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Research Article

ESTABLISHING BEST PRACTICES IN DIABETES CARE AT A TERTIARY CARE HOSPITAL

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A B S T R A C T

Introduction: This study aimed to study best practices in Glycemic control of patient with diabetes in private tertiary hospital in Mumbai, India. Glycemic control policy is a structured way to manage inpatient hyperglycemia with Oral hypoglycemic Agents and insulin. A special protocol for Intravenous insulin infusion has also been formulated as a part of the Glycemic control policy.

Methods: A total of 924 diabetic patient records were included in the study. Before implementing the Glycemic control policy, it was designed and validated for 1 month in the hospital for inpatient hyperglycemia management. Training on Glycemic control policy was imparted to 60 nurses and they were evaluated pre and post training. The adherence towards Glycemic control policy was evaluated four times in different time intervals of 3 months.

Result: The results of a 3 months study from December 2016 to February 2017 reflect the average adherence to Glycemic control policy as 30.13%. Before the training session the knowledge regarding Glycemic control policy was 33.66% and after the training session it improved up to 74.13%. The final phase of the study was from January 2018 to March 2018 which shows adherence increased up to 94.35%.

Conclusion: In the beginning there was a lack of knowledge and non adherence to the Glycemic control policy but through constant training and supervision there was a remarkable improvement. The study paved the way to establish best practices in diabetes care in a tertiary care hospital.

INTRODUCTION

The term Diabetes is derived from the Greek word 'diabainein' which means 'to siphon' and the word Mellitus derived from the Latin which means 'sweet'. Diabetes Mellitus is a silent disease and now recognized as one of the fastest growing threat to public health in almost all countries of the World. It is also called the disease of prosperities. [1]

Around 150 Million people suffer from diabetes in the World, out of that above 35 million are Indians- the highest in the world. Every fifth person who suffers from diabetes in the world today is an Indian. By 2030 India will have 79.4 million diabetic patients as per WHO (World Health Organization), that's more than twice the current number over 35 million cases. No wonder India is the "Diabetic Capital of the World". [2] [22]

Need of the Study

Each year, millions of people with diabetes are hospitalized in the United States, according to the CDC (Centers of Disease Control). Hyperglycemia is a common and costly problem in hospitalized patients. Bersoux and colleagues found that the prevalence of hyperglycemia was 32.3% in non-ICU (Intensive Care Unit) patients and 28.2% in ICU patients. [16] [17]

Although poorly controlled diabetes in the hospital has a direct effect on outcomes-patients develop more complications, endure longer hospital stays and incur higher costs - the disease is still routinely considered secondary to the primary reason for admission. Many hospitals are identifying shortcomings in their inpatient diabetes management programs and designing appropriate solutions to improve diabetes care. The usual protocol for blood sugar control is to perform pre - meal blood sugar and inform the physician. He would then give verbal order for OHA or insulin to be administered. The problems encountered as a result of verbal order were:

- Nurses burdened with the task of informing Physician the pre- meal Hemo Glucose Test (HGT) results to decide the insulin doses.
- Risk for delay and errors while following verbal orders for Insulin administration.
- No structured process in managing diabetic patients.
- Sliding scale practices leads to poor Glycemic control.

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Thus emerged the need to develop a Glycemic control policy in our organization for the stakeholders.

Glycemic control policy is a structured way to manage inpatient hyperglycemia with OHA (Oral hypoglycemic Agent) and insulin (basal and bolus therapy along with correction scale). This study aimed to study best practices in Glycemic control of patient with diabetes in private tertiary hospital in Mumbai, India. A special protocol for IV (Intravenous) insulin infusion has also been formulated as a part of the Glycemic control policy for nurses to drive the management of inpatient hyperglycemia.

Also with this came the opportunity for verticalization in the field of nursing -Diabetes Nurse Educator

One way to reduce the morbidity and mortality as a result of Diabetes is to educate health care providers. Nurses are the first point of contact for inpatients seeking information on diabetes care. The quality of information will depend on the knowledge and experience of these nurses in diabetes care. [3] Insulin is a life-saving medication but, if wrongly administered, it can cause death or severe harm. Errors in insulin administration are common, including the inappropriate use of syringes. We surveyed all clinical areas to identify types of syringes and needles available and how these were stored and distinguished from IV syringes. Based on these results, we developed recommendations to promote safety and best practices to standardize insulin syringes throughout.

