Diabetes Management in Hospice-Management of Anti-Diabetic Medications and Insulin at End of Life

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ProCare HospiceCare

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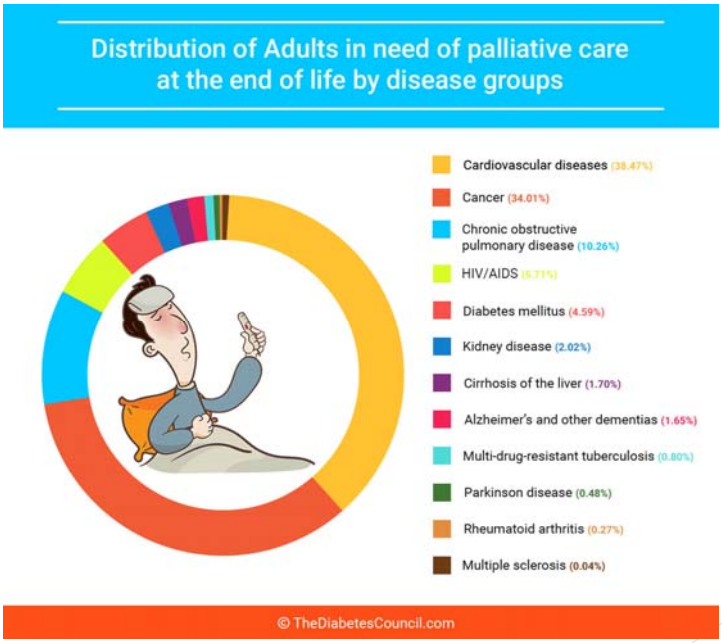
Objectives

- Understand goals of therapy
- Identify the differences in the management of type 1 and type 2 diabetes
- Review signs and symptoms of hypo/hyperglycemia
- Review blood sugar targets and monitoring
- Understand reasons for discontinuation of certain drugs
- Diabetes treatments (insulin or non-insulin therapies)
- Discuss steroid induced diabetes

Introduction

- Estimated that 425 million people worldwide have diabetes
- Chronic disease associated with multiple complications
- It is also connected to an increased risk for the development of some types of cancer
- Among the ten leading causes of death worldwide
- Increases with age



Diabetes Management standard goals

- Tight glycemic control to meet general targets
- Avoid acute decompensation
- To prevent tissue damage caused by too much sugar in the blood stream
- Prevent or delay the appearance of late disease complications
- Decrease mortality
- Maintain a good quality of life
- Avoid hypoglycemia

Diabetes Management in the Hospice Patient

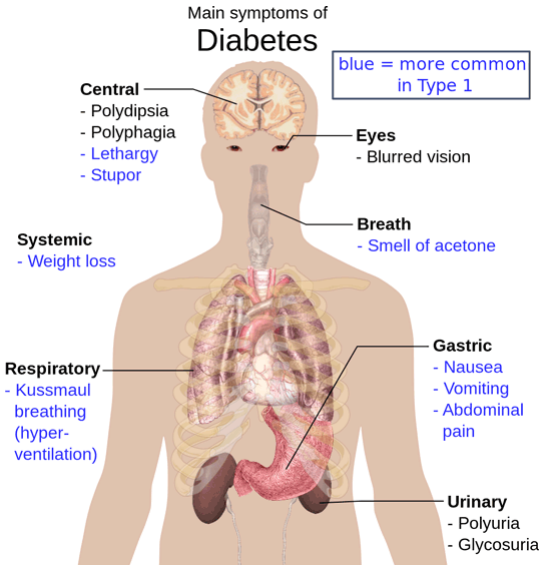
- Relieve current symptoms of disease
- Provide comfort to the patient
- One touch monitoring
- Target sugar levels
- Preserving quality of life
- No goal of achieving long-term positive outcomes

