

Diabetes Guidelines for Elderly Residents in Long-Term Care (LTC) Facilities

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Acknowledgements

The DCPNS would like to acknowledge and thank the following individuals for their work in developing, revising, and reviewing these diabetes guidelines:

- **Members of the DCPNS Diabetes in LTC Committee**

- Ann Beauchamp, Parkstone Enhanced Care
- Trish Bilski, VMB
- Lois Cartwright, VMB
- Dr. Barry Clarke, VMB
- Brenda Cook (Chair – 2005 to Present), DCPNS
- Peggy Dunbar, DCPNS
- Esther Gould, Cumberland Regional Hlth Ctre DC
- Dr. Lynne Harrigan, DCPNS
- Sharon Hepburn, DCPNS (until 2005)
- Lynn Hynes, Parkstone Enhanced Care
- Elizabeth Kingsland, Soldiers Memorial DC
- Dr. Laurie Mallery, VMB
- Bev Muldoon, DoH
- Dr. Tom Ransom, QEII
- Lauren Richardson, St. Vincent's Guest Home
- Dr. Sonia Salisbury, DCPNS (until 2004)
- Sohani Welcher, VMB

Acknowledgements (cont)

- **Directors of LTC, Nova Scotia Association of Health Organizations, who provided direction for formatting and pilot testing the guidelines.**
- **LTC Directors who volunteered their facilities for the pilot project and the staff for carrying it out:**
 - Joy Boyle, North Queens Nursing Home, Caledonia, NS
 - Coleen Conway, Glades Lodge Care Centre, Halifax, NS
 - Dawn Ryan, Parkstone Enhanced Care, Halifax, NS

Special Thanks

The DCPNS would like to give a special thanks to the Working Group members for their ongoing dedication to this project:

- Brenda Cook
- Dr. Laurie Mallery
- Dr. Lynne Harrigan
- Dr. Tom Ransom

Case 1

- 83 year old female nursing home resident with 10 year history of DM, severe dementia, and CHF
- Rx'd with metformin 1000 mg BID, glyburide 10 mg OD, and insulin NPH 14 U at bedtime
- Her blood sugars are as follows:

	Before Breakfast	Before Lunch	Before evening meal	Before bedtime
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Tues	7.1		13.9	
Wed	8.2	13.1		14.8
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1. Add NPH in am (see targets next slide for reference)
2. Add am NPH and regular insulin before evening meal
3. Continue current therapy
4. Other

CDA Targets

In order to achieve an A1C of 7.0%, aim for:

- An FPG or preprandial PG target of 4.0 to and
- A 2-hour postprandial PG target of 5.0 to 10.0

If A1C targets cannot be achieved with postprandial target of 5.0 to 10.0.

- Consider postprandial BG lowering to 5.0 to 8.0

CDA guidelines 2008

Case 2

- Mr. Smith is a 79 year old male with diabetes, Parkinson's disease, severe dementia, CKD (CrCl of 28) and CHF
- **Cognition:** MMSE is 19/30 with delayed recall of 0/3. He had severe impairment of memory on the BCRS
- **Function:** Mr. Smith is dependent for all IADLs and ADLs (bathing, dressing, and toileting). He requires help due to both cognitive and physical impairment

Case 2

- **Mobility:** declining over past year. Now requires 2 person assist to transfer from bed to wheelchair
- **Diabetes:** Mr. Smith has had diabetes for 20 years. He uses glicazide 60 mg OD and NPH insulin, 6 units BID.
- **Medications:** azilect, amantidine 100tid, sinemet 250/25 tid, mirapex 0.5 tid, haldol 1mg bid, seroquel 100 mg qhs, glicazide 60 mg OD, NPH insulin 10 U BID, ramipril 2.5 mg od, ferrous sulphate 300 mg od with near normal hgb, colace bid, Aricept 10 mg od.

Case 2

- **Course:** From October to December random PG measurements ranged between 4.5 and 9.0. Due to the low blood sugars, blood sugar monitoring was increased from once daily to QID
- The insulin dose was decreased to 6 U BID, with subsequent fasting and preprandial blood sugars that ranged between 5 and 8

Case 2

What to do now?

