P-ISSN: 2617-9806
E-ISSN: 2617-9814

Impact Factor: RJIF 5.89
www.nursingjournal.net

International Journal of Advance Research in Nursing

Volume 9; Issue 1; January 2026; Page No. 22-28

Received: 12-10-2025
Accepted: 16-11-2025

Indexed Journal
Peer Reviewed Journal

The role of diabetes educator in life-style modification in geriatric patient with diabetes mellitus II: A narrative clinic utility note

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DOI: https://www.doi.org/10.33545/nursing.2026.v9.i1.A.621

Abstract

The role of a Diabetes Educator (DE) is crucial in addressing the challenges of geriatric patients with diabetes mellitus by providing structured education and support tailored to the needs. This experience explores the multifaceted role of the (DE) in optimizing lifestyle modification (LSM) and prevention and diagnosis of hypoglycemia and also touches caregiver education, dietary guidance among others helping optimizing glycaemic control. LSM remains a cornerstone in geriatric diabetes management, with a focus on balanced nutrition, physical activity, and stress management. DEs play a vital role in adapting lifestyle recommendations to accommodate age-related limitations. Hypoglycemia is a major concern in elderly with diabetes and DEs educate patients and caregivers to recognize early signs, it's emergency treatment, adjusting medication regimens in consultation with healthcare providers, and implementing dietary strategies. Implementing structured DE programs can significantly improve diabetes outcomes, reduce complications, and enhance the overall well-being of elderly with diabetes.

Keywords: Diabetes educator, diabetes mellitus ii, geriatric patients, lifestyle modification, hypoglycemia, self-management

Introduction

Why DEs are more relevant to geriatric patients with DM II

Diabetes mellitus type II (DM II) is primarily caused by insulin resistance and B-cell dysfunction [1]. The incidence of DM II increases with age following deficiency of insulin secretion and growing insulin resistance caused by a change in body composition and sarcopenia [2].

More than 29% of people aged over 65 years have diabetes and the number is likely to increase in the coming decades [3, 4]. India is second only to China in the global diabetes epidemic with 77 million people with DM II and 12.1 million are more than 65 years of age, which is estimated to increase to 27.5 million in the year 2045 [5]. Advances in the management of DM II and especially its complications have led to longer survival with better quality of life. However, it has become increasingly challenging due to frailty, multiple comorbidities, polypharmacy, cognitive impairment, psycho-social issues (depression, loneliness, financial hardship, etc.), functional decline etc. Adding to these challenges is complexity of implementing tighter glycaemic control to avoid hypoglycemia due to poor counter-regulatory response in the elderly. So, the clinical guidelines for management of DM II in the elderly recognizes importance of avoiding hypoglycaemia and to maintain quality of life [6]. As the world population is ageing and India being no exception, it is our responsibility to develop effective management strategies for this population. From a holistic perspective, management of DM II in the geriatric population encompasses the overall management of multiple co-morbidities in the background of patients' functional status and psycho-social circumstances [7]. We have mentioned in our previous work that DE has a clear and important role in the overall management in all stages of care by providing much needed detailed information and support on adequate understanding of the pathology and safe-execution of the prescription by the specialist and other life-style changes to combat diabetes effectively and this is obviously true for geriatric population as well. This is more significant in countries like India where there is an unfavourable ratio of specialist to patients with diabetes and even more important in geriatric population due to presence of multiple health and social issues. The accessibility of the health-care team by the huge number of patients with diabetes in the government hospitals and consequent rush hours can be effectively compensated by the DE by relieving the physician of routine and repeated individual counselling contributing to effective utilization of clinic-time by the physician and avoiding fatigue and burnout. Literature has evidence that this cost-effective intervention can improve patient outcome and warrants more investment in formal training and continuous academic development of DEs [8]. In this manuscript, a step-by-step counselling of geriatric patients with DM II on LSM and hypoglycaemia is described for easy understanding and execution in the routine out patient setting.

