Management of Diabetes at the End of Life

Sumon Rahman Chowdhury, Sultana Ruma Alam, Rezaul Haider Chowdhury, and Shangkar Barua

I. INTRODUCTION

Diabetes management during end of life and terminal illness is a complex process involving many factors ranging from psychological, ethical, and clinical perspectives. Terminal illnesses pose many challenges including the method and frequency of SMBG, avoiding hypoglycaemic complications and ensuring control of osmotic related symptoms [1]. The terminally ill patient also has to face challenges like presence of pre-existing diabetes, diabetess induced by steroid intake and diabetes associated with cancer/tumor development [1].

Certain physiological factors also exist that may influence glycaemic status during terminal illness. These consist of cachexia, anorexia, malabsorption, hepatic and renal failure. Patients with terminal illness may also experience exacerbations of pain, constipation and fatigue as a result of neuropathy and prolonged hyperglycaemia [2].

Subsequently there are no agreed, evidence-based strategies to manage diabetes at the end of life or during terminal illness.

Therefore, in this review I will try to uncover some of the challenges and discuss the available guidelines associated with managing diabetes at the end of life and terminal illness from the available scientific evidence.

II. SEARCH STRATEGY

Available studies and abstracts were identified through Pub Med and Medline data bases (From 1993-2020) and Cochrane data bases. Key search terms were diabetes and elderly. All available studies and abstracts describing the relationship between diabetes management and end of life were included. The reference list of review articles was also searched.

III. DISCUSSION

A. Targets for Blood Glucose Measurements

A flexible level of BG between 15-20 mmol/l has been recommended by the palliative care physicians where else the diabetic physicians favored a BG level between 10-15 mmol/l [3].

The following points summarize the opinions regarding the frequency of SMBG [3]:

- Diabetes Specialists and Palliative Care Specialists prefer SMBG from twice daily to once every 3 days.
- Frequent testing is advisable for symptomatic patients with hyper or hypoglycaemia.
- Patient wishes and family opinions need to be considered regarding the frequency of SMBG.
• There is a general reluctance to stop SMBG during terminal illness and until the day of death [3].

• For Type 1 DM, there are no guidelines regarding the frequency of BG monitoring; but there is a general opinion to minimize monitoring in order to reduce the pain and discomfort associated with finger-pricking [4].

• During the initial phase of terminal illness, in case of Type 2 DM treated with oral hypoglycaemic agents, there is a general agreement to stop SMBG monitoring [4].

• During the later stages of terminal illness, it is advisable to stop SMBG monitoring [3], [4] but it is not easily implemented3.

B. Managing Blood Glucose Controls

Careful control of chronic complications (micro and macro vascular) is not a priority in terminal illness [5]. Hence consideration should be made to stop therapies such as ACE inhibitors and other anti-HTN medications, statins and aspirin.

Diabetes management during end of life will depend on the type of diabetes, prognosis, feeding ability and the presence of co-existing diseases such as renal and hepatic impairment [3].

The table below summarizes the managed care guidelines for elderly patients with diabetes (Table 1) [6].

C. Type 1 DM and Type 2 DM Treated with Insulin

• Continue previous insulin regimens if otherwise well.

• If reduced appetite or generally unwell, reduce insulin dose or consider short acting insulin in small doses and switch to long acting if condition improves.

• In order to reduce frequent injections and avoid post-prandial hypoglycaemia, long-acting insulin (Detemir/Glargine) is preferable [7].

• Patients with an anticipated survival of a few months should stop A1C testing and target for FBG up to 180 mg/dl. The Type 1 DM patient on insulin should continue insulin in order to prevent DKA and so should Type 2 DM patients who are prone to symptomatic hyperglycaemia [8].

Type 1 and Type 2 DM patients with an anticipated survival for weeks who are prone to HHS should continue their insulin therapy to prevent DKA. Insulin doses should be adjusted to keep the BG levels >180 mg/dl to avoid hypoglycaemia. Short acting insulin in conservative dose is preferable [8].