1. Continue current therapy
2. Taper and discontinue insulin
3. Start glargine
4. Other

Case 2

- Late December: Hospitalization for hypoglycemia and depressed level of consciousness
- In hospital, insulin was stopped
- Insulin was restarted in January (6 U BID), when preprandial blood sugars ranged from 10 to 13
- No A1C was tested, but following insulin restart, fasting blood sugars ranged from 5 to 8

Case 2

What to do?

1. Continue NPH
2. Start Glargine
3. Stop insulin altogether

Case 3

- 84 year old male with severe dementia and diabetes on maximum doses of metformin and SU
- Fasting blood sugars range between 12 -14. There are no symptoms of hyperglycemia

What to do?

1. Continue current therapy.
2. Start evening NPH

DCPNS Diabetes Guidelines for Elderly Residents in Long-Term Care (LTC) Facilities

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DIABETES GUIDELINES for Elderly Residents in Long-Term Care (LTC) Facilities

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April 2010

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GUIDELINES DEVELOPMENT

- Needs Assessment (2002)
- Diabetes in LTC Committee (2003)
- Diabetes Guidelines Development
 - Hypoglycemia Treatment
 - Targets for Glycemic Control
- Pocket Reference
- Pilot Project (2007)
- DCPNS Advisory Council Approval (2009)
- Release (2009)

BACKGROUND

- Guidelines for diabetes management in LTC must consider the characteristics of the individuals who live there.
- Older residents in LTC are frail.

BACKGROUND (cont)

What is Frailty?

- Accumulation of multiple chronic illnesses with associated vulnerabilities such as dementia, functional decline, and geriatric syndrome including falls, impaired mobility, and polypharmacy.

BACKGROUND (cont)

Frailty and Care Guidelines

- Care is made complex by multiple interacting problems and vulnerability.
- Most guidelines are written for those with single illnesses: sees one-thing-wrong-at-once.
- Care needs to be organized in the context of frailty, where many things are wrong at once.

BACKGROUND (cont)

KEY MESSAGE

GOAL: Avoid the acute complications of poor glycemic control including hypoglycemia and prolonged, severe hyperglycemia.

Background: Type 2 Diabetes

- For healthy populations with diabetes, *Canadian Diabetes Association (CDA) 2008 Clinical Practice Guidelines for the Prevention and Management of Diabetes in Canada* recommend fasting blood glucose 4 -7 and A1C below 7.0.
- But how much benefit is there from tight control of blood sugar?

The Evidence: Type 2 Diabetes

- Studies may not be applicable to a frail population because:
 - Studies exclude the frail elderly
 - Frailty limits life expectancy. Therefore, benefit may not be realized if it takes time to achieve
 - The frail have more adverse effects from treatment
 - The risk of hypoglycemia is increased
 - Hypoglycemia can be hidden by lack of symptoms, inability to communicate, and atypical disease presentation

Type 2 Diabetes: Preventing Complications

- Microvascular complications
 - Eyes: retinopathy
 - Kidneys: albuminuria and renal failure
 - Nerves: sensory, autonomic (BP, GI)
- Macrovascular complications
 - Heart
 - Stroke
 - Peripheral vascular disease
- Amputation – PVD, infection
- Death

Evidence – United Kingdom Prospective Diabetes Study (UKPDS)

- N = 3867 with newly diagnosed type 2 diabetes
- **Mean age 54**
- Intensive treatment:
 - Sulfonylurea (chlorpropamide, glibenclamide or glipizide); metformin added to SU if optimal control was not achieved; insulin added if combination was not effective
 - Goal: FBS < 6 mmol/L; ac meals 4-7 mmol/L

Reference: *Lancet*. 1998;352(9131):837-53

Evidence – UKPDS (cont)

- Control group:
 - Diet restriction with drugs added if there were symptoms of hyperglycemia or if FBS was > 15 mmol/L
- If obese, there was also a metformin arm
- Followed over 10 years

