

Promoting Comfort for the Older Adult with Diabetes Approaching the End of Life: A Case Study on the Deintensification of Insulin Therapy

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Abstract

The American Diabetes Association (ADA) has put forth the 2018 Standards of Medical Care, stating that, in the relatively healthy older adult, an A1C target of $\leq 7.5\%$ is reasonable, yet once that person reaches the window referred to as the “end of life,” greater individualization of care, simplification of treatment, and avoidance of hypoglycemia is most critical. The palliative care and hospice philosophy emphasizes comfort and the reduction of self-care burden to promote the quality of life for persons with limited life expectancy. Hypoglycemia is an even greater enemy when a person becomes terminally ill, yet allowing blood glucose to be high enough to contribute to polyuria, dehydration and electrolyte abnormalities should also be avoided. While the ADA has developed a position statement on the patient with diabetes in long-term and end-of-life care, many providers and patients are reluctant to relinquish tighter glucose control through intensive insulin therapy and find it difficult to know when to move to palliative care. Once it is decided to move to palliative care, the actual steps to take to deintensify treatment must be individualized. The purpose of this paper to examine the case of an older adult with T2DM on basal bolus therapy who approached the end of her life, and note the challenges that were faced by the patient, her caregivers and providers who wanted her diabetes to be of minimal burden but controlled enough to avoid hypo or hyperglycemia during her illness. The case is then described with application of the new consensus guidelines with “deintensification” of diabetes therapy. A discussion guide is provided for teams to apply principles of deintensification to other patient cases at the end of life.

Keywords: Diabetes; Elderly; End of life; Intensive therapy; Deintensification

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Ms. B was a 75 year old woman who, when this case study begins, had been diagnosed with type 2 diabetes mellitus (T2DM) 17 years earlier, and was currently managed with 20 units of insulin glargine at bedtime, and 4-8 units of rapid acting insulin at meals. She had been doing fairly well with this program, while leading a full life of volunteer work, travel and gardening. At the opening encounter, her A1C was 7.5% at her primary care visit, aligned with the current standard of practice for older adults as put forth by the American Diabetes Association (ADA, 2018). Review of her glucose diary with the nurse practitioner (NP) revealed she had two episodes of mild hypoglycemia in the previous month, which she was able to manage with a quick source of carbohydrate. Her diabetes clinical picture was

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greatly improved from ten years prior, when she had an A1c of 10.5%, had involuntarily lost twenty pounds from glycosuria, was having much more hypoglycemia with a split-mixed insulin program, and was making errors in carbohydrate counting and meal planning. All of that improved with her attendance at an interdisciplinary diabetes education program, and ongoing diabetes management visits with her primary care NP who was also a certified diabetes educator.

Regarding her comorbidities, her hypertension was managed with lisinopril/HCT, her lipids were controlled with atorvastatin 40 mg daily, and her atrial fibrillation was controlled with metoprolol succinate 25mg daily and warfarin therapy. She also had some arthritis, for which she took acetaminophen as needed, avoiding high-dose acetaminophen as well as non-steroidal anti-inflammatories that can cause gastropathy and nephropathy.

Regarding diabetes complications, her chronic kidney disease was stable with a low level of micro albuminuria, kept in check with an angiotensin converting enzyme (ACE) inhibitor, her background diabetic retinopathy was not showing progression at her annual ophthalmology visit, and her symptoms of peripheral sensory neuropathy had improved. For arthritic foot deformities, she wore extra depth shoes with a custom insole; she was pleased she had never developed a diabetic foot ulcer with careful foot care, though she was no longer able to examine the soles of her feet.

Regarding her social history, Ms. B had never married, having experienced a teen pregnancy that caused her to leave home in the eleventh grade; she had given the child up for adoption, and thereafter never wanted to marry. Ms. B was among those who are considered “low income” from a modest job as a bookkeeper for her church for many years, while living in an expensive city. To her credit, she had developed a resilient personality with a keen interest in others, a remarkable sense of humor, and a practical approach to fully engaging in her plan of care co-designed with her health care team “so I can stay perpendicular to the floor as long as possible.” She never drank or smoked, she walked for 20 to 30 minutes daily with her dog, and had frequent contact with her friends, as well as her sister who was ten years older, and who had agreed to be her health care proxy. Her sister’s son, who also had diabetes treated with basal-bolus insulin, was her second proxy, and the two were an inspiration to each other in their close attention to achieving optimal glucose levels.