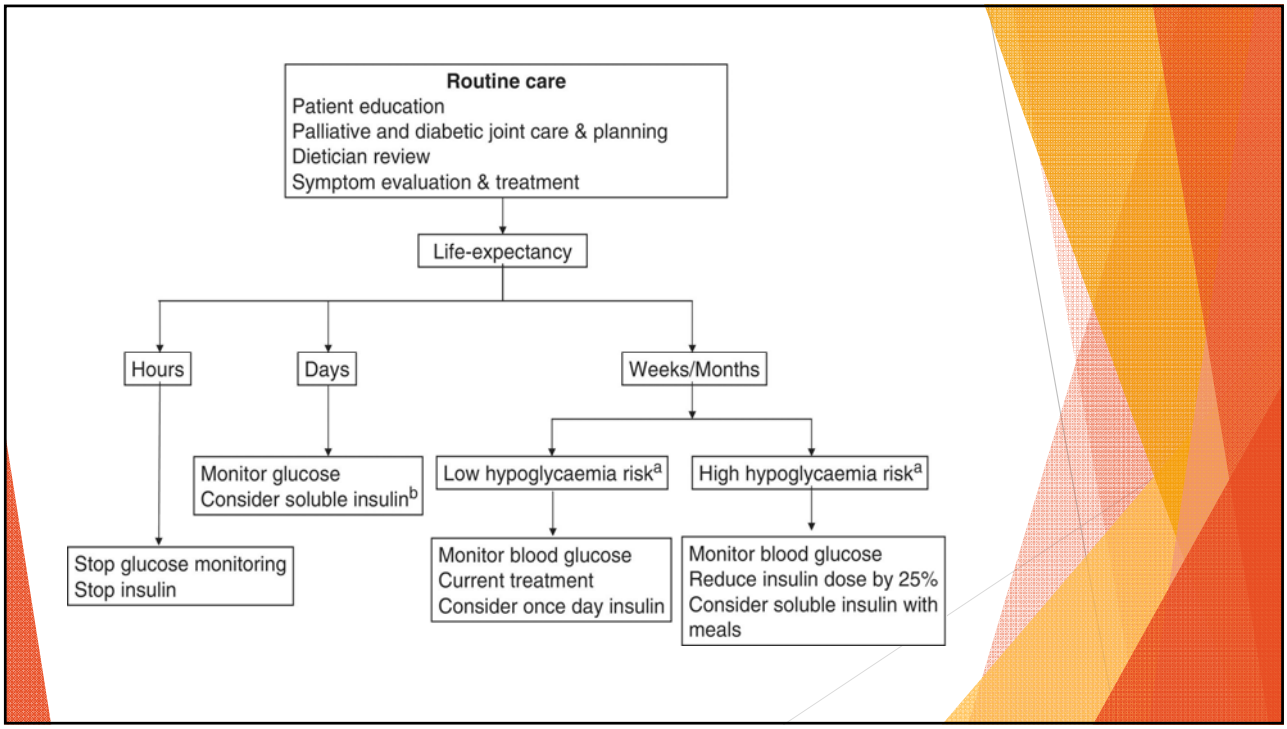
Goals of a diabetic patient in hospice care

- Minimize risk of hypoglycemia
- Simplified treatment regimens are preferred
- Painless and symptom free death
- Avoid metabolic de-compensation and related emergencies
- Avoid foot complications
- Avoid dehydration
- Monitor glucose lowering therapy
- Sole use of sliding scale should be avoided

Diabetes

- Type 1 Diabetes
- Type 2 Diabetes
- Steroid Induced Diabetes





Monitoring

- Both Type 1 and Type 2 diabetes require reduced monitoring
  - Insulin- 2-3 times per week
  - Oral hypoglycemic- 1-2 times per week
- Target glucose in terminal illness
  - 108-270mg/dl
- Target glucose in later stages
  - 108-360mg/dl