Reference: *Lancet*. 1998;352(9131):837-53

Evidence – UKPDS Results

- At study end: A1C = 7 (intervention) vs 7.9% (control)
- Demonstrated benefits were surrogate outcomes
 - Decrease in microvascular disease
 - Retinopathy: 25 % decrease in retinal photocoagulation, **no difference in visual acuity or proportion blind in both eyes**
 - Kidney disease: Decreased urinary albuminuria, **no difference in renal failure with dialysis or plasma creatinine above 250**

Resource: Lancet 1998

Evidence – UKPDS Results (cont)

- No difference in any clinical outcome (visual acuity, renal failure, death, CV disease or stroke)
- More hypoglycemic episodes in the intensive therapy group

Resource: Lancet 1998

Evidence - UKPDS Time Frame

- No difference in any outcome at 3 yrs
- Decrease in microvascular surrogate at 6 – 7.5 years

Evidence – UKPDS

Obese Treated with Metformin

- Reduction in retinopathy at 9, not 12 years, but no significant decrease in combined microvascular outcomes
- 42% reduction for diabetes related death
- 36% decrease for all death
- 39% decrease in MI

Reference: Lancet 1998

Evidence – UKPDS Follow-up

After trial was over, participants were followed over 10 years:

- A1C difference lost in 1 year
- Sulfonylurea/insulin group maintained decrease in microvascular complications
- Also, now 15% decrease in MI and 13% decrease in mortality
- Metformin maintained decrease in MI (33%) and mortality (27%)
- Effect seen after decades had passed

Reference: NEJM 2008

Summary - UKPDS

- Retinopathy benefit in 6 – 7.5 years, surrogate outcome
- Macrovascular benefit takes decades
- In obese metformin group, earlier benefit

Evidence – Action in Diabetes and Vascular Disease (ADVANCE)

- N=11,140 participants with type 2 diabetes
- Population at study entry:
 - Mean age 66
 - Baseline A1C 7.5%
 - 32% cardio or cerebrovascular disease
 - More frail than those in UKPDS

Resource: NEJM 2008

Evidence – ADVANCE (cont)

- Intensive treatment
 - Sulfonylurea (gliclazide) and add other medication as necessary
 - Goal: A1C \leq 6.5%
- Control group
 - Any medication except gliclazide
 - Goal: standard A1C target

Evidence – ADVANCE (cont)

Results at 5 Years

- At study end: A1C 6.5 (intensive) vs 7.3 (control)
- Decreased microvascular outcomes (9.4 vs 10.9%), **mostly albuminuria with intensive treatment**
- No difference in creatinine endpoint or dialysis
- No difference in retinopathy
- No difference in death, CV disease
- Increased hypoglycemia and hospitalization with intensive treatment

Evidence – Action to Control Cardiovascular Risk in Diabetes (ACCORD)

- N =10,251 with type 2 diabetes and either CVD or at risk of developing CVD
- Population at study entry:
 - Mean age 62 years
 - Baseline A1C 8.4 %
 - 35% prior CV event

Resource: NEJM 2008

Evidence – ACCORD (cont)

- Intensive and control groups any drug combination
- Intensive group A1C goal: < 6%
- Control group A1C goal: 7.0 – 7.9%

Resource: NEJM 2008

Evidence – ACCORD (cont)

- Stopped after 3.5 years, 18 months early
- Results:
 - A1C 6.4% (intensive) vs 7.5% (control)
 - 24% reduction in non-fatal MI with intensive treatment
 - **Significantly increased relative risk of death** from CV disease and death from any cause with intensive glycemic control

Resource: NEJM 2008

Evidence – Veterans Affairs Diabetes Trial (VADT)

- N = 1792 with poorly controlled type 2 diabetes
- Primary outcome was time to cardiovascular event
- Study population at entry:
 - Mean age 60
 - Baseline A1C 8.5%
 - 40% prior CVD, diabetes of 12 years duration
 - Any drug combination could be used

Resource: NEJM 2009

Evidence – VADT (cont)

