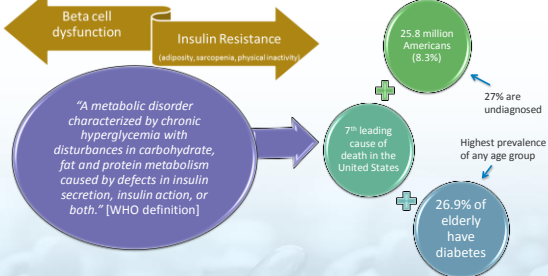






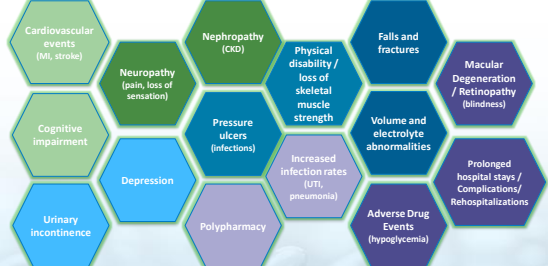
General Facts About Diabetes^{1,2,3,4}



At least 25-32% of U.S. nursing home residents have diabetes			
>30% have depression	>50% have pain	>80% have cardiovascular disease	69% have 2+ additional chronic conditions



Complications of Diabetes^{4,5,7,8,9}

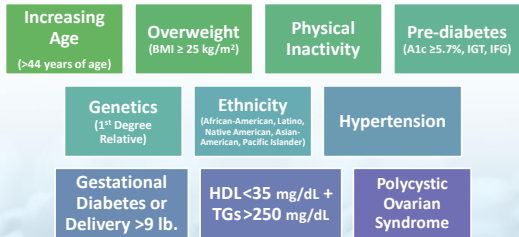


particular attention should be paid to screening for risk factors of complications that might further impair functional status or quality of life over a relatively short period of time, such as foot ulcers/amputations and visual impairment.

Older adults with diabetes have the highest rates of:	Major lower-extremity amputation	Myocardial infarction	Visual impairment	End-Stage Renal Disease
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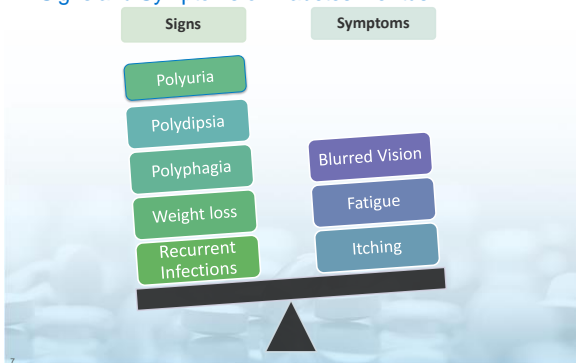


Risk Factors for Diabetes⁷





Signs and Symptoms of Diabetes Mellitus¹⁰





Criteria for Diagnosing Diabetes Mellitus¹⁰

Stage of Glycemic Control	Plasma Glucose (mg/dL)			
	Fasting Plasma Glucose (mg/dL)*	OGTT* (2-hr Plasma Glucose)	Casual Plasma Glucose	A1c*
Normal	<100	<140	unknown	<5.7%
IFG or IGT (pre-diabetes)	100-125	140-199	unknown	5.7-6.4%
Diabetes	≥ 126	≥ 200	≥ 200 + symptoms of diabetes	≥ 6.5%

IFG=impaired fasting glucose
 IGT=impaired glucose tolerance
 OGTT = oral glucose tolerance test

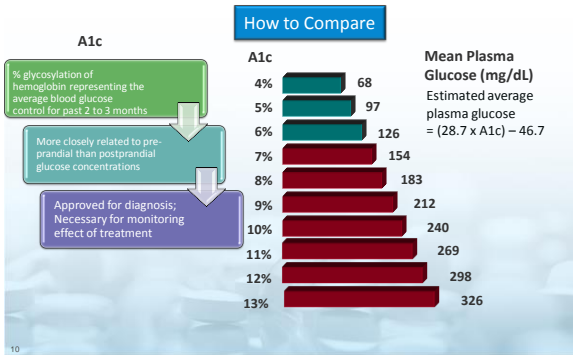
* = In the absence of unequivocal hyperglycemia, criteria should be confirmed by repeat testing