Several studies have shown that high blood sugar (glucose) levels are associated with diseases caused by the diabetes. [18] Controlling the blood sugar may prevent these complications. As people age, their insulin production decreases. OHA used to treat diabetes may help for a while, but over a period of time their effect reduces. When the blood sugar is too high, insulin is frequently recommended. Enhanced support is especially important when undertaking and sustaining new challenging self-care tasks, such as initiating or intensifying insulin treatment regimens. Many people with type 2 diabetes who need insulin therapy are often reluctant to start using insulin to manage their diabetes. This may be because they are worried about self injection and do not have enough knowledge about insulin to make an informed choice. [4]

Review of literature

"Incorrect Insulin Administration: A Problem that Warrants Attention" study reported that, Incorrect administration of insulin (e.g., too little, too much, or at the wrong times) can result in both transient and serious hypo- and hyperglycemia, wide Glycemic excursions, severe hypoglycemia, and DKA. When Glycemic control is poor, patients and providers commonly assume that this is because of poor behavioral adherence (e.g., insulin omission), dietary indiscretions, difficulties using carbohydrate counting, or sedentary lifestyle. However, in an analysis of insulin errors that resulted in emergency department visits for hypoglycemia, in addition to "intentional" errors, the authors identified other insulin errors, including "unintentionally took wrong insulin product," "meal-related misadventure," "pump-related misadventure," and "other misadventure". [19]

The authors were not aware of any studies in which the accuracy of patient self-administration of insulin has been systematically examined. The primary purpose of their study was to evaluate the insulin injection technique of a sample of ambulatory adult patients who regularly use insulin to assess their injection skills and knowledge related to self-administering correct insulin doses. In secondary analyses, the relationship of skill accuracy to Glycemic control was assessed. [5]

Similarly, in the lay literature, one finds reports of cases in which a provider asked a patient to demonstrate his or her insulin injection technique and thereby identified serious flaws. In one case, a patient was not properly using an insulin pen and so was unaware that, in fact, she was not getting any insulin at all. [20] In another case, a patient was using a syringe that was not designed for the delivery of insulin and was therefore not getting enough insulin. [21]

A study was conducted by Indian council of Medical Research (ICMR) which studied the pattern of morbidity amongst NIDDM individuals in the age group of 25-65 years with 4637 subjects. Analysis of large vessel disease showed that the most common vessel disease observed in patients with type II Diabetes is Coronary artery disease with males showing 8.1% and the females having 4.7%, prevalence. The findings of this study show that nephropathy has a significant relationship with the onset of diabetes. Duration of diabetes and hypertension are the major determinants of both large and small vessel disease of diabetes. [6][15]

A study was done on the effectiveness of planned teaching programme on management of Diabetes mellitus among patients attending the diabetic clinic at NIMS, Hyderabad. Thirty diabetic patients were included in this study. Assessment was done on based on Dorothea Orem's theory. One group Pre test and Post test design was used. There was a significant increase in post test scores which showed that Nurses role in managing Diabetes is pivotal and Education is the greatest support in the cure of Diabetes. [7]

A randomized controlled trial was conducted on 169 adults by Diabetes dose adjustment for normal eating (DAFNE) group. Results showed that at 6 months, HbA1c was significantly better in immediate DAFNE patients (mean 8.4%) than in delayed DAFNE patients (9.4%). Conclusion was promoting dietary freedom, improved quality of life and Glycemic control without worsening severe hypoglycemia or cardiovascular risk. This approach has the potential to enable more people to adopt intensive insulin treatment and is worthy of further investigation in "present quality of life". [8]