- Intensive Group
 - Goal: A1C < 6.0%
- Control Group
 - Goal: A1C 8.0 to 9.0%
- Results at 6.25 years
 - A1C 6.9% (intensive) vs 8.4% (control)
 - **No** significant difference in **CVD** events or **microvascular disease**

Resource: NEJM 2009

Summary of Evidence for Intensive Glucose Control

- The microvascular benefit seen in some studies are surrogate endpoints and take a long time to achieve.
- No benefit in clinically relevant microvascular outcomes seen in any study.
- Macrovascular outcomes seen in UKPDS follow-up only (not RCT evidence) and in RCT trial for obese using metformin.
- One study of older adults with preexisting complications showed that more aggressive lowering of glucose increased death (ACCORD)
- VDAT showed equivalent outcomes with A1C of 6.9% vs 8.4%
- All studies show increased risk of hypoglycemia with tighter control

Other Issues

- Hypoglycemia occurs more frequently with tight control and can cause falls and other adverse effects
- Quality of life may be adversely affected by trying to achieve tight blood glucose control
- The cost and human resources needed to measure and maintain tight control in the nursing home would be significant

Summary

- In frail elderly with preexisting diabetic complications and limited life expectancy, there is little evidence to support tight control of blood sugar.
- Benefit of glucose control takes years to achieve, longer than the expected life of an older individual in a nursing home.
- Risk of hypoglycemia is immediate and can cause serious adverse effects.

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April 2010

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TARGETS FOR GLYCEMIC CONTROL

KEY MESSAGE

- There is no evidence of benefit from tight control (i.e., fasting plasma glucose 4 to 7 mmol/L) for the long-term care population.

RATIONALE

- It takes 5 years to demonstrate a reduction in risk for micro and macro vascular complications.

TARGETS FOR GLYCEMIC CONTROL (cont)

- The goals of managing diabetes in elderly residents admitted to a LTC facility are different than for people in younger age groups.
- Avoid the acute complications of poor glycemic control including hypoglycemia and prolonged, severe hyperglycemia.

TARGETS FOR GLYCEMIC CONTROL (cont)

- When the health care team discusses an individual's overall health status and prognosis with either the patient or the family, a review of glycemic targets and the importance of avoiding hypoglycemia would be beneficial. If glycemic targets are different from the diabetes guidelines, this should be clearly documented and include the rationale.

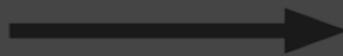
TARGETS FOR GLYCEMIC CONTROL (cont)

RECOMMENDATIONS

If Random Blood Glucose (BG):

Treatment

Less than 7 mmol/L



- **Notify physician to decrease diabetes treatment.**

7.0 - 9.9 mmol/L



- This range may be acceptable. There is risk for hypoglycemia with Glyburide, Gliclazide, and Glimepiride or insulin therapy. If the resident has hypoglycemia (more than once a month), notify the physician to decrease treatment.

10.0 - 20.0 mmol/L



- This range is acceptable if the resident has no reversible symptoms such as polyuria or nocturia.
- If the resident has reversible symptoms, notify the dietitian to assess food intake. Notify physician to assess the diabetes treatment. Increased treatment may not improve symptoms if due to other causes.

Greater than 20.0 mmol/L



- **Notify physician to increase diabetes treatment.**

Greater than 33.0 mmol/L with stupor or coma



- **Notify the physician.**

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3. Continue current therapy
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- An FPG or preprandial PG target of 4.0 to 7.0 mmol/L and
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**If A1C targets cannot be achieved with
postprandial target of 5.0 to 10.0 mmol/L,**

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Case 2

- **Course:**

- Oct to December PG between 4.5 and 9.0.
- Due to the low blood sugars, blood sugar monitoring was increased from once daily to QID.
- The insulin dose was decreased to 6 U BID
- Subsequent fasting and preprandial blood sugars that ranged between 5 and 7.

Case 2

What to do now?

1. Continue current therapy
2. Taper and discontinue insulin
3. Start glargine
4. Other

Case 2

- Late December: Hospitalization for hypoglycemia and depressed level of consciousness
- In hospital, insulin was stopped. However, insulin was restarted in January (6 U BID), when preprandial blood sugars ranged from 10 to 13
- No A1C was tested, but following insulin restart, fasting blood sugars ranged from 5 to 8.