Identifying Appropriate Goals for Diabetes¹¹





A1c and Corresponding Plasma Glucose Levels⁷





Frequency of A1c Testing^{3,7,12}

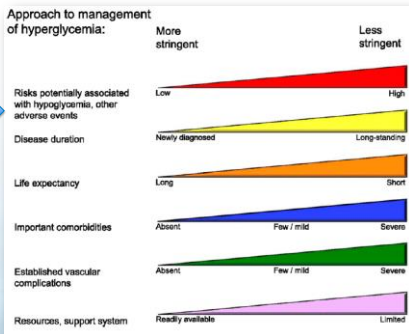
Diabetic Goal	ADA Guidelines (2014)	AGS Guidelines (2013)	AMDA Guidelines (2008)
Stable and at Goal	At least twice annually if stable and within target A1c range	Every 12 months may be appropriate if stable over several years. (more frequent if symptomatic)	Every 6 months if well controlled
Not at Goal	Quarterly if not at goal or after any change in therapy	At least every 6 months if not at goal	Every 3 months if poorly controlled



Selecting Glycemic Goals^{7,12}

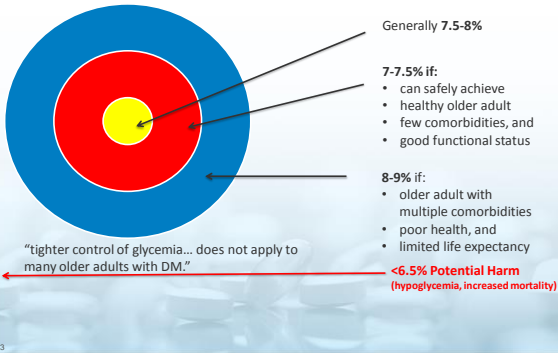
ADA Standards of Medical Care in Diabetes 2014

"In older adults with functional and cognitive impairment as well as limited life expectancy, glycemic goals may be individualized and relaxed. It is, however, worth examining (and documenting in the medical record) the reasons for less stringent management of diabetes in individual patients."
[AMDA]





AGS –Target A1c³





Medications That May Impact Glycemic Control^{10,13}

May Cause or Worsen Hyperglycemia		May Cause or Worsen Hypoglycemia	
Antipsychotics (e.g., Zyprexa)	Niacin/Nicotinic Acid	ACE Inhibitors (e.g., lisinopril)	Disopyramide
Beta-agonists (e.g., Albuterol)	Pentamidine (permanent)	Beta-Blockers (e.g., metoprolol)	Ethanol
Calcineurin Inhibitors (e.g., cyclosporine, sirolimus)	Phenytoin (Dilantin)	Chloramphenicol	Fluoroquinolones*
Corticosteroids (e.g., prednisone)	Protease Inhibitors	Chloroquine	Pentamidine (acute)
Diazoxide	Thiazide Diuretics	Clofibrate	Salicylates
Fluoroquinolones* (e.g., Avelox, Levaquin, Cipro)	Thyroid Preparations (e.g., Synthroid)		
Gamma Interferon			

* May cause hypoglycemia or hyperglycemia



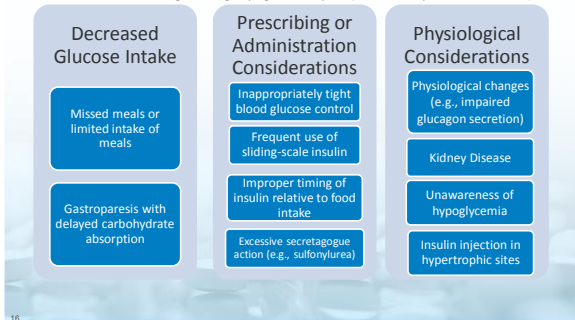
Recognizing Hypoglycemia¹²

Anxiety / nervousness	Behavior changes / moodiness	Blurred vision	Clumsy or jerky movements
Confusion / difficulty concentrating	Dizziness	Drowsiness	Falls
Headache	Hunger	Pale skin color (pallor)	Rapid heart beat
Seizure	Sweating	Tingling sensations around the mouth	Weakness/fatigue



