The Rising Cost of Diabetes: Tips for Prevention

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ABSTRACT

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The rising cost of diabetes has been considered to pose a serious threat to the economy of both developed and developing world. Vascular complications of diabetes results in costly interventions to save the life of the individual. Landmark clinical trials have proven the importance of sustaining the glycemic targets and normalising cardiovascular risk parameters which translates to significant reduction in the micro vascular complications of diabetes. There are global as well as country specific guidelines for choosing the appropriate therapies. Early insulin initiation, delaying or slowing the beta cell decline, choosing therapies based on individualised parameters avoiding hypoglycaemia, cheaper Insulins and oral therapies in low resource settings are the proven strategies to prevent the exhaustive rise in the cost of treating diabetes and its complications. Sustained efforts at educating the public and patients should serve as the backbone to reach long term goals in preventive diabetes care.

Keywords: Diabetes, Cost, Complications, Education

*See End Note for complete author details

INTRODUCTION

It has been noticed that diabetes has evolved as the most expensive disease of the modern times. The numbers of patients with diabetes as well as the lifespan of patients with diabetes have tremendously gone up with more and more of them surviving longer with multiple complications of the disease. For a person with controlled diabetes, the cost of treating diabetes would mean the cost of glucose meter and strips for self monitoring, cost of insulin and oral anti-diabetic agents, cost of laboratory investigations etc. The picture is grim when it comes to long standing uncontrolled diabetes with multiple complications including cardiovascular disease, chronic kidney disease, retinopathy, foot ulcers etc. Studies have shown that when compared to a person with diabetes but no complications, there is a 4.1 fold increase in the cost of treating diabetes as microvascular and macrovascular complications set in.

Why is the cost going up?

Adequate treatments of diabetes addressing multiple components of metabolic syndrome are more expensive compared to conventional management of diabetes with one or two oral drugs. Early cheaper therapies may be effective but with chances of suboptimal dosages and weight gain. Not even 10% of subjects undergoing treatment for diabetes reach all the three targets of therapy namely blood pressure, glucose and cholesterol.

Adequate management includes adopting safer medications, early insulin initiation, glucose monitoring, avoidance of hypoglycemia and periodic diabetes education aimed at patient empowerment. Onset of neuropathy, retinopathy and nephropathy increases the cost by 2-3 folds and with the onset of both microvascular and macrovascular complications; it rises to more than 4-5 folds. Escalating diabetes treatment expenses are thereby directly proportionate to treatment of complications resulting from persistent hyperglycemia, recurrent hypoglycemia, glucose variability, untreated hypertension and untreated dyslipidemia which may cause Coronary Artery Disease, Chronic Kidney Disease, lower extremity amputations, blindness, erectile dysfunction, depression and poor quality of life.

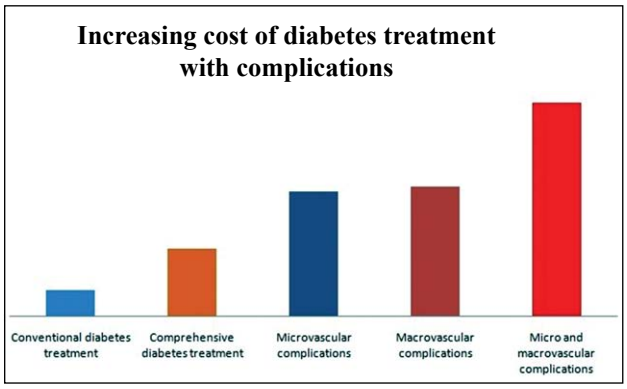

Figure 1. **Increase in the cost of diabetes treatment with increase in complications**

Comprehensive care address and target HbA1c, blood pressure and lipids; early insulin initiation, polypharmacy and education applicable.

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Recommended treatment for diabetes

IDF 2014 therapeutic algorithm[1] suggests metformin as first line therapy if lifestyle measures fail and HbA1c is more than 7%.Sulphonyl urea and premix or basal insulin are to be considered as second line and third line therapies respectively. IDF also suggests Sulphonyl urea or alpha glucosidase inhibitor as alternative first line therapy considering the cost concerns.