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What to do?

1. Continue NPH
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- 84 year old male with severe dementia and diabetes on maximum doses of metformin and SU.
- Fasting blood sugars range between 12 -14. There are no symptoms of hyperglycemia.

What to do?

1. Continue current therapy.
2. Start evening NPH

Hypoglycemia

HYPOGLYCEMIA

- Hypoglycemia is defined as a BG level < 4.0 mmol/L with symptoms (trembling, sweating, palpitations, nausea, hunger, confusion, drowsiness, weakness, difficulty speaking, and headache).
- Hypoglycemia is caused by inadequate CHO intake at meals, increased physical activity, or excess OAA/insulin.

HYPOGLYCEMIA (cont)

RATIONALE

- Hypoglycemia in the elderly person with DM can be serious and may be underestimated.
 - Fewer symptoms of hypoglycemia or ↓ awareness of hypoglycemia.
 - Poor balance and ↑ risk of falls.
 - More severe and prolonged hypoglycemia can precipitate a CV event.
- Dementia may limit ability to communicate symptoms.
- The elderly are frequently on multiple medications and may also have kidney or liver impairment, which may lead to changes in breakdown of medications.

HYPOGLYCEMIA TREATMENT

RECOMMENDATION

- Prevent, recognize, and treat hypoglycemia promptly and raise the BG > 4 mmol/L. Subsequently, the aim is to keep BG ≥ 7.0 mmol/L.

HYPOGLYCEMIA TREATMENT (cont)

HYPOGLYCEMIA - Assessment

HYPOGLYCEMIA - Treatment

Table 1

BG less than or equal to 3.9 mmol/L

- Resident is able to ingest



Give:

- Oral ingestion of 15 g CHO. See Table 2 for examples.
- Wait 15 minutes and retest. If BG is less than or equal to 3.9 mmol/L, re-treat with 15 g CHO, wait 15 minutes and retest.
- Continue to treat/test until BG is greater than or equal to 4.0 mmol/L.
- If a meal is more than 30 minutes away, a snack containing CHO and protein should be provided (e.g., 1 slice bread and 1 oz. [30 g] cheese or meat).

- Resident is unable to ingest



Give:

- 1 mg glucagon (intramuscularly) if ordered by a physician. (There should be a prn order for glucagon on the chart.)
- Notify the physician.

- Resident is unconscious



Give:

- 1 mg glucagon (intramuscularly) if ordered by a physician. (There should be a prn order for glucagon on the chart.)
- Notify the physician.

After treatment (BG greater than or equal to 4.0 mmol/L) and symptoms remain, look for other causes of symptoms.

PRACTICE TIPS

- It is important to have a hypoglycemia treatment kit readily available. It should include sources of CHO for treatment.

Examples of 15 g CHO for treatment of hypoglycemia

Table 2

- 3 teaspoons (15 ml) or 3 packets of table sugar dissolved in water
- 3/4 cup (175 ml) juice or regular soft drink
- 1 packet (15 ml) honey or jam
- 6 Life Savers (1 = 2.5 g CHO)
- 15 g glucose in the form of glucose tablets
- 15 g glucose in the form of glucose gel

- Do not use any of these examples if the person is unable to ingest or is unconscious.

FOLLOWING A HYPOGLYCEMIC EVENT

- After treatment (BG \geq 4.0 mmol/L), if symptoms remain, look for other causes of symptoms.
- Assess factors that may have contributed to the hypoglycemic event, such as inadequate CHO intake at meals, increased physical activity, or too much OAA/insulin, and adjust treatment accordingly.
- Reduce diabetes intervention accordingly if pattern of repeated hypoglycemia ($>$ once a month).

SUMMARY

POINTS TO REMEMBER:

- Elderly residents in LTC facilities are frail with limited life expectancy.
- Frail elderly residents are at risk for adverse outcomes, hospitalization, and death.
- Diabetes care guidelines for the frail elderly must be individualized, flexible, and consider quality of life.

THANK YOU!

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