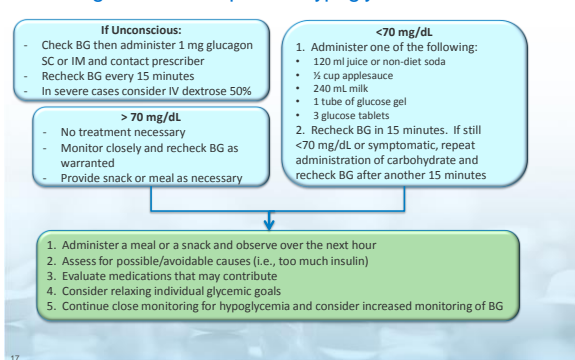
What Puts Your Resident at Risk for Hypoglycemia?¹⁴

- Highest rate of Emergency Room visits for hypoglycemia are for those 75 years and older
 - Almost 3 times as high as the group aged 45-64 years (27.6 vs. 10.0 per 1,000 DM adults)

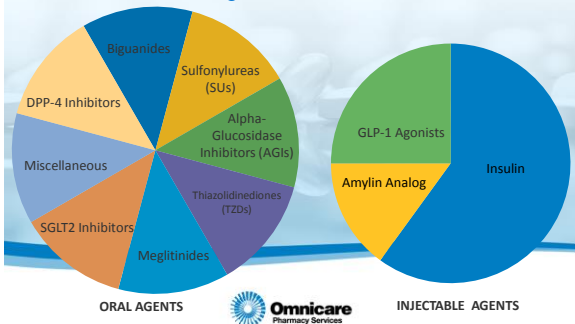




Management of Suspected Hypoglycemia¹⁵



Overview and Update on the Pharmacological Management of Diabetes





<p>Sulfonylureas Glimepiride (Amaryl®), Glipizide (Glucotrol®), Glyburide (DiaBeta®, Micronase®), Glynase®)</p> <p>A1c Reduction: 1-1.5%</p> <p>Stimulates the pancreas to increase insulin secretion</p> <p>hypoglycemia, GI side effects, sunburn / photosensitivity,</p> <p>Chlorpropamide and Glyburide listed in F329 Table 1 - Unnecessary Drugs</p>	<p>Alpha Glucosidase Inhibitors Acarbose (Precose®), Miglitol (Glyset®)</p> <p>A1c Reduction: 0.5-1%</p> <p>Block glucose absorption from the small intestine</p> <p>nausea, bloating, flatulence, elevated liver enzymes</p> <p>For cases of hypoglycemia, glucose not sucrose must be used</p>	<p>Biguanides Metformin (Glucophage®)</p> <p>A1c Reduction: 1-1.5%</p> <p>Makes insulin work better, decreases liver's output of glucose and helps muscles use insulin better</p> <p>anorexia, nausea, transient diarrhea (weight neutral)</p> <p>Oral agent of 1st choice if not contraindicated</p>
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Using Metformin More Often But Safely^{3,7,12,16,17}



- 1st line therapy unless contraindicated in combination with lifestyle therapy
- Can be used in stable heart failure but should generally be avoided when hospitalized
- Can be continued at lower dosages in people with estimated GFR between 30 – 60 mL/min but renal function should be monitored frequently
- Should not be used if estimated GFR is less than 30 mL/min