Materials and Methods: Patient evaluation and education

1. American Diabetes Association (ADA) in 2025 advises evaluation of the medical, psychological, functional (self-care abilities), and social aspects of older adults with diabetes to establish a structured approach for setting treatment goals and management. ADA also advocates screenings at least once a year for geriatric syndromes (such as cognitive decline, depression, urinary incontinence, falls, chronic pain, and frailty), as well as for hypoglycaemia and polypharmacy, as these factors can influence diabetes management and reduce overall quality of life as a part of diabetes management in the elderly.
2. Assessment of geriatric patients with diabetes should include categorizations of diabetes on the basis of duration, presence of complications and treatment related concerns (e.g. fear of hypoglycemia) [9-11].
3. To screen for functional disability, accelerated muscle loss, mobility impairment, frailty, and coexisting illnesses, such as hypertension, chronic kidney disease, coronary heart disease, stroke etc.
4. To ensure adequate caregiver support as geriatric patients have more risk for common geriatric syndrome such as cognitive impairment, depression, urinary incontinence, injurious falls, persistent pain, and frailty, polypharmacy etc [12]. Hospital or society-based support workers would be of help if there is a vulnerability identified. All India Institute of Medical Sciences (AIIMS), New Delhi is a tertiary care Medical University and a strong social service unit is associated with all the departments including the out-patient clinics which always proves helpful in such situations.
5. Yearly specialist's evaluation for diabetic foot and eye check-up.

In this regard the 4M framework developed by 'The Institute for Healthcare Improvement' is potentially worth implementing. It involves Mentation, Medications, Mobility, and What Matters Most (person centered), with the understanding of interdependency among them [13].

Table 1: The 4M framework

Mentation	Medications
Self-administration of medications Ability to use diabetes technology Anxiety, depression, and diabetes distress Mild cognitive impairment or dementia Coping skills and self-care	Treatment burden Affordability or insurance coverage End-organ disease or complications affecting medication choice Polypharmacy History of adverse medication effects Social and family support Risk of hypoglycemia, hypoglycemia unawareness, and fear of hypoglycemia
Mobility	**What matters most**
Foot complications Functional ability Frailty and sarcopenia Leg weakness Neuropathy Vision and hearing impairment	Discussing goals and expectations Symptom and disease burden Meal and treatment preferences (e.g., injections and glucose monitoring) Risks, burdens, and benefits of treatment Loneliness, social isolation, and overall quality of life Life expectancy

Results: Role of DE in lifestyle management (LSM) of geriatric patients with DM II

1. Reduced muscle strength (dynapenia), poor muscle quality, and accelerated loss of muscle mass (sarcopenia) or osteopenia [14-16] and most importantly frailty are well known for association with DM in the elderly. Although there are many definitions of frailty, for simpler clinical application we can accept it as decline in physical performance and an increased risk of negative health outcomes due to physiologic vulnerability and functional or psychosocial stressors.
2. Malnutrition in the geriatric population leads to a multitude of decline in the activities of daily living (cognition, lower limb performance, grip strength, quality of life etc) [17-19]. It is important to recognize that inadequate protein intake is an important nutritional cause of sarcopenia and frailty in older adults and has significant association with diabetes [20, 21]. Nutritional management and an individualised exercise programme (aerobic, weightbearing, and resistance training etc.) could help control sarcopenia and frailty by reducing sedentary time and preventing disability [22]. However, it is important to recognise that the goal of these programs is to enhanced functional status and not weight loss. Geriatric patients with DM II who are not frail but overweight or obese, an intensive LSM programme to decrease weight is beneficial across multiple domain that includes weight loss, improved physical fitness, increased HDL cholesterol, lowered systolic blood pressure, reduction in A1C levels, waist circumference, and need for medications [23].
3. Nutritional guidance remains a critical component, considering cultural dietary preferences, economic constraints, and misconceptions prevalent in the societies. DEs work with patients and caregivers to develop affordable, culturally acceptable, and nutritionally balanced meal plans. They also address myths regarding food restrictions and the use of alternative remedies that may interfere with conventional treatment.

Discussion: Recommended physical activity participation for people with diabetes [24]

1. For healthy individuals pre-exercise medical clearance is generally unnecessary prior to beginning low- or moderate-intensity exercise (e.g. brisk walking).
2. Advisable for most adults with diabetes 150 min or more of moderate-to-vigorous intensity activity weekly,

spread over at least 3 days/week. There should not be more than 2 consecutive days without activity which otherwise will adversely affect benefits of exercise in preventing insulin resistance. It is also recommended to follow structured lifestyle interventions that include at least 150 min/week of physical activity and dietary changes resulting in weight loss of 5%-7% are recommended to prevent or delay the onset of type 2 diabetes in populations at high risk and with prediabetes. 2-3 sessions in a week of resistance exercise on non-consecutive days are also recommended.