The NP noted that Ms. B had multimorbidity and polypharmacy, which are commonly seen in geriatric practice, and was glad Ms. B’s cognitive test results showed a sharp intellect with good executive function, so critical to management of an intensive insulin program. While the American Geriatric Society does not recommend routine cognitive screening of all older adults who are asymptomatic, its guideline does highlight the importance of cognitive screening among older adults with diabetes at baseline and with changes in status, (AGS, 2013; Munshi, *et al.* 2017). Ms. B was also noted to be fully independent in all basic and instrumental ADLs. The geriatric care provider must be careful to frequently assess patients for cognitive and functional decline, and screen for “geriatric syndromes” they are prone to, such as depression, delirium, falls, insomnia, frailty and incontinence, especially among those with diabetes (AGS, 2013). Indeed, Ms. B showed risks for multiple geriatric syndromes, which she and her NP worked together to minimize.

At the baseline visit, the NP found Ms. B to be stable and made no changes in her program, but counseled her carefully regarding the episodes of hypoglycemia to prevent their recurrence. For instance, the NP counseled Ms. B to wait until she had eaten her meal to decide how much short-acting insulin to take since it appeared Ms. B typically took 6 units of short acting insulin when planning to eat 45 grams of carbohydrate, yet she was often not eating all her food. The NP considered the recommendation to limit bolus insulin at meals only to correction doses and have her instead take a DPP4 inhibitor, but Ms. B chose not to further increase her oral medications.

At the next visit, the NP noted Ms. B’s point of care A1c was closer to 8% and her glucose log showed ranges between 68 mg/dL (marked as without symptoms of hypoglycemia) and 372 mg/dL, though the majority were in the range of 100-220 mg/dL likely below her renal threshold, as recommended in the ADA position statement as the target (Munshi, *et al.* 2016). While the NP counseled her that reducing the intensity of her diabetes plan was one option, Ms. B wanted to stay with it, feeling it gave her the most flexibility in her day to day life, and she was “used to it.” Had the NP administered the Diabetes Distress Scale at this baseline visit, (as cited in Butts, Collins

and Dugan, 2018), Ms B would have denied that she found her diabetes treatment program overly burdensome, and she was happy to continue to “compare notes” with her nephew. The NP carefully counseled Ms. B that her nephew did not have the co-morbidities and older body systems that make an elderly person more vulnerable to the dangers of intensive therapy. Yet use of this tool may help providers identify patients who find their program too burdensome and simplify it earlier.

Diabetes is common among older adults, with the Centers for Disease Control and Prevention noting that a quarter of adults over age 65 carry the diagnosis (CDC, 2017). The American Diabetes Association (ADA) has put forth the 2018 Standards of Medical Care for various populations, stating that, in the relatively healthy older adult, an A1C target of $\leq 7.5\%$ is reasonable (ADA, 2018). Older adults who are healthy, such as Ms. B, often have many years or even decades of life remaining, in which it is considered still of benefit to avoid long-term complications of diabetes. Regarding patient resistance to deintensification of diabetes therapy, Raghavan and Matlock (2017) found that, Patients who are comfortable on their diabetes treatment, are empowered by their achievement of goal-glycemic control, have embraced the importance of glycemic control to avoid diabetes complications, ... and have never experienced severe hypoglycemia, might be uncomfortable with deintensification of treatment.

In a retrospective cohort study, Sussman and colleagues (2015) demonstrated that diabetes treatment can be successfully deintensified, and concluded that performance measures are needed to reduce overtreatment of diabetes. Yet evidence from randomized trials as to when and how to “deintensify therapy” is lacking. Intensive insulin therapy in this case refers to a multi-disciplinary approach involving two insulin types, or pump therapy, to deliver basal bolus doses, glucose testing, patient education, meal planning, exercise guidelines, and sick day management to avoid or mitigate short and long-term complications. Patients often require extensive education, durable medical equipment, multiple medications for related conditions, and on-going visits to specialists both for the regulation of the glucose itself as well as the management of common co-morbidities of diabetes such as hyperlipidemia, hypertension, nephropathy, retinopathy and neuropathy. While intensive insulin therapy has proven beneficial in reducing the progression of long-term complications, it means the affected person has a significant self-care burden. Among older adults where multi-morbidity, polypharmacy and functional decline commonly occur, the burden of intensive therapy has not been found to offer adequate benefit to justify its continuance in late life, at which time it is best to consider intensive therapy “over-controlled diabetes” (Raghavan & Matlock, 2018). Addressing this, the American Geriatric Society put forth a guideline on the care of older adults with diabetes (2013).