20



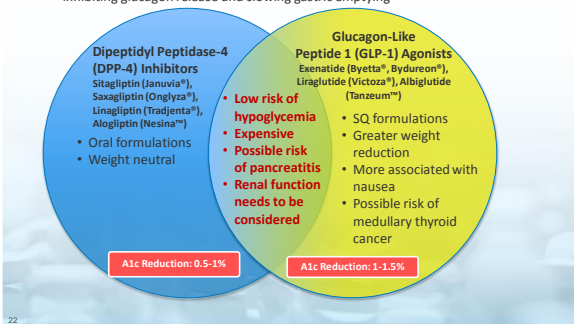
<p>Thiazolidinediones Pioglitazone (Actos®), Rosiglitazone (Avandia®)</p> <p>A1c Reduction: 1-1.5%</p> <p>Make muscle and fat tissue more responsive to insulin and reduce the liver's making of glucose</p> <p>Weight gain, edema, liver damage</p> <p>Contraindicated in Heart Failure (NYHA III or IV) Increased risk of edema, weight gain, bone fractures</p>	<p>Meglitinides Repaglinide (Prandin®), Nateglinide (Starlix®)</p> <p>A1c Reduction: 0.5-1%</p> <p>Stimulates insulin secretion after a meal is eaten</p> <p>Hypoglycemia, upper respiratory infection, weight gain</p> <p>Short lived action requires administration at each meal</p>	<p>Sodium-Glucose Co-Transporter 2 (SGLT2) Inhibitors Canagliflozin (Invokana®), Dapagliflozin (Farxiga™)</p> <p>A1c Reduction: 0.5-1%</p> <p>Increases output of glucose in the urine</p> <p>Genital mycotic infections, UTIs, increased LDL</p> <p>Limited use with kidney disease; Watch for hypotension if receiving other blood pressure meds</p>
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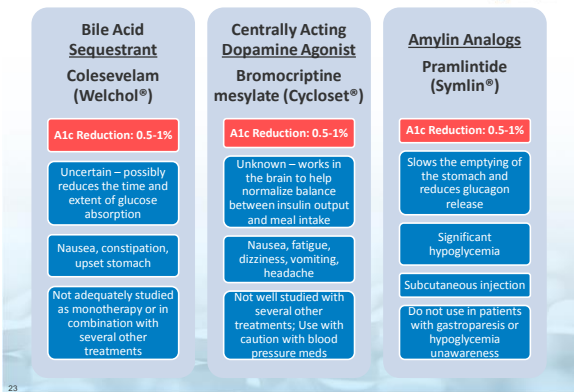
21



Incretin Mimetics¹⁸

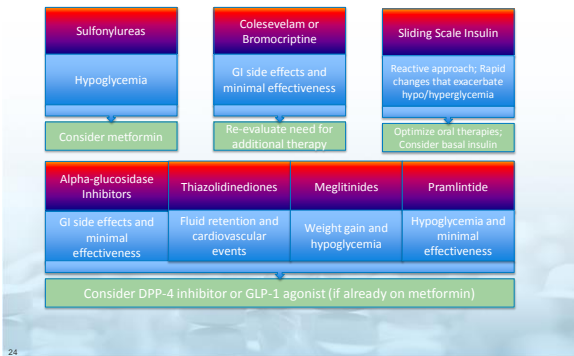
Decrease post-meal blood glucose by increasing insulin secretion, inhibiting glucagon release and slowing gastric emptying







Summary of Potentially Inappropriate Therapies





Summary of Risk of Hypoglycemia^{15,19}

Higher Risk of Hypoglycemia

- Insulins
- Meglitinides
- Pramlintide
- Sulfonylureas

Lower Risk of Hypoglycemia

- Alpha-Glucosidase Inhibitors
- DPP-4 Inhibitors
- GLP-1 Agonists
- Metformin
- SGLT2 Inhibitors
- Thiazolidinediones

When used in combination (especially with insulin or a secretagogue), any of the above agents can increase the risk of developing hypoglycemia

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Summary of Effects on Weight^{15,19}

Weight Gain

- Insulins
- Sulfonylureas
- Thiazolidinediones
- Meglitinides

Weight Neutral

- Metformin
- Alpha-glucosidase Inhibitors
- DPP-4 Inhibitors
- Colesevelam
- Bromocriptine

Weight Loss

- GLP-1
- Pramlintide
- SGLT2 Inhibitors

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Optimizing Insulin Therapy and Eliminating Sliding Scale Insulin



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Types of Insulin Preparations*20

	Onset	Peak	Duration	Available as a Pen?
Rapid-Acting				
Aspart (Novolog®)	<20 min	0.5-1.5 hrs	3-5 hrs	Y
Glulisine (Apidra®)	<30 min	0.5-1.5 hrs	3-5 hrs	Y
Lispro (Humalog®)	<30 min	0.5-2.5 hrs	3-6.5 hrs	Y
Short-Acting				
Regular (Novolin®, Humulin®)	0.5 – 1 hr	1-5 hrs	5-10 hrs	Humulin not Novolin
Intermediate-Acting				
NPH (Novolin N®)	1-4 hrs	Dual	12-18 hrs	Humulin not Novolin
Long-Acting				
Gargine (Lantus®)	1-2 hrs	None	Up to 24 hrs	Y
Detemir (Levemir®)	0.8-2 hrs	None	6-23 hrs	Y