• Patients in the final days of life have altered conscious levels and oral intake and so should stop their insulin and SMBG in case of Type 2 DM [9].

For Type 1 DM patients there is still a chance to develop DKA so it is advisable and reasonable to continue insulin therapy with relaxed BG targets (<360 mg/dl) [9].

D. Type 2 DM on Oral Agents

• For Type 2 DM on oral agents, it is recommended to lower the dose of the SU by 50% if hypoglycaemia occurs. Prefer switching to short-acting SU’s (nateglinide, repaglinide) as an alternate approach. DPP-IV inhibitors could also be used as an alternate [3].

• Metformin can lead to anorexia and should therefore be discontinued.

• SGLT2 inhibitors can demonstrate important benefits for older people, such as a lower risk of hypoglycaemia and reduction of cardiovascular and renal risk thereby allowing its use in disease of any duration. The SGLT2i class is generally well-tolerated, though some caution is also suggested, including adjustment of concomitant therapies, such as insulin and antihypertensives, especially loop diuretics [10].

• If BG levels are persistently above 15 mmol/l then insulin may be required with oral agents. Consider short acting insulin with meals [3].

• Type 2 DM patients on insulin and oral agents with an anticipated survival of a few months can stop their insulin and oral medications should be halved with further dose adjustment [8].
Type 2 DM patients with an anticipated survival for weeks can stop their OHA in the final weeks of life unless they are prone to HHS.
- For patients prone to HHS, short-acting SUs can be used to minimize the risk of hypoglycaemia [9].

**TABLE 3: ORAL TREATMENT FOR TYPE 2 DIABETES WITH TERMINAL ILLNESS**

| Routine care | Life-expectancy |
|--------------|-----------------|
| Stop glucose monitoring | Stop OHA |
| Low hypoglycaemia risk | Monitor blood glucose Current treatment |
| High hypoglycaemia risk | Monitor blood glucose Reduce SU dose by 50% Consider short acting SU Consider DPP-IV inhibitor |

**E. Patient Education**

Patient education is of fundamental importance to ensure that the terminally ill patient can adapt to the changing situations [11].
- The Diabetes Specialist Nurse has an evident role for providing education, information/advice (SMBG and Insulin delivery devices) and support to the terminally ill patient.
- Dietary restrictions should be relaxed for the terminally ill patient.
- The Diabetes Specialist team (Diabetes Specialist Nurse, Diabetes Dietician, Educator and Consultant Physician) should work in tandem with the relatives and family members to educate them about the frequency of SMBG, BG targets, dietary management, recognize hypo/hyperglycaemia and to offer dignity and comfort to the terminally ill patient and provide the optimum end of life care (EOLC) [12].

**IV. CONCLUSION**

Diabetes management at the end of life imposes many challenges to the patient and his/her family and relatives, health care provider and to the general society. Diabetes related chronic complications remain the primary cause for the premature and untimely death of the patients with terminal illness.

Patients with terminal illness in the final stages of life and their families rarely receive any education regarding glycaemic targets, SMBG monitoring, choice of medications, dietary advice, and hypo/hyperglycaemia management hence denying the patient the right to end of life care. It is both an emotional and physically challenging phase for the patient that requires the approach of a multi-disciplinary team in order to ensure a safe and symptom free transition into obtaining dignity and comfort at the end of life.

The presence of multiple co-morbidities, unintentional weight loss of >10% over the last 6 months, general physical decline, serum albumin levels of <25 g/L and relative dependence on regular activities are some of the generic indicators of poor prognosis which need to be discussed with the patients and their families so that appropriate treatment strategies can be implemented, and careful planning can be initiated.

Finally, it is the distinguished right for every individual with diabetes to gain access to EOLC and a moral obligation of the DST to provide them with the opportunity.

**AUTHORS CONTRIBUTIONS**

S.R.C. and S.R.A were involved in data collection and drafted the manuscript. R.H.C. conceived the study. S.R.C and S.R.A wrote the manuscript with input from all authors. S.R.A., R.H.C. and S.B. critically revised the final manuscript. All authors approved of the final manuscript for publication.

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