Diabetes is an **"**Ice Berg" disease. According to recent estimates prevalence of Diabetes Mellitus in adults was around 4% worldwide and it means that over 143 million persons are newly affected. [9] The population in India has an increase in adult diabetics and was found to be 2.47 % in rural and 4.0-11.6% in urban dwellers. High frequencies of impaired glucose tolerance showed by studies ranging from 3.6 to 9.17% indicates the potential for further rise in prevalence of diabetes mellitus in the coming decades. It is projected that the disease prevalence will increase 5.4% by the year 2025, with Global diabetic population reaching 300 million, of this close to 77% of the Global burden of disease was projected to occur in the developing countries. The important differences are observed in the age structure of diabetic population between developed and developing countries. Whereas, in the developed World, the majority of diabetics are aged 65 years and above, it was 45 to 64 years in the developing country. An estimated 30 million persons in the South-East Asian region are affected at

present. The prevalence of Diabetes Mellitus in countries of the South – East Asia region ranges between 2.1 – 4% and from this 1% is adult populations. In major urban agglomerates, the prevalence was shown to be much higher: 6 to 12%. [10]

It is estimated that in India during 1997 about 102,000 persons died due to Diabetes Mellitus, Earlier it was called as rich man's Mellitus. So the investigator thought that it is important for the community to know about Diabetes and its prevention. Diabetes also alters the immune system. Thus increasing the body's ability to fight infection. Small infection can rapidly progress to death of the skin and outer tissues (Necrosis), which may lead to complications of the various systems of the body. Thus saving the life of the Community. [11, 12]. The researcher through the review of literature, references and through their previous experiences felt that there is a need to conduct the study. Earlier it was called as a "Richman's Disease", whereas now it is seen even among the "slum dwellers". Hence the researcher felt that there is need to prepare booklet in order to create awareness among the general public both in urban & a rural areas. [13]

Aims and Objectives

1. To develop integrated diabetes service i.e. developing a Glycemic control policy for patients on Oral Hypoglycaemic Agents, subcutaneous insulin administration and intravenous Insulin infusion therapy.
2. A broader perspective to check the adherence to Glycemic control policy.
3. Nurses empowerment in best practices on Glycemic control policy.

METHODOLOGY

***Research design*:** To perform a descriptive observational study with an intervention (Planned teaching program for the Nurses).

Research setting: Dr LH Hiranandani Hospital, Powai, Mumbai, India 400076.

Population: Diabetic patient records of hospital and hospital nurses.

Sample: Patients records admitted to the hospital with history of diabetes mellitus.

Nurses who are practicing Insulin Technique

***Sampling Technique*:** Convenient sampling

***Sample size*:** A) A total of 924 diabetic patient records.

1. 200 diabetic patients records from December 2016 to February 2017.
2. 237 diabetic patients records from May to July 2017.
3. 223 diabetic patients records from October to December 2017.
4. 264 diabetic patients records from January to March 2018.

B) 60 nurses for training (March - April 2017)

Tool:

a. Observation checklist
b. Structured questionnaire
c. Glycemic Control Policy

MATERIALS AND METHODS

The genesis of Diabetes services at Dr L H Hiranandani Hospital stemmed from the Organizational Support of the administration and active involvement of the physician to devise a comprehensive plan in managing diabetic patients. Co-ordination and Team work laid the ground work to develop the policy. This needed co – ordination and communication between the Physician, Resident doctors and Nurses and thus came the need to have a Diabetes Nurse Educator. With the consent of the physician the Glycemic Policy was devised to give away the sliding scale.

Glycemic Control Policy includes the patient details, physician order along with the details regarding pre hospitalization medicines and pre admission and current HbA1c. The physician orders for HGT monitoring and documentation in the policy.

There are three different parts of Glycemic control policy for management of inpatient hyperglycemia:

Part A: Glycemic control policy for OHA

This includes the oral hypoglycemic agents that need to be administered which are prescribed with all information along with physician orders for special instructions to inform HGT.