Insulin therapy is NOT “a treatment of last resort”

Compared to Short-Acting, Rapid-Acting have:

- greater convenience
- less variable glycemic control

Be aware of coverage constraints (e.g., Humulin vs. Novolin, Pen vs. Vial)

Long-acting insulins have lower risk of hypoglycemia compared to NPH

Long-acting Insulin is often first choice for the elderly due to effectiveness and simplicity

*Some variability exists depending upon which reference source is consulted.

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Insulin Pens^{21,22}



Pros

- Less waste due to decreased volume (3 mL versus 10 mL)
- Portable and discrete
- More accurate dosing mechanisms (quick dose setting)
- Faster and easier to use
 - Estimated decreased staff time (2 minutes v. 8-10 minutes)
- Improved patient attitude and compliance

Cons

- Limitations to the number of units you can give per dose
 - Maximum of 60 units per injection for aspart, detemir, and lispro
 - Maximum of 80 units per injection for glulisine and gargine
- Additional cost for needles
- Possible increase in fingerstick risk for healthcare professionals

Overall Considerations:

- Needles are only to be used once
- An “air shot” of 2 units of insulin must be released **PRIOR TO EACH** injection
- Keep the needle in the injection site for 5-10 seconds

CHECK INDIVIDUAL PENS FOR EXACT DIRECTIONS

Insulin pens and cartridges are **NEVER** to be shared among patients due to risk of HIV, Hepatitis and other blood-borne pathogens

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Are Insulin Pens Cost Effective?

- Cost effectiveness of utilizing a pen device depends on length of stay and number of insulin units/day
 - **General** considerations from a cost perspective:
 - Does not apply to pens with longer expiration (e.g., Levemir)
 - Frequency of administration also impacts cost savings due to pens needing 2 unit air shot before each dose

Length of Stay	Units per Day	Which is generally cheaper - Pens or Vials?
15 days	40 units or less	Up to 2 pens
15 days	41 units or more	1 vial
28 days	20 units or less	Up to 2 pens
28 days	More than 20 units	1 vial

- Must also have either NovoFine autocovers or BD Safety Autocovers available (additional cost)

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Types of Insulin Regimens

- Basal Insulin

 - inhibits hepatic glucose production overnight and between meals
- Bolus Insulin
(aka prandial or meal-time)

 - promotes glucose disposal into muscles from food consumption
- Sliding Scale Insulin (SSI)

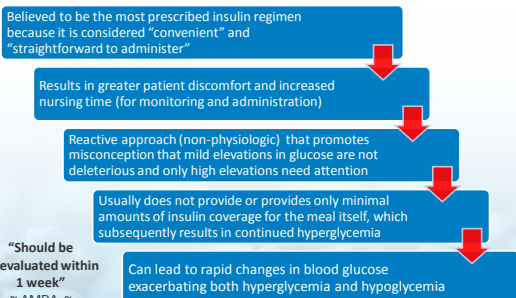
 - PRN insulin, based on bedside capillary glucose measurement (often before meals and at bedtime)
- Correction-dose Insulin

 - Rapid- or short-acting insulin added to the usual bolus insulin based on total daily dose of insulin or patient weight or meal intake (looks like sliding scale but is more individualized to the patient)

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Why Not Sliding Scale Insulin?^{12,23,24,25,26}



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Re-evaluation of Sliding Scale – How Can You Help?²⁷

- Are glycemic targets clearly identified?
- Is the sliding scale being administered? How often?
- Is their morning fasting blood glucose consistently less than or equal to 180 mg/dL?
- Have the doses of their other diabetes medications been titrated upward as tolerated?
- Are they receiving two or more oral medications for diabetes?