The ADA EASD position statement[2] recommends metformin as initial drug for Monotherapy given its low cost, proven safety record, weight neutrality, and possible benefits on cardiovascular outcomes. Metformin and Sulphonyl urea combination is may be considered as a low cost three drug combination.

Early initiation of NPH insulin once daily or premix human insulin twice daily plus metformin with smaller doses of sulphonylureas may be considered a cheaper but safer option in the management of diabetes. Newer therapies with Incretins, SGLT2 inhibitors etc may prove grossly expensive for the less affordable though proven to have multitude of other benefits.

It has been suggested that the use of newer diabetes drugs are largely responsible for the rise in the mean cost per prescription in diabetes. Though the newer drugs are more convenient, have fewer side effects, and have multiple benefits, many a time, their efficacy may not match the older drugs. Moreover, the benefits may not outweigh the costs in some cases of newer drugs, particularly when combined with late insulin initiation (Table 1).

Table 1. Classification of Antihyperglycemic Agents

Drug	Weight	Hypo risk	Side Effects	Efficacy	Cost
Metformin	Neutral/ loss	Low hypo risk	GI/lactic acidosis	high	low
Sulphonylureas e.g. Glimepiride, Gliclazide	gain	Moderate risk	Hypoglycemia	high	low
Thiazolidinediones e.g.Rosglitazone, Pioglitazone	gain	Low risk	Edema,heart failure, fractures,bladder cancer	high	low
Alpha glucosidase inhibitors e.g.Acarbose, Voglibose	neutral	Low risk	Flatulence	intermediate	low
DPP4 inhibitors e.g. Sitagliptin, Vildagliptin	neutral	Low risk	Rare	intermediate	high
SGLT2 inhibitors e.g.Dapagliflozin, Canagliflozin	loss	Low risk	Genitourinary	intermediate	high
GLP-1 receptor agonists e.g. Exenatide,Liraglutide	loss	Low risk	Gastrointestinal	high	high
Human Insulins e.g. Insulatard, Mixtard	gain	High risk	Hypoglycemia	variable	low

IMPORTANCE OF GUIDELINES

The ADA EASD position statement advocate patient centered care and calls for shared decision making where the optimal glycemic target for a patient is determined based on a series of patient and disease factors, some of which are potentially modifiable. Risk of hypoglycemia, disease duration, life expectancy etc. have been identified as more or less fixed whereas resources and support system are considered unique to a patient and are considered modifiable, as is the case with patient's attitude and expected treatment efforts. It is the responsibility of the diabetes treating team to optimize care and to improve patient compliance, which means lesser complications of diabetes and less spending.

The International Diabetes Federation Global Guideline for type 2 diabetes has recommended three levels of care for diabetes keeping in mind that the implementation of particular levels of care in certain parts of the world is largely offset by lack of resources. According to this guideline, limited care is the lowest level of care that anyone with diabetes should receive where only low cost or high cost effectiveness interventions are included. Comprehensive care includes the most up-to-date and complete range of health technologies that can be made available in diabetes and aims at achieving the best possible outcomes. Recommended care stands for evidence based care which is thought to be cost effective in most nations.

Cheaper Therapies: Merits and Demerits

Studies have shown that both glucose-related and glucose-independent mechanisms contribute to vascular complications which can set in even in pre-diabetes.[3] It is always therefore wise to start therapeutic management as early as possible. Evidence suggests that due to metabolic memory in type 2 diabetes, early interventions to achieve and maintain glycemic control might reduce vascular complications.[4] Early, aggressive insulin therapy has been shown to have pleiotropic effects, which may be cardio protective and potentially anti-atherosclerotic. Though insulin therapy has unlimited potential to achieve the most effective reductions, "clinical inertia," associated with insulin initiation makes it the "last

resort" or "end-stage" therapy, even among patients where oral agents are no longer adequate.