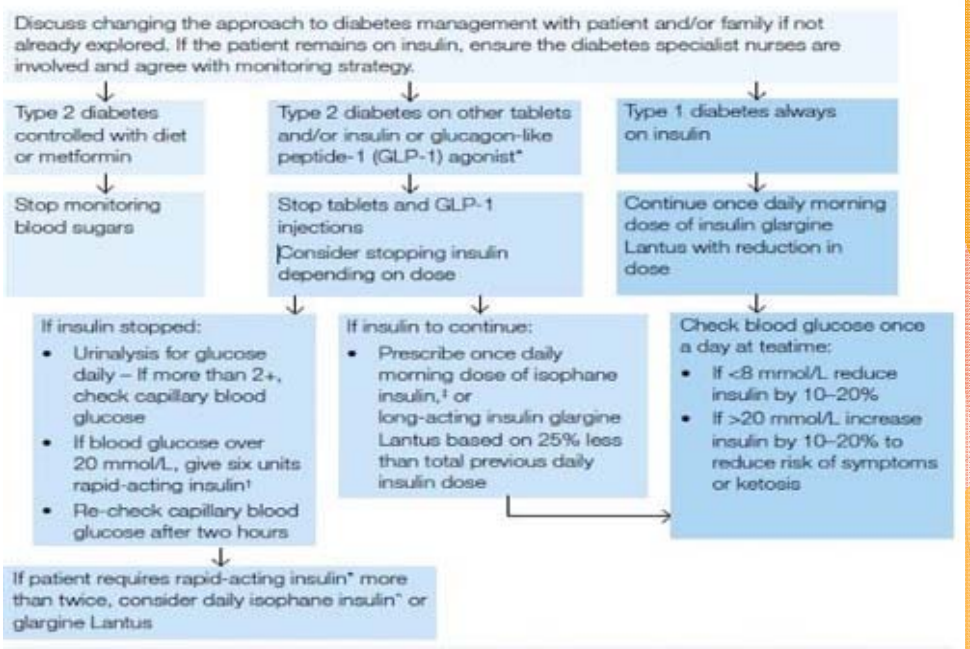
	Special considerations	Rationale	A1C	Fasting and premeal blood glucose targets	Glucose monitoring
Community-dwelling patients at skilled nursing facility for short rehabilitation	• Rehabilitation potential • Goal to discharge home	• Need optimal glycemic control after recent acute illness	• Avoid relying on A1C due to recent acute illness • Follow current glucose trends	• 100–200 mg/dL	• Monitoring frequency based on complexity of regimen
Patients residing in LTC	• Limited life expectancy • Frequent changes in health impacting glucose levels	• Limited benefits of intensive glycemic control • Focus needs to be on better quality of life	• <8.5% (69 mmol/mol) • Use caution in interpreting A1C due to presence of many conditions that interfere with A1C levels	• 100–200 mg/dL	• Monitoring frequency based on complexity of regimen and risk of hypoglycemia
Patients at end of life	• Avoid invasive diagnostic or therapeutic procedures that have little benefit	• No benefit of glycemic control except avoiding symptomatic hyperglycemia	• No role of A1C	• Avoid symptomatic hyperglycemia	• Monitoring periodically only to avoid symptomatic hyperglycemia

Type 1 Diabetes

- Goal avoiding symptoms of hyper/hypoglycemia
- Little Monitoring
- Simplified insulin regimen
- Last days patient will require basal insulin and some pre-prandial short acting insulin if still eating

Type 2 Diabetes

- Type 2 diabetes guidelines recommend less aggressive glycemic control for patients with limited life expectancy
- Overly tight glycemic control in hospice patients include:
  - Discussions about reducing or stopping chronic medications are uncomfortable
  - Many patients and families believe that mild hyperglycemia can cause symptoms



Factors affecting glycemic control in patient's with type 2 diabetes in EOL

- Stress response to severe or sustained illness
- Organ failure
- Malignancy
- Chemotherapy
- Use of steroids
- Frequent infections
- Poor appetite/smaller meals
- Cachexia/weight loss
- Dehydration
- Difficulty taking medications

Symptoms of Hypoglycemia

- Shakiness
- Dizziness
- Sweating
- Hunger
- Irritability or moodiness
- Anxiety or nervousness
- Headache

Symptoms of Hyperglycemia

- Increased thirst
- Fatigue
- Polyuria
- Dehydration
- Blurred vision
- Weight loss
- Headaches
- Urinary incontinence
- Electrolyte abnormalities

Hospice patients are at high risk of hypoglycemia/hyperglycemia

- Anorexia/cachexia
- Progressive renal/hepatic impairment
- Bowel obstruction or vomiting
- Pancreatic cancer

Blood sugar targets in hospice patients

- If patient is still testing
  - A1C target <8.5%
  - Random glucose ~200mg/dl
- If patient is not testing
  - Discontinue as long as patient is comfortable

Less aggressive glycemic treatment

- Reduce pill burden
- Finger sticks
- Laboratory monitoring
- If not on insulin and sugars stable
  - Stop monitoring
- Prognosis weeks to days
  - Only do prn

