  - Noted concern for long term sustainability
  - Not adequate research for type 1

# Exercise recommendations

- At least 60 minutes of moderate-to-vigorous aerobic activity daily (can be done in segments)
  - Muscle and bone strengthening activity  $\geq 3$  days/week
  - Improve blood glucose control, weight reduction, reduce cardiovascular risk factors, improve well being
- Decrease sedentary time. Screen time  $< 2$ hr/day

# Educating type 2 pediatric families

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- Work with family to understand their health beliefs and behaviors. Design plan based around those beliefs and behaviors
- Small achievable goals and understanding that changes are meant to be for a lifetime/permanent
- Behavioral changes may require reward system for success

# Dietary focus for families

- Increase fruit and veggie intake
- Reduce processed, packaged foods
- Reduced foods made with refined sugars (high fructose corn syrup, candy)
- Portion control. Serve food in bowl or plate (not straight from package)



# Dietary focus for families

- Less meals out
- Change to brown rice and wholegrain products
- Focus on nutrient dense foods and healthy eating patterns
- Decrease sugar added beverages and calorie dense (low nutrient) foods

# Change in family diet behaviors

- Limit availability of high fat, calorically dense food and drink in home
- How to read food label
- Parental modeling of healthy eating
- Avoid overly restricting
- Positive reinforcement of goal achievement. Avoid blame for failure

# Change in family diet behaviors

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- Schedule meals and sit as family at table
- Avoid electronics at table
- Food and activity log for accountability and awareness

# Be Healthy Today; Be Healthy For Life

- During the study “Treatment Options for Type 2 Diabetes in Adolescents and Youth (TODAY)”, standardized education material was created for type 2 families participating and now is a resource from ADA
  - managing blood glucose, healthy eating, reading a food label, exercise, goal setting, stress management, etc.

# Be Healthy Today; Be Healthy For Life

**S STOP** before you make a decision. What kind of snack is best to choose? Is it better to go for a walk or watch TV?

**T THINK** about your choices before you act. How will they affect you and your diabetes care plan? For example, a piece a fruit will affect your blood sugar level differently than a bag of chips.

**A ACT** on the better choice for your health. Remember, change is slow. No one expects you to always choose the healthier option. Small steps add up to big results!

**R REFLECT** on your progress. Give yourself credit when you make a healthy choice. If you choose the bag of chips, think about what you can do to make up for your extra calories. How can you make a different decision next time?

# Be Healthy Today; Be Healthy For Life

## Step 1. Avoid drinks with sugar, like sodas, sports drinks and juices. Instead, choose to drink:

- ▶ Water—drink 6 to 8 glasses a day
- ▶ Diet soda (like diet cola, diet root beer)
- ▶ Diet drinks (like sugar-free flavored water)
- ▶ Skim or 1% milk—up to 3 cups per day



## Step 2. Eat the right-sized portions! Know how much you're eating for meals and snacks.

- ▶ Use a measuring cup.
- ▶ Meat servings at a meal should be the size of a deck of cards.
- ▶ Use small baggies to portion out your snacks.
- ▶ Eat one sandwich instead of two.
- ▶ Put food on your plate before sitting down at the table. Avoid placing foods at the dinner table and taking portions from large serving bowls.
- ▶ Always leave something over on your plate.

## Step 3. Don't skip meals. Try to eat three meals each day.

- ▶ Eat breakfast!
- ▶ Avoid eating late at night.
- ▶ If you're hungry between meals, choose healthy snacks.





# Be Healthy Today; Be Healthy For Life

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## Food choices

- Whole grain breads, cereals, oats
- Fresh fruit or canned fruit in water or juice
- Low fat milk and light yogurt
- Whole wheat pasta, brown rice, barley, bulgur