3. Flexibility and balance training are recommended 2-3 times in a week for older adults with diabetes. Yoga and tai chi may be included based on individual preferences to increase flexibility, muscular strength, and balance.
4. Patients are encouraged to increase total daily non-exercise physical activity to gain additional health benefits.
5. It is always advisable to participate in supervised training for maximum benefit.
6. Both aerobic and resistance exercise training for optimal glycemic and health outcomes.

Aerobic exercise involves repeated and continuous movement of large muscle groups [25] like walking, cycling, jogging, swimming etc. because they rely primarily on aerobic energy-producing systems. The benefits of aerobic training includes increased mitochondrial density, insulin sensitivity, oxidative enzymes, compliance and reactivity of blood vessels, lung function, immune function, and cardiac output [26] leading to substantially lower cardiovascular and overall mortality in DM I and DM II [27]. Aerobic training increases cardiorespiratory fitness, decreases insulin resistance, and improves lipid levels and endothelial function in DM I [28]. In patients with DM II, it reduces A1C, triglycerides, blood pressure, and insulin resistance [29]. On the other hand, high-intensity interval training (HIIT) enhances rapid improvement of skeletal muscle oxidative capacity, insulin sensitivity, and glycemic control in adults with DM II [30, 31] and can be performed without deterioration in glycemic control in DM I [32, 33].

Resistance or strength training involves exercises with free weights, weight machines, body weight, or elastic resistance bands etc. It improves muscle mass, body composition, strength, physical function, mental health, bone mineral density, insulin sensitivity, blood pressure, lipid profiles, and cardiovascular health [26]. The benefits of resistance exercise on blood sugar control in DM I is not clear [33] but minimizes risk of exercise-induced hypoglycemia [34]. It is advisable to perform resistance exercise first which results in less hypoglycemia followed by aerobic exercise rather than the opposite way [35]. Resistance training helps in improvements in glycemic control, insulin resistance, fat mass, blood pressure, strength, and lean body mass in patients with DM II [36].

Flexibility exercises improve range of motion of the joints [37]. Balance exercises benefit gait and prevent falls [38] even in presence of peripheral neuropathy [39]. Activities like tai chi and yoga combine flexibility, balance, and resistance activities. Limited joint mobility in DM is following formation of advanced glycation end products, accumulated during normal aging and are accelerated by hyperglycemia [40]. Balance training can reduce falls risk by improving balance and gait, even when peripheral neuropathy is present. It is reported that group exercise interventions (resistance and balance training, tai chi classes etc.) reduce falls by 28%-29% [41]. Yoga may improve stress induced risk in geriatric patients with DM II and offers promise for the prevention or delay in diabetes complications in addition to significant improvement in all stages [42].

Benefits of and recommendations for reduced sedentary time: [24]

1. Advised to decrease the amount of time spent in daily sedentary behavior.
2. Advised to interrupt longer sitting periods with light activity every 30 min which will have benefits on blood glucose control. These short light activities are in addition to increased structured exercise and incidental movement.

What must be avoided

Behaviours with low energy expenditure (sedentary behaviour) is associated with increased mortality and morbidity [43-47]. Sedentary time leads to poorer blood sugar control and metabolic risk in prediabetes also [48-51]. It has been found that even a brief period of standing (<5 min) or a light walk every 20-30 min improves blood sugar control [52-56]. Post meal walking habits by adults with DM II for 15 min [57] and 3 min of light walking in between prolonged sitting with simple body-weight resistance activities every 30 minutes [58] improves blood sugar control.

We have regularly noticed in the Indian society that post meal nap is almost always the rule rather than exercise in the geriatric population, which adversely affects glycaemic control. We regularly counsel against this habit and encourage to exercise post meal. In a widely cited systematic Review with meta-analysis, Engeroff *et al*. drawn that exercise (e.g. 20 min of walking) has an acute beneficial impact on post meal raise in blood sugar when undertaken as soon as possible after a meal. Longer intervals between eating and exercising weaken this beneficial effect on glucose levels. They also found that exercise prior to a meal does not decrease postprandial rise in blood sugar. Post-meal exercise minimizes blood sugar spikes and might lower the risk for low-grade inflammation diseases and cardiovascular diseases [59]. From a pure practical stand point, most of the geriatric patients also suffer from generalized arthritis especially knee osteoarthritis, poor vision, poor balance during walking secondary to spinal cord or root compression (myelopathy or radiculopathy or both) in the spinal degenerative cascade or rarely cerebellar degeneration, alcohol use, vitamin B12 deficiency, previous stroke, other neurological disorders (e.g. Parkinsonism) etc. Treatment of any of these conditions is essential to make LSM more feasible and subsequent diabetes control better. We advise on starting small on exercises and to gradually build-up on both physical and psychological strength over weeks and months to be more acceptable to the patients.