Part B: Glycemic control policy for subcutaneous insulin

This is the main policy for inpatient hyperglycemia management which includes the type of insulin for bolus and basal therapy or some time premix insulin. The Physician prescribes the prefixed basal or bolus insulin dose for the day. The nurse documents the details of administration. This form also includes the standard correction scale required for any HGT deviations along with lower and higher corrections. This policy helps in establishing a uniformity of Glycemic control in the organization and deviate from current non scientific practice of sliding scale.

Part C: IV insulin infusion protocol

This protocol includes the indications for IV Insulin infusion. The purpose of this protocol is to control blood sugar gradually in case of severe hyperglycemia by titrating the dose of IV Insulin. The preparation, mode of administration and the primary target of blood sugar are mentioned in this protocol. There is insulin infusion chart which includes different HGT level with insulin correction dose for nurses to drive the management of inpatient hyperglycemia and information regarding dose changes with respect to changes in blood sugar level. This protocol is also inclusive of management of mild to severe hypoglycemia. There is also a detailed description on how to transit a patient from IV insulin infusion to subcutaneous insulin. This is adapted from Atlanta medical university column to column protocol. [23]

Training was imparted to the Resident doctors and staff nurses on the effective use of the policy by the Physician and Diabetes Nurse Educator. Post training feedback and adherence to the policy was evaluated.

For the study a constructive observation check list was formulated to know about the adherence of Glycemic control policy in the hospital and then to accomplish the best practices in diabetes care. A structured questionnaire was formulated to assess the knowledge of nurses related to the Glycemic control policy.

The observation check list (Table 1) was constructed to check the adherence of Glycemic control policy in the hospital for inpatient hyperglycemia management.

Table 1 Glycemic Control Policy Adherence Observational Check List.

Patient MR No.	Date	Policy followed	Policy not filled	IV Policy not followed	Policy not kept

In this observational check list there is patient detail or Medical Record No. and the date of observation

a. Policy followed – Inpatient hyperglycemia is managed with the help of Glycemic control policy in which the accurate documentation done as per the policy.
b. Policy not filled- In this category there is no complete documentation of the policy by health care professional.
c. IV Policy not followed- The inpatient hyperglycemia management by insulin infusion therapy is not according to the policy designed.
d. Policy not kept- In diabetic patients file Glycemic control policy was not found.

First part of the study was to check the adherence of the new Glycemic control policy in the hospital for 3 months with the help of observation check list.

Since the adherence of the policy was very low, key problems of non adherence were identified and more emphasis was laid on constant training and evaluation.

Structured training programme on Glycemic control policy was prepared. 60 nurses were trained. Pre and post training evaluation was conducted using questionnaire. After the training the adherence to the policy was assessed by an observational check list.

RESULT AND DISCUSSION

The study reflects the challenges faced by the organization in complying to a Glycemic policy with the ultimate goal to have better blood sugar control for inpatients by health care professionals.

Salmaan Kanji *et al*. showed that Standardization of intravenous insulin therapy improves the efficiency and safety of blood glucose control in critically ill adults. [14]

Improvements in health care technologies and treatments have resulted in increased life expectancies and improved disease management potential for individuals with Diabetes and on prolonged Insulin therapy. To a great degree, quality of life may be determined by the ways they deal with the illness. Thus, identifying effective ways of coping and promoting their self-dependence with these diseases may lead to the development of efficacious interventions. Since 1980 there has been a substantial amount of research devoted to understanding the relation between coping with chronic illnesses and psychological adaptation. [4]

The study was conducted in different time intervals to check the adherence of Glycemic control policy in the hospital. A gap was found out while evaluating the adherence of Glycemic control policy for which again the action was taken as per the need and knowledge was given to health care professional with the help of structured teaching programme to see the effectiveness. There was a test before and after the training and then again with the help of observation check list the adherence towards the Glycemic control policy was evaluated. From then on it was a continuous process in the hospital to check the adherence of the Glycemic control policy by health care professionals.