A randomized, parallel arm study of 382 patients with newly diagnosed type 2 diabetes demonstrated > 95% of patients in the insulin treatment groups achieved euglycemia and that too significantly faster when compared to 84% of those receiving oral agents.[5]Initiation of insulin therapy fairly early in patients with hyperglycemia can effectively and rapidly correct their metabolic imbalance and reverse the deleterious effects of glucotoxicity and lipotoxicity on beta cells, with minimal weight gain and hypoglycemia.[6]

As β-cell dysfunction progresses over time, many patients, treated with oral agents, fail to achieve adequate glycemic control, causing prolonged hyperglycemia which predisposes to increased risk of diabetes-related complications. In long standing diabetes, years of use of maximal doses of oral agents may lead to almost total functional loss of beta cells and higher insulin dosages may be required to achieve glycemic control. Late initiation of insulin may also result in recurrent episodes of hypoglycemia, hypoglycemia unawareness etc. Many a time, when patients are initiated on insulin late in diabetes, dosages are not adjusted or advanced for fear of hypoglycemia.

The long-acting basal insulin analogs such as insulin detemir and insulin glargine have a highly favorable pharmacodynamic profile with minimal risk of hypoglycemia and fewer propensities for weight gain when compared to neutral protamine Hagedorn (NPH) insulin which is a cheaper option. Premixed insulins provide an easier means of achieving near-normal insulin profiles, but with less flexibility.

Though cheaper medications like glibenclamide are widely used as monotherapy in newly detected diabetes, it has been found that ischemic preconditioning is impaired by glibenclamide which increases cardiovascular risk.[7]It is very much prone for inducing hypoglycemia and weight gain.

Thiazolidinediones (pioglitazone) are another class of drugs widely used for diabetes management. However, fluid retention, incidence of fracture both in men and women, worsening of Congestive Heart Failure and possible bladder cancer risk etc. makes it a less favourable option in diabetes management despite being an effective insulin sensitizer.

Lifestyle

Untimely food habits, choice of unhealthy diet options, lack of physical activity, mental stress etc. are the major reasons for both occurrence and progression of diabetes. The Diabetes Prevention Program demonstrated that an intensive lifestyle intervention was most effective in reducing progression to diabetes in high-risk individuals, followed by metformin therapy. Evidence demonstrates 58% reduced incidence of type 2 diabetes by Intensive lifestyle intervention.

Also, incidence of diabetes during the 10-year average follow-up after randomization was reduced by 34% in those initially randomized to lifestyle.[8] Being stress smart is also necessary for effective diabetes management.

Indigenous medicines

Indigenous medicines and alternate medications are very popular in diabetes. Alternative medicine is any practice that is perceived by its users to have the healing effects of medicine, but does not originate from evidence gathered using the scientific method, is not part of biomedicine or is contradicted by scientific evidence or established science. Thousands of diabetes patients are allured to advertisements promising 'cure for diabetes'. By the time the patients get back to modern medicine, diabetes could have become uncontrolled and the patient could have developed the expensive complications of diabetes, in turn resulting in high cost of therapy.

Diabetes Education

Modern expensive medications and devices may be required for those with stressful jobs and lifestyles. Imparting professional education, addressing the importance of diet, physical activity, regular glucose monitoring,[9] polypharmacy and stress management are indispensable in ensuring success and keeping the cost low in the long term. Involving a family member for the care of the patient with diabetes and involving him in education and developing skills in the management of disease are also pivotal in reducing the cost of therapy.

CONCLUSION

Long standing uncontrolled type 2 diabetes behaves similar to type 1 diabetes necessitating multiple daily shots and addressing recurrent episodes of hypoglycemia. Therefore, diabetes patients should be taught on cost savings in the long term. Regular structured self monitoring and early insulin intervention are the key factors. The rising cost of diabetes is the result of refusal to adopt optimal and recommended therapies

which could otherwise prevent the costly vascular complications of the disease. Widespread education on recommended therapies is mandatory for the management of diabetes in patients with low socio-economic status. Cheaper and safer therapies such as metformin and human insulins combined with glucose monitoring and therapies for co-existing co-morbidities, though may appear expensive, will largely offset the escalating cost in future, preserving the quality of life.

END NOTE

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Editorial Comments

Diabetes care is a fascinating subject always of interest to the general practitioner, physician, surgeon and the lay public alike. Recent trends in the management of diabetes are discussed in the article. Here the focus is on the rising costs of treatment. Rising cost of healthcare has been engaging the attention of health administrators and health policy makers the world over for obvious reasons. Major journals analyse the trend periodically. The responsibility lies with each health care professional to work out cost effective strategies in the management of diabetes keeping the economic capabilities and long term care involved in diabetes.

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