Medications that can increase blood sugars

- Benzodiazepines
- Thiazide diuretics
- Beta-blockers
- Steroids
- Birth control pills
- Progesterone
- Epi-pen
- Asthma inhalers

Managing Type 2 Diabetes

- If oral medication causes hypoglycemia
  - Stop or decrease intake
- If medications cause side effects
  - Stop
- Avoid long-acting sulfonylurea preparations if small meals are taken
- Blood sugars >270mg/dl
  - Switch to insulin
- Insulin alone- basal insulin every day or twice daily
- Basal insulin will be increased with the use of the sliding scale

	Clinical presentation that may interfere with diabetes management	Possible strategies to manage diabetes
Confusion, cognitive dysfunction, delirium	• Irregular dietary intake or skipped meals • Refusal of blood glucose monitoring • Refusal of medications or injections	• Offer a regular diet and preferred food items • Offer food substitutions if meal intake is <75% • Administer prandial insulin immediately after meals to match carbohydrate intake to avoid hypoglycemia • Block testing (monitoring at different times of the day to identify patterns, e.g., checking fasting glucose on some days, prelunch or predinner on other days) to provide pattern without multiple daily checks • Increase glucose monitoring during acute mental status or behavior changes • Switch to a long-acting form of oral medications that can be given once daily or to crushed or liquid formulation • Switch to mixed insulin to decrease daily injections, although hypoglycemia risk will remain high
Depression	• Not interested in activities • Weight loss, refusal to eat • Excessive intake of sugary foods	• Assess and treat depression • Encourage physical activity as possible • Encourage socialization, especially during meals

Physical disability	• Unable to exercise • High risk of deconditioning and pressure ulcers • Require assistance with food and fluid intake • High risk of functional disability	• Encourage activity that patient can perform, e.g., exercise pedals for non–weight-bearing patients • Assessment for pressure ulcers • Encourage ADL independence
Excessive skin problems, e.g., infections, ulcers, delayed wound healing	• Causes hyperglycemia • Anorexia, poor dietary intake • May decrease physical activity	• Nutrition consult • More frequent glucose monitoring and temporary regimen intensification • Exercises appropriate for non–weight-bearing patients • Regular skin checks and foot assessments by nursing staff
Hearing and vision problems	• Decreased hearing can lead to isolation and depression • Low vision has large impact on quality of life	• Continue hearing and vision screening and preventive strategies if feasible
Oral health problems, teeth decay, dry mouth	• High risk of infection • Weight loss due to loss of chewing ability • Loss of taste sensation	• Regular oral health evaluations and cleaning • Ensure appropriate daily oral care

ADL, activities of daily living (such as bathing, toileting, eating, dressing, transferring).

Reasons to continue medication

- Patient has type 1 diabetes
- Patient is symptomatic from hyperglycemia
- Patient wants to continue to test blood sugar
- Patient has high PPS score with adequate intake

Reasons for discontinuation of medication

- Tight glucose control only has a long term benefit
- Hyperglycemia in most cases are asymptomatic
- Terminal patients have a higher risk of hypoglycemia with reduced intake
- Frequent laboratory monitoring required
- Many medications are contraindicated

Diabetes medications are usually discontinued at end of life

- Less side effects
- Less pills
- Risk vs benefit
- Impact on quality of life
- PPS score

TYPES AND NAMES OF DIABETES MEDICATIONS*

CLASS	BRAND NAMES
Biguanides	Glucophage, Fortamet
GLP-1 receptor agonists	Trulicity, Tanzeum, Bydureon, Victoza
DPP-IV inhibitors	Januvia, Onglyza, Nesina
SGLT-2 inhibitors	Invokana, Farxiga, Jardiance
Sulfonylureas	Amaryl, Glucotrol, DiaBeta, Glynase
Insulin	Tresiba, Toujeo, Afrezza, Levemir, Lantus
Combination drugs	Janumet, Jentadueto, Kombiglyze, Tradjenta, Kazano, Oseni