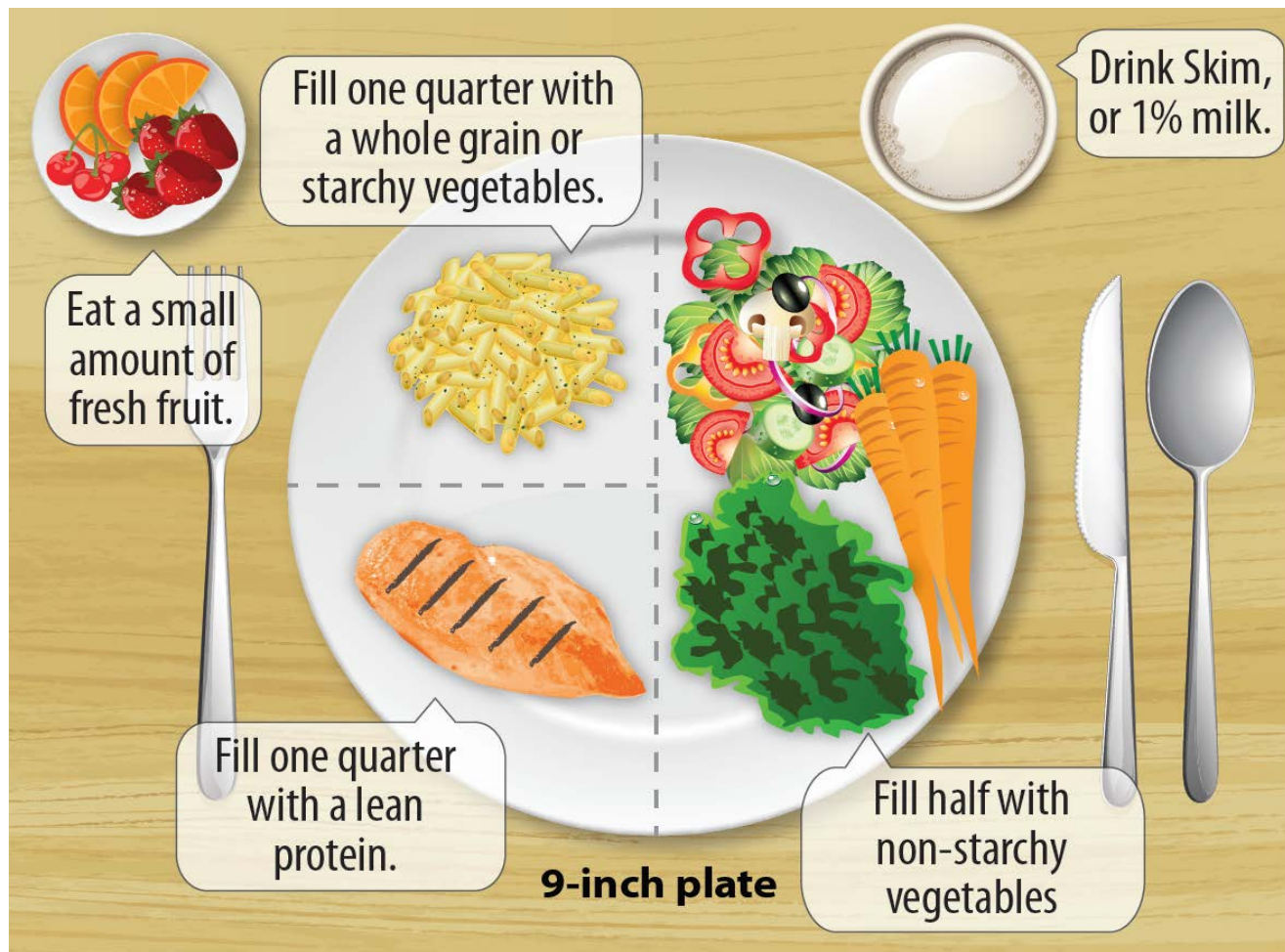
# Be Healthy Today; Be Healthy For Life

## Food choices

- Baked potato with skin
- Vegetables (any kind)
- Beans
- Snacks- pretzels, baked chips, light popcorn, animal crackers, graham crackers, baked fish crackers, sf popsicles



# Healthy Plate



# When lifestyle change is not enough

- Metabolic surgery may be considered
  - BMI  $>35\text{kg}/\text{m}^2$  with comorbidities and uncontrolled glycemia despite lifestyle and pharmacologic interventions
  - BMI  $>40\text{kg}/\text{m}^2$  with or without comorbidities

# Bariatric surgery in youth

- TODAY study found those with type 2 and BMI of 35kg/m<sup>2</sup> demonstrated rapid progression of cardiovascular risk factors during treatment
  - Hypertension tripled over 3 years

# Bariatric surgery in youth

- The Teen Longitudinal Assessment of Bariatric Surgery (TEEN-LAB) study found the following results 1 year post surgery:
  - Average BMI loss of 15kg/m<sup>2</sup>
  - 74% remission of hypertension
  - 66% remission of dyslipidemia
  - 86% resolution of kidney function.
  - Similar improvements with other comorbidities (OSA, PCOS, fatty liver)

# Bariatric surgery in youth

- Found to have remission rate of type 2 diabetes to be 70-100%
- Risks and possible complications to consider
  - Gastric stricture, reoperation, leaks, dehydration
  - Nutritional deficiencies- vitamin B12, thiamine, vitamin D



# THINGS TO REMEMBER WHEN WORKING WITH CHILDREN

# Inclusion with diabetes

- Encourage healthy food choices not because of diabetes but because everyone needs nutrients. Everything in moderation.
  - kids want to be able to pack chips for lunch just like their friends; carrot sticks are not the same as chips
  - If everyone is eating cereal in the house, then the child with diabetes should also have cereal