The principles of this guideline were updated in the recent position statement from the ADA (2018). The update cites a useful approach to help providers separate patients into stages as they approach the end of life in order to decide how intensively to treat them, based on work by Angelo, Ruchalski and Spruge (2010) in palliative and hospice medicine. The first category is for the stable patient, for whom it is recommended to continue the same regimen with a focus on hypoglycemia prevention and maintenance of glycemia below renal thresholds, and less emphasis on A1C testing (ADA, 2018). Ms. B was in this category when the evolving case opens. It is noteworthy that the A1c of 7.5%, while “at target” can not tell the provider how often the patient is experiencing hypoglycemia; Brown, Kennedy, Runge and Close (2016) explain findings that many individuals who have A1c levels above target ranges often still experience hypoglycemia too frequently, thus the careful review of glucose logs, or the periodic use of a continuous glucose monitor, can help providers better tailor insulin programs to minimize hypoglycemia. Additionally, focusing attention on the injection technique to avoid either intramuscular injection or lipohypertrophy, which can cause hypoglycemia or inadequate control respectively, is critical (Panya, Losben & Moore, 2018).

The next category is the patient with organ failure, for whom prevention of hypoglycemia is even more crucial (ADA, 2018). Allowing glucose to be in the upper end of the target range and emphasizing the avoidance and prompt treatment of dehydration is recommended at this stage (ADA, 2018). As our case continues, Ms. B missed her next appointment to be seen by the NP in primary care, because she had recently been admitted to the hospital through the emergency room for dehydration after experiencing the stomach flu. Her serum

creatinine, which had been 1.2 mg/dL at baseline, in the context of her age and weight of 130 lbs, translated to an estimated glomerular filtration rate (eGFR) of 39 ml/min/1.73m², squarely in stage 3 chronic kidney disease where many older adults can be stabilized for years with good attention to blood pressure and lipid control as well as use of an ACE inhibitor. With her acute gastroenteritis leading to dehydration and pre-renal azotemia, her serum creatinine had climbed to 3.2 mg/dL, translating to a drop in eGFR by almost two thirds when she was admitted (putting in her acute renal failure), and had rebounded to a new baseline of 1.8 mg/dL, or an eGFR of 25 ml/min/1.73m², translating to stage 4 CKD. Further, while in the hospital, Ms. B received IV hydration, which resulted in flash pulmonary edema, indicating Ms. B also had heart failure. Thus, she had entered the stage of organ failure.

The NP learned that, when Ms. B was in the hospital, she had been taken off her usual insulin program and placed on a sliding scale insulin protocol. The American Geriatrics Society Beer's list criteria notes sliding scale insulin should be avoided in older adults in any setting, and this is also noted in the ADA guidelines (American Geriatric Society, 2012; Munshi, *et al.* 2017). The reason for this, which could be seen on the review of Ms. B's hospital records, was that the hospitalist wanted to avoid hypoglycemia. Therefore it was ordered that when her glucose level was over 150 mg/dL, and for every successive level 50 mg/dL higher, she received a dose of short acting insulin in accordance with the level, but with no awareness of whether the glucose level might be falling and how fast, which often leads to a greater rate of hypoglycemia, especially where acute kidney injury and chronic renal failure reduce insulin clearance. Hypoglycemia in older adults often presents atypically, with fewer adrenergic symptoms that prompt the affected person to self-correct it (including anxiety, hunger and palpitations) and more neuro-glycopenic symptoms (including focal neurologic changes, lethargy, weakness and even seizures), which can prevent self-correction (Singh & Marshall, 1995). It would therefore have been superior for the hospital team to note that Ms. B had been using an average of 30 units of insulin per day, and simply give her intravenous insulin and glucose based on this information in the context of her acute renal failure; updated guidelines for care of the hospitalized older adult with diabetes have been published since her case unfolded (Umpierrez & Pasquel, 2017).