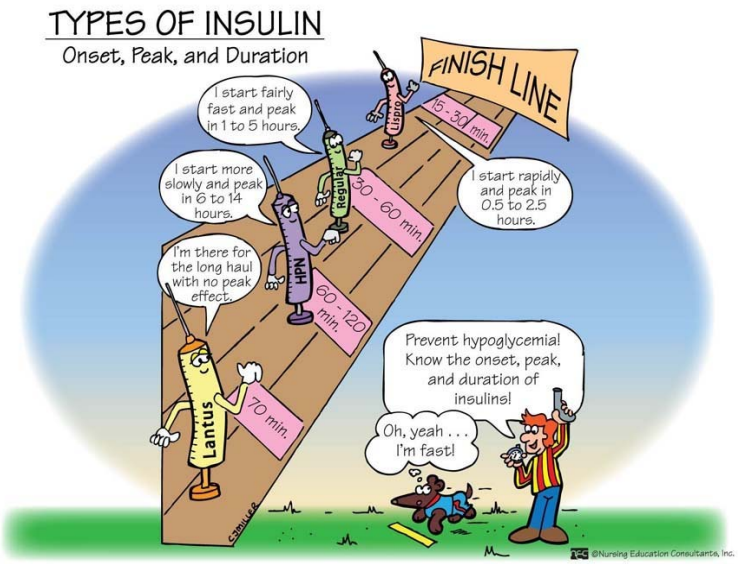
*This chart provides examples of some, but not all, medications used to treat diabetes.

	Advantages	Disadvantages	Caveats in LTC population
Biguanides	• Low hypoglycemia risk	• Many contraindications in population with high comorbidity burden	• Can be used until estimated glomerular filtration rate is <30 mL/min/1.73 m^2
Metformin	• Low cost • Known side effects • Established safety record	• May cause weight loss or gastrointestinal upset in frail patients	• Extended release formulation has lower complexity and fewer gastrointestinal side effects • Assess for vitamin B_{12} deficiency
Sulfonylureas	• Low cost	• High risk of hypoglycemia • Glyburide has the highest risk of hypoglycemia and should be avoided	• Avoid if inconsistent eating pattern • Careful glucose monitoring during acute illness or weight loss • Consider discontinuing if already on substantial insulin dose (e.g., >40 units/day)
Meglitinides	• Short duration of action	• Can be held if patient refuses to eat	• Some risk of hypoglycemia • Increased regimen complexity due to multiple daily mealtime doses
TZDs	• Low hypoglycemia risk • Low cost • Can be used in renal impairment	• Many contraindications in population with high comorbidity burden	• Less concern for bladder cancer if shorter life expectancy
DPP-4 inhibitors	• Low hypoglycemia risk • Once-daily oral medication	• High cost • Lower efficacy	• Can be combined with basal insulin for a low complexity regimen
SGLT2 inhibitors	• Low hypoglycemia risk	• High cost • Limited evidence in LTC population	• Watch for increased urinary frequency, incontinence, lower blood pressure, genital infections, and dehydration
GLP-1 agonists	• Low hypoglycemia risk • Once-daily and once-weekly formulation	• High cost • Injection	• Monitor for anorexia and weight loss
Insulin	• No ceiling effect • Many different types can be used to target hyperglycemia at different times of the day	• High risk of hypoglycemia • Matching carbohydrate content with prandial insulin if variable appetite	• Basal insulin combined with oral agents may lower postprandial glucose while reducing hypoglycemia risk and regimen complexity • Continue basal–bolus regimen in patients with type 1 or insulin-deficient type 2 diabetes

DPP-4, dipeptidyl peptidase 4; GLP-1, glucagon-like peptide 1; SGLT2, sodium–glucose cotransporter 2; TZDs, thiazolidinediones.