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Optimizing Insulin Therapy¹⁵

Timing of Administration

- Once daily detemir should be generally administered with the evening meal or at bedtime
- Once daily glargine may be administered at any time of day but consistently at the same time
- Rapid-acting insulins vary in labeled timing of administration
 - should be given no earlier than 10 minutes before a meal
 - consider scheduling the dose within 20 minutes after the meal and hold the rapid acting insulin dose if food intake is inadequate

Alterations in Therapy

- Total daily basal insulin requirements greater than 50 units may need to be given in divided doses
 - For twice-daily dosing of detemir insulin, the evening dose can be administered either with the evening meal, at bedtime, or 12 hours after the morning dose
- If fasting blood glucose is at goal with basal insulin, but postprandial blood glucose is still elevated, consider bolus of rapid-acting insulin prior to the largest meal of the day or consider initiation of a DPP-4 inhibitor

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Storage of Insulin

- Insulin products should **never** be used if they were frozen
- All unused insulin products are best stored in the refrigerator before opening
- All insulin vials are best stored at room temperature after opening
- All insulin pens **must** be stored at room temperature after opening
- Insulin vials and pens have varying expiration dates upon opening
 - Refer to Omnicare' Insulin Storage Recommendation document available on Omniview

INSULIN STORAGE RECOMMENDATIONS

Vial(s)	Unopened		Opened	
	Unopened (U.S. to 30°C)	Unopened (30°F to 86°F)	Opened (U.S. to 30°C)	Opened (30°F to 86°F)
Humalog	Unit expiration date	28 days	28 days	28 days
Humalog Mix 75/25	Unit expiration date	28 days	28 days	28 days
Humalog U-100	Unit expiration date	31 days	31 days	31 days
Humalog U-300	Unit expiration date	30 days	30 days	30 days
Novolin	Unit expiration date	42 days (up to 77°F)	42 days	42 days (up to 77°F)
Novolin U-100	Unit expiration date	28 days	28 days	28 days
Novolin U-300	Unit expiration date	28 days	28 days	28 days

Do Not Use Any Insulin product that has been frozen
***Protect from light**

INSULIN PEN(S)	Unopened		Opened	
	Unopened (U.S. to 30°C)	Unopened (30°F to 86°F)	Opened (U.S. to 30°C)	Opened (30°F to 86°F)
Humalog Mix 75/25 pen	Unit expiration date	28 days	28 days	28 days
Humalog U-100 pen	Unit expiration date	31 days (containing 10 units)	31 days	31 days
Novolin U-100 pen	Unit expiration date	42 days (containing 10 units)	42 days	42 days
Novolin U-300 pen	Unit expiration date	28 days	28 days	28 days
Novolin U-300 pen	Unit expiration date	28 days	28 days	28 days
Novolin U-300 pen	Unit expiration date	28 days	28 days	28 days
Novolin U-300 pen	Unit expiration date	28 days	28 days	28 days
Novolin U-300 pen	Unit expiration date	28 days	28 days	28 days

Do Not Use Any Insulin product that has been frozen

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Last Revised March 31, 2014

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Administration of Insulin²⁸

- Prior to each injection, verify order and insulin label
- Check appearance before using insulin (no clumps or changes in color/clarity)
- Never shake insulins vigorously – gently roll to mix (e.g., Novolin 70/30, etc)
- Only administer insulin that is at room temperature
- Clean the injection site with alcohol and allow to completely air dry
- An amount of air equal to the dose of insulin required should first be drawn up and injected into the vial to avoid creating a vacuum (ensure no air bubbles in syringe before injection)
- Slowly administer the insulin subcutaneously into the fat layer of the skin at an appropriate site with the angle of the needle kept at 45-90 degrees

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Conclusions

Diabetes dramatically impacts the individual's life and goals and therapy choices must remain patient centered

With an increasing number of therapeutic options, potentially inappropriate antidiabetic medications should be re-evaluated for possible minimization or elimination

Individualize therapy but always endeavor to avoid complicated, costly, or uncomfortable treatment regimens