# Things that could result from exclusion



- Restricting
  - When restricting carbs, tends to lead to sneaking and feeling different
  - Kids will have a hard time choosing the low carb, protein pancake over their favorite cereal even though that cereal will make them higher.
- Disordered eating
  - Avoidance and/or fear of certain foods that will make their blood glucose go up and cause damage
  - Avoid taking insulin



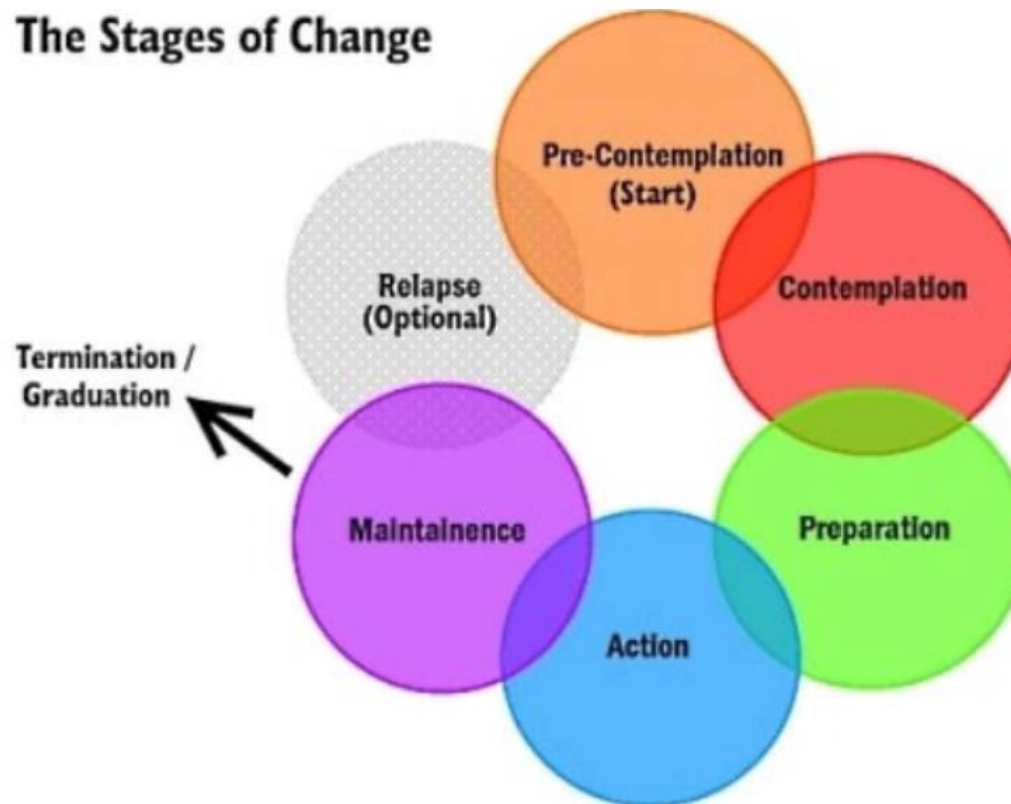
# Readiness to change

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- Patients may have many changes or improvements they need to make to manage diabetes but all those items won't happen if they are not ready to make the change
  - Find out what is important to them
  - Use motivational interviewing to learn what they are willing to change currently in their care

# Readiness to change

- Together help create Small, Measurable, Attainable, Realistic, Timely (SMART) goals



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**TOOLS FOR SUCCESS INCLUDE  
MAKING SURE CHILDREN AND  
PARENTS HAVE APPROPRIATE  
RESPONSIBILITY FOR  
DIABETES MANAGEMENT**

# Age appropriate self care tasks

Age	Self Care Tasks
<b>8 years and younger</b>	<ul style="list-style-type: none"><li>• Parents do most /all tasks</li><li>• Gradually learn to tolerate tasks</li><li>• Perform bg check with supervision</li><li>• Help choose injection/sites</li></ul>
<b>8 to 12 years old</b>	<ul style="list-style-type: none"><li>• With supervision, draw up insulin</li><li>• With supervision, give insulin</li><li>• Be involved in calculations</li></ul>
<b>13 to 18 years old</b>	<ul style="list-style-type: none"><li>• Carb counting</li><li>• Draw up/inject insulin</li><li>• Help with record keeping</li><li>• Review logs with family</li><li>• Work toward independence with pump/injections</li></ul>

# Transitioning care from parents to patients

- Assess knowledge
  - carb counting quizzes
- Provide technology apps/resources
  - My Fitness Pal, My Net Diary, Lose It, Fooducate, Calorie King, insulin calculate, Easy Dose, My Sugr,
  - Websites: Eating well.com, Skinny taste.com, Cooking light.com, Kidshealth.org

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