The case further highlights the importance of good transitional care in the elderly. Ms. B was stabilized and prepared for discharge to a skilled nursing facility on the fourth day of her admission, when she had regained renal function, was eating and drinking, and was hemo dynamically stable. Given how weakened she was from the episode, she was deemed in need of rehabilitation, however, without a bed readily available, and with her discharge note and recent lab values lost in a system of disconnected medical records, she had to wait in the discharge lounge for hours prior to arriving at the nursing home not having received an adequate lunch. At that point, the admitting nurse noted she was exhibiting signs of agitated delirium, which led to her getting readmitted to an emergency room at an unrelated hospital system. On her second admission to the hospital, when she again needed intravenous therapy, she was thought to have developed a urinary tract infection, which led to her getting intravenous antibiotics followed by oral antibiotics, which further offset her anticoagulation on warfarin, and further delayed her discharge. By the time she did reach her bed in a skilled nursing facility another ten days later, she was more debilitated by iatrogenic events, yet was in store for more. She was again placed on sliding scale insulin in the post acute care setting, developed another episode of hypoglycemia, fell and broke her hip, and was readmitted yet again, cycling in and out of the hospital and post acute care setting, as so many older adults do.

When the NP did see Ms. B again two months later, where she was discharged "home" to live with her sister, the NP provided a home-based primary care visit. The NP then performed a brief updated geriatric assessment and noted that, with Ms. B meeting criteria for both frailty and mild cognitive impairment, she had a much poorer prognosis than at her previous baseline; this syndrome has been dubbed "cognitive frailty" (Arahamian, *et al.* 2018). She still had stage 4 CKD and heart failure in addition to her atrial fibrillation and diabetes. Prior to her bout with gastroenteritis, it appeared that Ms. B would likely live another five to 10 years, but now it appeared she was within one to two years of the end of her life; the NP explained what palliative care could offer Ms. B and her sister, and both agreed that a palliative care approach was now best, except her nephew who felt the NP was "giving up" on Ms. B. Thus it was critical to explain to the nephew then, as well as at each subsequent encounter, that Ms. B was more vulnerable to the risks of hypoglycemia than he was, and less likely to benefit than he was to tight glucose control.

It has been noted that family caregivers can create a barrier to palliative care in their wish that health care professionals “not give up” on the patient, and it is wise for health professionals to couch it in terms of managing it “differently” instead of managing it “less” (Claydon, 2015; Dijkers, Dunning and Savage, 2013). Dionisio, *et al.* (2015) explored aspects of care among hospice patients both with and without diabetes, and concluded that having diabetes did not change the overall prognosis, but it increased the burden of care. Thus the NP explained to the family that research shows that a much broader population of elderly patients could benefit from primary palliative care to enhance their quality of life while decreasing their caregivers’ burden (Dudley, *et al.* 2018).

Following the ADA recommendations, after a brief period where her blood glucose was found to be kept in the range of 100-280 with low doses of long-acting insulin and small frequent meals, Ms B was prescribed five units of long acting detemir insulin each morning and the capillary glucose testing was reserved for only those times when she felt ill or was having a change in routine. While this may seem to be so low a dose as to be unnecessary, her blood glucose levels did rise above renal thresholds without it, so it was maintained. Note that her blood glucose levels were adequately maintained now on only 20% of her original dose. In addition to deintensifying her diabetes therapy, her warfarin was replaced with low dose aspirin, her statin medication was discontinued, and her diet was liberalized to allow her some of the sweets she had previously enjoyed (Munshi, *et al.* 2016).

The NP made primary palliative care home visits every six to twelve weeks and found her occasional glucose levels to be ranging from 150-300, and, when the nephew inquired about her A1C, explained it was not necessary as it would not change the approach. With her weight only being down two pounds, and her having stayed out of the hospital with her various chronic diseases progressing slowly, she reported being happy that she did was still “perpendicular to the ground, and not yet six feet under it.” Despite her love of life, Ms. B was aware that her death was approaching and was not afraid of it. If she feared anything, she said it was to be readmitted to the hospital, and her family agreed this was highly stressful for both them and for her. Her sister was able to bring her to the clinic in a wheelchair when there was not inclement weather, and Ms B’s resiliency was again evident, as her renal function continued to show normal electrolytes and a stable eGFR in stage 4 CKD. In a healthy outpatient who would want life-prolonging therapy, this would be the time to refer the patient to get prepared for dialysis, but Ms. B preferred a palliative care approach now and wanted as much time as possible to enjoy the things she loved – her sister and nephew’s company, the garden and birds at the bird feeders, old movies, and her dog. Her appetite was fine for small frequent meals, and her weight was stable. Over subsequent visits it was noted that her cognition gradually transitioned from mild cognitive impairment to a major neurocognitive disorder. This was not surprising, since there is evidence from a meta-analysis that diabetes is a risk factor for dementia (Cheng, Huang, Deng & Wang, 2012).