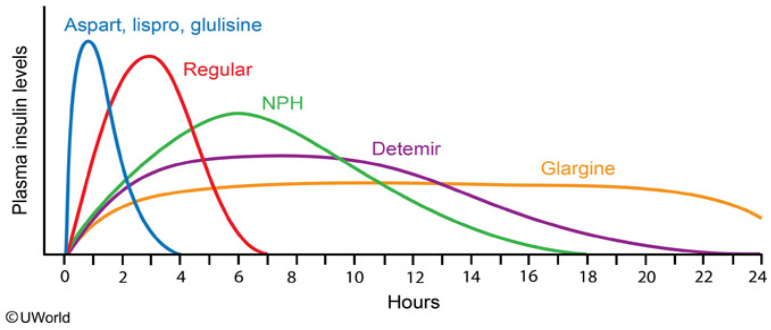
Insulin

- Rapid
- Short
- Intermediate
- Long
- Pre-mixed
- Sliding scale



	Type	Trade Name	Onset	Peak	Duration
Rapid Acting	**aspart** **glulisine** **lipsro**	NovoRapid Apidra Humalog	10-15m	1-1.5h	3-5h
Short Acting	**Regular**	Humulin-R Novolin grToronto	30-45m	2-3h	6.5h
Intermediate	**NPH**	Humulin-N Novolin ge NPH	1-3h	5-8h	14-18h
Long Acting	**detemir** **glargine**	Levemir Lantus	1-2h 1-2h	8-10h no peak	12-24h 22-24h

Pharmacokinetic profiles of common insulin preparations



Current regimen	Suggested steps
SSI is the sole mode of insulin treatment	• Review average daily insulin requirement over prior 5–7 days • Give 50–75% of the average daily insulin requirement as basal insulin • Stop SSI • Use noninsulin agents or fixed-dose mealtime insulin for postprandial hyperglycemia • Consider giving basal insulin in the morning to impact postprandial hyperglycemia and reduce risk of early-morning hypoglycemia
SSI is being used in addition to scheduled basal insulin	• Add 50–75% of the average insulin requirement used as SSI to the existing dose of basal insulin • Use noninsulin agents or fixed-dose mealtime insulin for postprandial hyperglycemia
SSI is being used in addition to basal and scheduled meal time insulin (i.e., correction dose insulin)	• If correction dose is required frequently, add the average correction dose before a meal to the scheduled mealtime insulin dose at the ***preceding*** meal. For example, if glucose values are consistently elevated before lunch or dinner requiring 2–3 unit corrections, the scheduled breakfast or lunchtime dose of insulin could be increased by the average correction dose (2 units), respectively. Similarly, if glucose values are consistently elevated before breakfast requiring correction doses, the scheduled basal insulin dose could be increased by the average correction dose used

SSI is used in short term due to irregular dietary intake or due to acute illness	• Short-term use may be needed for acute illness and irregular dietary intake • As health and glucose levels stabilize, stop SSI and return to previous regimen as tolerated
Wide fluctuations in glucose levels in patients with cognitive decline and/or irregular dietary intake on a chronic basis	• Use scheduled basal and mealtime insulin based on individual needs with the goal of avoiding hypoglycemia • May use a simple scale, such as "give 4 units of mealtime insulin if glucose >300 mg/dL" • Keep patients hydrated, especially when glucose levels are high (e.g., >300 mg/dL)

Type 2 Diabetes

- Need to see when glucose is high with insulin
  - Morning fasting high
    - NPH in the evening
  - Post-prandial high
    - AM NPH or Lantus
    - +/- pre-prandial or sliding scale (ultra short acting)
  - If always high
    - NPH BID or Lantus daily + pre-prandial or sliding scale

General Nutrition

- "Diabetic" diet have been prescribed in the past
- LTC have shifted to offering a wider variety of food choices (more liberal)
- "no sugar" diet orders are ineffective for glycemic management and should be avoided
- Consistent carbohydrate meal plan

Enteral nutrition support

- Diabetes specific enteral nutrition
  - Glucerna
  - Glytrol
  - Diabetisource
- Manage glycemic index during tube feedings

Steroid induced diabetes

- Abnormal increase in blood glucose associated with the use of glucocorticoids in a patient with or without a prior history of diabetes mellitus
- Criteria for diagnosis by the American Diabetes Association
  - 8 hr fasting blood glucose >126mg/dl
  - 2 hr post 75 g oral glucose tolerance test >200mg/dl
  - A1C >6.5%
  - Random plasma glucose of >200mg/dl
  - Patient with symptoms of hyperglycemia

Steroid induced diabetes

- Monitor blood sugar with start of steroid therapy
- Symptoms
- Hyperglycemia is worse post-prandial and late in the day
- Can use NPH or Lantus in the morning with sliding scale
- Decreasing steroid is an option
- Glucose may take some time to get back to normal