Prevention of hypoglycaemia: Hypoglycaemia can be

defined as a plasma glucose level of 70 mg/dl (4 mmol/L) [60-62] or less. While hypoglycaemia can be mild, moderate or severe, it is important to remember that the blood sugar level in mild and moderate hypoglycaemia is same (50 to 70 mg/dL or 2.8-4 mmol/L).

Patients experience only autonomic symptoms like tremulousness, palpitations, anxiety, sweating, tingling, hunger etc. in mild hypoglycaemia and are able to self-treat with a good response to glucose therapy. On the other hand, both autonomic and neuroglycopenic symptoms like weakness, fatigue, drowsiness, difficulty thinking or speaking, confusion, incoordination or odd behaviour etc. happens in moderate hypoglycaemia. However, the symptoms in moderate hypoglycaemia could be managed similarly by the patients themselves. In severe hypoglycaemia, the blood glucose level is less than 50 mg/dL (2.8 mmol/L), and manifests as decreased level of consciousness and requires external resuscitative measures. Untreated cases may experience seizures, coma, or death.

We traditionally advice our geriatric patients with DM II not to go for planned physical exercise if the blood sugar if <120mg/dl and advice to take meal before going for exercise. Elderly patients with DM II are more prone to hypoglycaemia for a variety of medical and psychosocial reasons. There are some predisposing and predicting factors of hypoglycaemia which might not be limited to the table below and must be actively looked into during encounters with the geriatric patients with diabetes.

Table 2: Predisposing and Precipitating Risk Factors of hypoglycemia [63, 6, 4]

Predisposing factors	Precipitating Factors
Advanced age	Antidiabetic agents like sulfonylureas, meglitinides, and insulin
History of severe hypoglycaemia	Potentiators of sulfonylureas
Insulin intake for > 10 years	Other medications (e.g. ACE inhibitors)
Chronic renal failure	Overmedication
Chronic liver disease	Missed meals / Delayed meals / Eating less food
Hypoglycaemic unawareness/diminished counterregulatory response	Alcohol intake
Cognitive impairment	Acute illness (poor intake): e.g. Addison's disease
HbA1c <6%	Increased exercise
	Gastroparesis

While worsening kidney functions, insulin deficiency and insulin therapy, irregular meal intake [60], other diabetes medications (sulfonylureas, meglitinide etc.) loss of counter-regulatory homeostatic response, multiple co-morbidities with poly-pharmacy, dementia are important; social isolation, will-full negligence, depression, poverty etc also contribute to precipitation of hypoglycaemia. Dementia and depression could lead to cognitive impairment causing missed meals, forget to take their medications, overmedication, or forget to check blood glucose. There may also be issues with glucose monitoring, including using outdated strips, incorrect technique (both blood glucose monitoring and insulin injection etc.). Hence, assessment for cognitive impairment is essential in elderly patients with DM II.

Advices: [24]

1. To assess and address episodes of hypoglycaemia at routine visits for the obvious reasons mentioned above.
2. To advice use CGM for geriatric patients with DM II whenever feasible on insulin therapy to improve glycaemic outcomes and reduce episodes of hypoglycaemia by detecting early.
3. To consider the use of automated insulin delivery systems, mechanical insulin delivery systems, other advanced insulin delivery devices (connected pens) to reduce risk of hypoglycaemia.

Challenges in managing hypoglycaemia: accuracy of measurement of glucose levels

Traditionally, diabetes treatment is followed-up with self-monitoring blood glucose (SMBG) with remarks on fluctuations. But they usually lack an alarm for high or low glucose values, which would be particularly useful for older patients with reduced hypoglycemia awareness. Another limitation is accuracy especially at glucose levels <75 mg/dL. CGM devices are found to be more accurate and allow for better understanding of how daily activities, meals, and medications affect blood glucose levels culminating in better control and reduce hypoglycaemia [65]. However, the cost and availability of such new devices, particularly to geriatric patients and ease of use are yet to be determined in the context of different societies.