The result of the study in different aspects is as follow

Table 2 Adherence of Glycemic control policy from Dec 2016 to Feb 2017

Month	Total Patients Records (N=200)	Policy followed (%)	Policy not filled (%)	IV policy not followed (%)	Policy not kept (%)
Dec 2016	37	27.05	59.4	8.1	5.4
Jan 2017	93	33.34	60.2	6.45	0
Feb 2017	70	30.01	60	4.71	4.28
Average		30.13	59.88	6.42	3.22

Table 2 shows that in the first three months the adherence to Glycemic control policy was 30.13%. ,whereas 59.88% files were having the Glycemic control policy but not filled, which shows non adherence to the policy.

This brought about the need to identify the gaps in implementation of the policy in the wards. It identified the following reasons such as acceptance and understanding of the policy, amongst Physician, Resident doctors and Nurses was low and also high attrition rate of Resident doctors and Nurses

Plan and implementations

- Administration decision to ensure all concerned will adhere to the policy.
- E-Mails sent to Physicians by the Medical Director
- Meeting with Physicians to encourage active involvement
- Train the trainer program for Resident doctors and Executive Nurses
- Evaluated nurse's knowledge on Glycemic policy and safe insulin administration practices.
- Glycemic policy and safe insulin administration practice included in induction training program for all newly recruited nurses.

The results of knowledge of the Nurses regarding the Glycemic control policy and safe insulin administration practices reflected only 33.66% being aware of the policy and its use as shown in Figure 1.

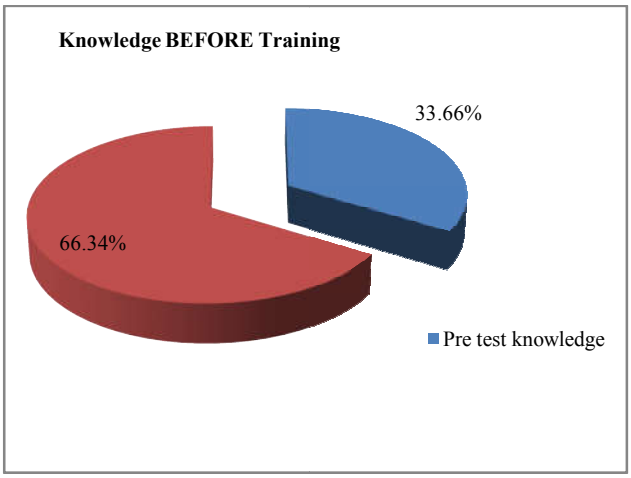

Fig 1 Nurses knowledge before training

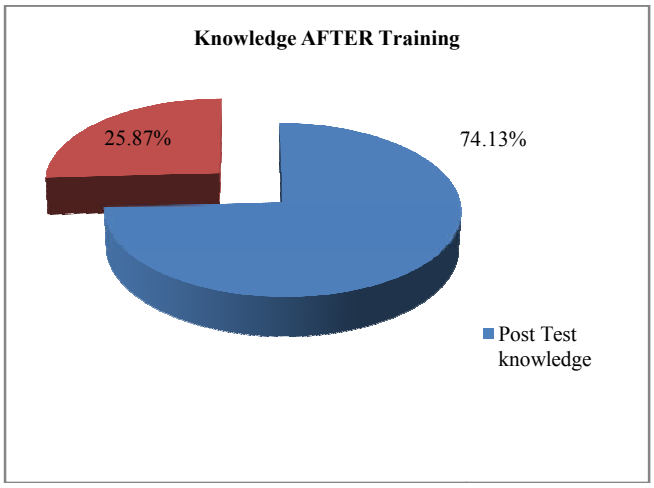

Fig 2 Nurses knowledge after training

After structured teaching programme, knowledge of nurses was re evaluated and it was increased up to 74.13% as shown in figure 2, which shows that training was effective and there was a significant increased in knowledge regarding Glycemic control policy.

Figure 3 shows the results found in this study. The results of a 3 months study from Dec 2016 to Feb 2017 reflect the average adherence to Glycemic control policy as 30.13%. Health care professionals were trained on Glycemic control policy and they were evaluated for the same before and after the training session. Before the training session the knowledge regarding Glycemic control policy was 33.66% and after the training session it improved up to 74.13%. The training proved to be effective and adherence to Glycemic control policy was checked on a continuous basis. Compliance to the policy was then again assessed in the months of May – July 2017 which reflects an increase in average compliance up to 78.57%. Average of three months from Oct. 2017 to Dec.2017 adherence was 91.42%. The final phase of the study was from Jan 2018 to March 2018 which shows adherence increased up to 94.35%.