General recommendations Prognosis- Years

- Maximizing glycemic control according to nations guideline to prevent long term complications, A1C <7%
- Blood pressure <140/80 mmHg
- In patients with Type 2 always use short acting sulphonylureas to reduce the risk of hypoglycemia especially in elderly

General recommendations Prognosis- Months

- Relax BG targets aiming for BG levels 145-270mg/dl range
- Want patients to be symptom free
- Type 2 –consider stopping oral antidiabetic agents and use once daily long-acting insulin

General recommendations Prognosis- Days or weeks

- Avoid hypoglycemia
- Try and limit symptomatic hyperglycemia
- Avoid unnecessary monitoring

Prognosis- Years

- Type 1 diabetes
  - Usual BG monitoring and insulin regimen
- Type 2 diabetes
  - If diet controlled and on oral anti-diabetic agents- no routine patient monitoring recommended
  - If found to be persistently hyperglycemic start on oral antidiabetic agents
  - Usually no need for sliding scale insulin
- Steroid induced diabetes
  - Patients on dexamethasone >4mg check BG if symptomatic
  - Hyperglycemia is directly linked to steroid dose
  - Consider check BG if symptomatic hyperglycemia is present or patients condition changes

Prognosis- Months

- Type 1 diabetes
  - Usual BG monitoring and insulin regimen
  - If oral intake decreasing consider altering insulin regimen
- Type 2 diabetes
  - If diet controlled and on oral anti-diabetic agents no routine patient monitoring recommended
  - If found to be persistently hyperglycemic consider burden/benefit of treatment
  - If oral intake decreasing may want to reduce or stop oral antidiabetic agents
  - If on insulin should keep same monitoring regimen
  - If on insulin, consider once daily long-acting insulin
- Steroid induced diabetes
  - Consider check BG if symptomatic hyperglycemia
  - Reducing steroid will likely improve hyperglycemia

Prognosis- Days or Weeks

- Type 1 diabetes
  - BG should be checked at time of admission
    - If BG <72mg/dl manage as hypoglycemia
    - If BG <180mg/dl reduce long acting or intermediate acting insulin dose by ½
    - If BG >270mg/dl and patient is conscious- continue regular long acting or intermediate acting insulin dose and continue daily BG's
    - If BG >270mg/dl and patient is unconscious- reduce long acting or intermediate acting insulin dose by ½
- Not enough evidence to support to stop insulin in this group of patients
- Once daily BGs can be continued or discontinued if stable

Prognosis- Days or Weeks

- Type 2 diabetes
  - If diet controlled no routine checks required
  - Reduce or stop oral diabetic medications and just observe for symptoms
  - BG should be checked at time of admission
    - If BG <72mg/dl manage as hypoglycemia
    - If BG <180mg/dl and patient is conscious- stop insulin or reduce long acting/intermediate acting insulin dose by ½
    - If BG <180mg/dl and patient is in dying phase- stop insulin
    - If BG >270mg/dl and patient is conscious- continue regular long acting or intermediate acting insulin dose and continue daily BG's
    - If BG >270mg/dl and patient is unconscious-stop insulin

Prognosis- Days or Weeks

- Steroid induced diabetes
  - Steroids will most likely be reduced or discontinued
  - No need for routine BG monitoring

Case Study #1

- DG is a 64yo male with type 1 diabetes admitted to your hospice. His blood glucose level is 80mg/dl. He tells you he takes NPH(Humulin R) insulin 40 units every morning and Regular(Humulin R) insulin with each meal and at bedtime. What are some possible reasons that BG dropped lower than usual?

Case Study #2

- MS is a 74yo man with type 2 diabetes. He has a history of coronary artery disease, frequent falls, and mild dementia. His intake is declining and PPS is 10%. He is currently on basal insulin, metformin, and glyburide. Which medication(s) should be discontinued and why?

Summary

- Goals for diabetes management at end of life
  - Promoting comfort
  - Controlling symptoms
  - Avoid dehydration
  - Avoiding ER and hospital visits
  - Preserving quality of life
- Decreasing complexity of treatment
- Important to respect a patient's right to refuse treatment and withdraw oral hypoglycemic agents and/or stop insulin at end of life
- Don't forget diabetic nurse and dietician

Questions?

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