Home treatment of hypoglycaemia

1. Any episodes of hypoglycaemia is a cause of concern and specially in geriatric patients with diabetes and we regularly advice to reach emergency department of the nearest hospital at the earliest.
2. However, as emergency health care might not be available for a variety of reasons, we also advice the following as soon as any symptoms of hypoglycaemia appears to prevent further deterioration of blood sugar level.
3. We also advice that family, co-workers, caregivers, teachers, and other people often around the patient should know how to handle hypoglycaemia.

The 15-15 rule [66]

1. To take 15 grams of simple carbohydrate. We advise for 15 grams of glucose powder (3 tea spoon full) or 120 ml of fruit juice as good options and to wait for 15 minutes.
2. Recheck blood sugar. If it's still less than 70 mg/dL, repeat this process.
3. Keep repeating these steps until blood sugar is back up in target range (>100 mg/dl).
4. Once the target blood sugar level is attained, we advise to eat a balanced snack or meal with protein and complex carbohydrates.

Tips to keep in mind

To check blood sugar often when lows are more likely, such as when the weather is hot, during travel and during increased physical activity.

DM II patients should never skip meals.

We instruct our all patients with diabetes to carry 4-5 hard candies while going out for any work to prevent hypoglycaemia if any symptoms are felt.

We also advice all the patients with diabetes to carry an identity card with details of name, address, caregiver's phone number or emergency phone number and a line in bold stating 'I have diabetes and I have candies in case I am found unwell' would be helpful in the time of need in local dialect.

We advise not to skip or miss insulin after a single hypoglycaemic episode. Instead, once blood sugar is corrected or above 100 mg/dl we advise to take insulin and to identify the reason for hypoglycaemia. If hypoglycaemic episodes are frequent or at a particular time we advise for a physician's consultation for possible adjustment of insulin and to rule out complications. We also advice self-adjustment of the insulin dose regularly even before any episodes of hypoglycaemia to pre-emptively prevent hypoglycaemia and also after any or repeated hypoglycaemia or continuous hyperglycaemia. This avoids erratic change in insulin dose and reduces the visit to the physician or visit in a more controlled or relaxed clinical situation. Apart from minimizing the intensity of hypoglycaemia it also manages better logistic issues of the geriatric patients with diabetes like frequent travels, physician burn-out etc.

Conclusion

Preventing long-term complications requires consistent monitoring and adherence to treatment regimens and persistent LSM. Apart from the detailed counselling on LSM; DEs emphasize regular screening, foot care, blood pressure control, and medication adherence, thereby reducing hospitalization rates and improving quality of life. LSM which is the central theme should be tailored to the functional status of the geriatric patient.

In India, caregiver education is particularly important as family members are primary caregivers for elderly patients in most cases. Many caregivers lack formal training in diabetes management, leading to inadequate care. DEs bridge this gap by training caregivers in medication administration, insulin injection techniques, dietary planning, and emergency management of hypoglycemia.

Encouraging self-management of diabetes empower elderly patients to take an active role in their care for better outcome. DEs provide practical training on glucometer usage, insulin self-administration, medication adherence, and recognizing symptoms of complications, promoting independence and reducing healthcare dependence.

A major challenge in our society is the lack of awareness and accessibility to diabetes education in rural and low-income urban population. Social stigma, financial barriers, and limited healthcare infrastructure hinder effective diabetes management. This research highlights the need for community-based DE programs, government initiatives, and telemedicine solutions to enhance diabetes care accessibility.

Diabetes Educator is a pivotal figure in managing geriatric patients with DM II by integrating medical, lifestyle, and psychosocial aspects of care. Addressing the gaps in diabetes education in contemporary time requires multi-stakeholder collaboration, policy changes, and increased awareness. Implementing structured DE programs can significantly improve diabetes outcomes, reduce complications, and enhance the overall well-being of elderly diabetics.

Conflict of Interest

Not available.

Financial Support

Not available.

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How to Cite This Article
Goswami M. The role of diabetes educator in life-style modification in geriatric patient with diabetes mellitus II: A narrative clinic utility note. International Journal of Advance Research in Nursing. 2026;9(1):22-28.