In the beginning there was a lack of knowledge regarding Glycemic control policy and non adherence to the policy but through constant training and supervision there was a remarkable improvement in adherence of Glycemic control policy. Adherence to the policy in the first phase of the study was 30.13% but improved to 94.35% in the final phase of the study.

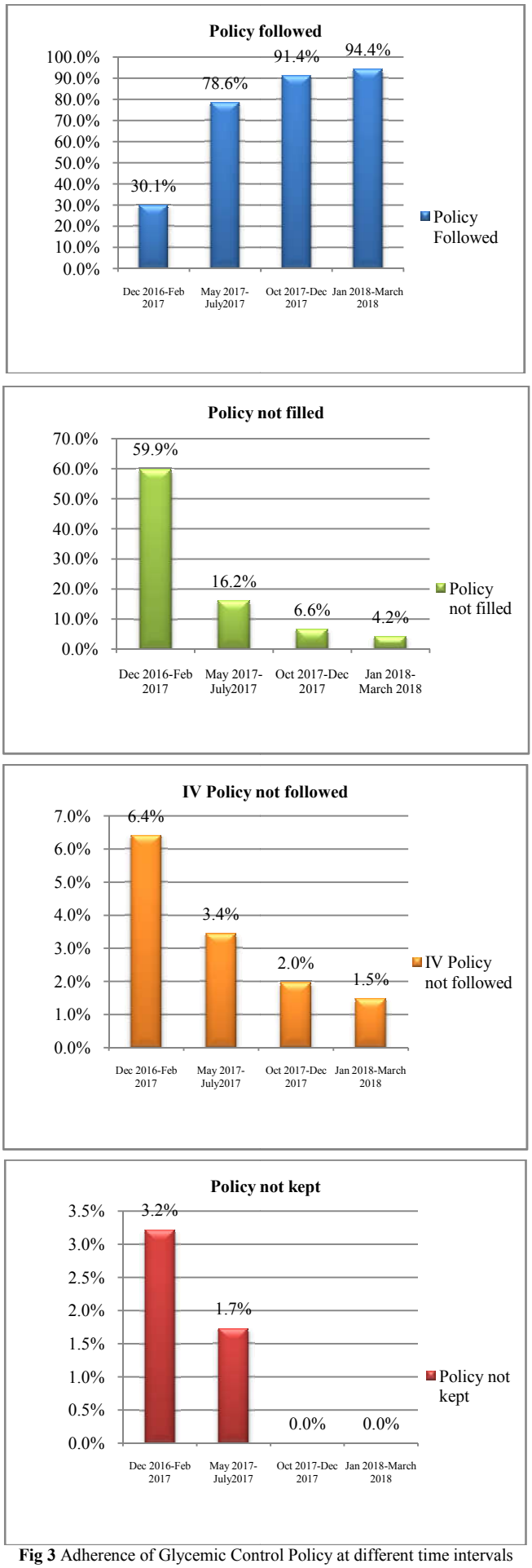

Fig 3 Adherence of Glycemic Control Policy at different time intervals

CONCLUSION

"Starting up a diabetes clinic in general practice from scratch may seem like a daunting task; however with some forward planning and expert guidance it is an achievable and worthwhile exercise." - Lowe, Joanne

Diabetes Nursing Verticalization in our hospital is a team effort. The above study has enabled us to establish verticalization and structured process in diabetes management in the hospital with the help of Glycemic control policy.

The diabetes services provided at our organization has shown these results due to the continuous support of our administration, Physicians and the Nurses. There will be challenges but sustaining and improving the results will remain our primary goal.

The study paved the way to establish best services in diabetes care in our hospital that is Metabolic Center - Diabetes and Obesity Center of Excellence at Dr L H Hiranandani Hospital, Powai, Mumbai, India.

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