Almost a year after she moved in with her sister, Ms. B developed a weakness on her left side, and her sister called the NP to the house. With her focal neurologic deficits making a small stroke or other central cerebral process likely, Ms. B and her family agreed to consider home hospice care. Ms. B was now sleeping several hours every day as well as for ten or more hours at night, and her urine output was declining. She was eating less and was dependent in all ADLs now. The attending physician who had seen Ms. B in the days she came to the clinic agreed to consult as to a referral to hospice care and agreed this would be sensible. Ms B had entered the third and final stage of the end-of-life continuum as she was nearing death. All capillary glucose testing was ended. All insulin shots were discontinued. There was no further need to be concerned about hyper or hypoglycemia. Ms. B died peacefully in a hospital bed set up in the living room with her family and closest friends by her side two weeks after entering hospice care. It was considered by all involved “a good death.”

As our health care system moves away from problem focused care to patient-centered care, the chronic care model is superior in its philosophy of supporting patients and providers in working together in a more proactive approach to care (Davy, *et al.* 2015). Palliative care can be introduced along with traditional medical therapies and ease gradually in to take a progressively stronger place in the care of the patient whose health is declining. Teams of providers are supported in better communication across settings of care so patients are protected from these preventable adverse events as highlighted in the case of Ms. B. Continuing education of health professional

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teams, such as with use of the discussion questions and case studies in the appendix, can serve to foster application of the principles deintensification of insulin therapy and improve the quality of end-of-life care.

Conclusion

The National Hospice and Palliative Care Organization emphasizes its philosophy of comfort and the reduction of self-care burden to improve the quality of life for persons with limited life expectancy (NHPCO, n.d.). Diabetes that is well controlled when one is in a stage of stable health becomes “over controlled” when the older adult’s health enters one of organ failure and decline, as hypoglycemia becomes an even greater enemy of health. Health care providers need to follow the ADA and AGS guidelines to slacken strict approaches to glycemia while also helping patient avoid persistently hyperglycemia, which may contribute to polyuria, dehydration and metabolic abnormalities. Familiarity with overall insulin needs and food preferences can help providers work with patients and their families to be proactive in covering eaten carbohydrates after the meal with small doses of short acting insulin or forgoing short acting insulin with the use of a DPP4 inhibitor and only using long acting insulin. By taking steps toward palliative care earlier in the trajectory of decline in the course of an older adult’s life, as in the case of Ms. B, primary care providers are better able to provide patient centered care as patients transition on to hospice care as death approaches. Research is needed to better assess the pros and cons of the various aspects of deintensification of intensive insulin therapy when patients enter palliative and hospice levels of care. End of life can be difficult for patients, providers, and family members, but is less difficult when a proactive approach is used. In the case of diabetes care, when the patient is relieved of the burdens of intensive therapy and hypoglycemia, death with dignity is enhanced. Further case discussion is needed to foster adoption of clinical practice recommendations in deintensification of glucose management to enhance comfort at the end of life.

Appendix

General Forum Opening Discussion Questions

1. What challenges do you currently face in the treatment of the diabetic patients on intensive insulin therapy?
2. How do you perceive the stages of the end-of-life affecting the interaction of intensive insulin therapy and the emphasis on comfort care?
3. What would be helpful to you in deintensifying diabetes care for the following case study patient moving through end-of-life care?

Case Discussion

Case 1

Ms. A, age 66, has metastatic ovarian cancer and is independent in ADLs. She eats 75% of her meals. Her glucose ranges 55-380 mg/dL without much pattern when she checks it before meals and at bedtime. She takes 25 units of long acting insulin at bedtime and 4-10 units of bolus insulin with meals, depending on glucose level and carbohydrates eaten. From this presentation, what changes would you make her in diabetes care?

Case 1 part 2

Ms. B has now become too weak to leave the house; her daughter comes in and cares for her and she is now getting intensive home hospice services. She eats 25-50% of her meals and her glucose ranges 120-350 mg/dL.

Case 2

Mr C is a 70 year old with idiopathic pulmonary fibrosis, T2DM and obesity. He has been on prednisone and 60 units of basal insulin with 15 units of short acting insulin at meals. As this patient enters the terminal stage of life, what change would you anticipate that would be made to the treatment of his diabetes? He has periods of dyspnea and anxiety and his wife frequently checks his glucose since she is worried he is having hypoglycemia. How might the patient’s glucose be controlled without being over-controlled?

Final Discussion

What do you find most challenging when caring for the diabetic patient who becomes increasingly ill? What would you find helpful in educating patients and family members about simplification of diabetes therapy for to increase comfort?

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