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References

List of 28 references including: Report of a WHO Consultation, Furl Facto-Type and variation in oral diabetes, American Diabetes Association, March 2013, Juhlstein et al., American Geriatrics Society Expert Panel on the Care of Older Adults with Diabetes Mellitus, American Geriatrics Society Guidelines for improving the care of older adults with diabetes mellitus, 2013 update, Zimwala et al., The application of evidence-based principles of care in older patients (level 3) management of diabetes mellitus, JAMA 2006; 295: 234-240, Kitzner MS, et al., Diabetes in older adults: a consensus report, AGS 2012; 36(12): 2650-64, Beretta A, et al., Pragmatic diabetes management nursing homes: individual care plan, JAMA 2013; 310: 791-800, American Diabetes Association. Standards of medical care in diabetes - 2014. Diabetes Care 2014;37(1):S14-76, Zhang X, et al., Trends in the prevalence and comorbidities of diabetes mellitus in nursing home residents in the United States, 1995-2004. J Am Geriatr Soc. 2010;58(4):724-730, Day C. Resident-focused and evidence-based management of diabetes mellitus in the nursing home setting. Annals of Long-Term Care: Clinical Care and Aging. 2013; 21(10):22-28, American Diabetes Association. Diagnosis and classification of diabetes mellitus. Diabetes Care 2014; 37(S2): S81-S90, Mahoney LH, et al., Evidence-informed guidelines for treating frail older adults with type 2 diabetes: from the diabetes care program of Nova Scotia (DOPNS) and the palliative and therapeutic Rehabilitation (PATH) program. JAMA 2013; 310: 807-808, American Medical Directors Association. Diabetes Management in the Long-Term Care Setting. Clinical Practice Guidelines, 2008, Rahman A, Saeed SM, and Yau MH. Drug-induced glucose alterations part 2: drug-induced hyperglycemia. Diabetes Spectrum 2001; 24: 234-238, Centers for Disease Control & Prevention. Diabetes public health resources—emergency department visits. www.cdc.gov/diabetes/diabetesemergency_department.html. Accessed 2/10/14, Package inserts obtained at various commercial websites and from Drugs@FDA available at: http://www.accessdata.fda.gov/drugsatfda/drugsatfda/. Accessed 2/10/14, Sabharwal SR, et al., Risk of fatal and nonfatal lactic acidosis with metformin use in type 2 diabetes mellitus. Cochrane Database of Systematic Reviews 2010, Issue 4 ArtNo: CD002957 DOI: 10.1002/14651858.CD002957.meta, Kidney Disease Improving Global Outcomes (KDIGO). Chapter 4. Other complications of CKD: CVD, medication dosage, patient safety, infections, hospitalizations, and care for investigating complications of CKD. Kidney International Supplements 2013; 3(3): 91-111, Hertzka C and Carmichael KA. What is a logical approach for choosing antidiabetic agents for patients with type 2 diabetes? Consistent. February 2013; 100-102, Intouch SE, et al., Management of hyperglycemia in type 2 diabetes: a patient-centered approach. Diabetes Care 2012; 35: 1364-1379, Lightman SL, et al., Insulin use in elderly adults: risk of hypoglycemia and strategies for care. AGS 2012; 60(9): 1564-1600, Meaco J. Insulin pen safety and practice among patients with type 2 diabetes in long-term care - raising standards through evidence-based practice. October 2009, Van Buren K, et al., Insulin use in long-term care settings for patients with type 2 diabetes mellitus: a systematic review of the literature. JAMA 2013; 310: 809-816, Hirsch IB. Sliding scale insulin - Time to stop sliding. JAMA 2009; 301(25): 219-214, Ungphiphong J, Pratach A, and Smetana D. Sliding scale insulin use: myth or messen? Am J Med 2007; 120: 565-567, American Diabetes Association. Standards of medical care in diabetes - 2011. Diabetes Care 2011; 34(S1):61-61, Centers for Medicare & Medicaid Services. State Operations Manual Appendix P-99 - Guidelines to Surveys for Long Term Care Facilities. Available at: http://www.cms.gov/medicare/coverageandpayments/OSR/2014_p99/osr99.pdf. Accessed 1/17/14, Geriatric Pharmaceutical Care Guidelines, Omnicare, Inc., Cincinnati, OH, 2014. available at: http://www.omnicare.com, ADA. Insulin administration. Diabetes Care 2004; 27(suppl 1): S100-S109.

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QUESTIONS?????

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