

# A Brazilian Experience with a Diabetes Program for Patient Safety in a Tertiary Hospital

Gustavo Daher, Rodrigo Bomeny de Paulo, Rogerio Silicani Ribeiro and Jose Antonio Maluf de Carvalho\*

*Chronic Conditions and Elderly, Hospital Israelita Albert Einstein, Sao Paulo, Brazil*

Diabetes mellitus is a global health problem estimated to affect 400 million people; among those 50% do not have the correct diagnosis or treatment [1]. In Brazil, the national data is not precise, and diabetes should affect 6% to 12% of the population, representing almost 25 million people [2,3]. The prevalence of the disease increases with age and it is often accompanied by others majors chronic conditions such as hypertension, dyslipidemia and cardiovascular disease (stroke and myocardial infarction among others). The combination of these factors represents a significant impact on health costs. In 2014 the estimated diabetes costs worldwide were of US\$612 billion, signifying more than 10% of general health expenditures [1].

Patients with type 1 or 2 diabetes mellitus are frequently hospitalized for treatment of conditions other than their diabetes. Therefore, the in-hospital prevalence of these disorders may be even more dramatic. General data estimates that 25-35% of the patients admitted have diabetes; out of which 4-10% did not had the diagnostic established prior to the hospitalization [4,5]. The Hospital Israelita Albert Einstein, located in São Paulo, Brazil, registered up to 4.000 patients with the diagnosis of diabetes on its discharge registries in 2013 [6]. Hyperglycemia related to acute stress conditions or others factors, such as medications in non-diabetic hospitalized patients is also very frequent, reaching a prevalence as high as 40-80% on critical care units [6,7,8].

Diabetes or hyperglycemia on hospitalized patients is related to higher rates of diabetes related complications, including hypoglycemia, a severe condition related to glycemic management, as well as, higher rates of infections and mortality. Those consequences reflect on longer periods of hospitalization and higher costs in comparison with non-diabetic and non-hyperglycemic patients. Therefore, an efficient in-hospital prevention and treatment of diabetes and adequate glycemic control, provided by a specialized team, is an important security and quality issue, that may also impact limiting the cost of care [7-12].

Taking into account this scenario, since 2007 the Hospital Israelita Albert Einstein started a series of initiatives aiming a better assistance to diabetic or hyperglycemic patients. Initially, education courses for a multidisciplinary team where held providing knowledge on diabetes pathophysiology, management and education. This education process was the basis for developing an institutional program for Diabetes care that was inaugurated in 2009.

During the first 8 years since the beginning of the educational process the Diabetes Program has capacitated 147 multidisciplinary staff members that are responsible for the multiplication of the knowledge to the rest of the staff and to provide direct diabetes education to the patients. Those staff members are continuously educated in the Diabetes Program by regular classes and by electronic based training.

In 2009, protocols and institutional policies were implemented with specific blood glucose targets. Technical capacitation for all caring professionals for the correct utilization of these protocols were provided by the Diabetes Program and an electronic system of glucose monitoring was initiated providing reliable glucose data from all the admitted patients.

All adult patients (18 years old or more) admitted (including those admitted on the Emergencies department and on Diagnostic centers) are screened for hypoglycemic risk. Patients are questioned about the current medications in use, past history of hypoglycemia or diagnosis of diabetes. If positive screening occurs the patient is identified by a specific blue string that is a visual sign for hypoglycemia risk, and the patient and responsible are oriented about signs, symptoms and strategies to avoid hypoglycemia. Concomitantly, a multidisciplinary team starts planning an individual strategy (nutritional status, medication, controls) that could minimize the risk and the consequences of any hypoglycemia.

A specific protocol is available for a fast recognition of hypoglycemia by any member of the staff and to an immediate correction of the event. The correction, as described on the protocol, can be performed by any member of the nursing staff without a specific need of medical prescription, involving even the use of intravenous glucose.

All the glucose data is monitored on a daily basis by the nurses and physicians of the Diabetes Program. A designed team analyses all the hypoglycemic events (defined as blood glucose values less than 60 mg/dL) that occur in the adult wards and critical care units. These analyses are made directly on the unit where it happens; the events are classified at the bedside as processes or therapeutic failures, enabling direct education of the involved staff with the event or eventually suggestions for changes of a specific therapy (medical, nutritional or others).

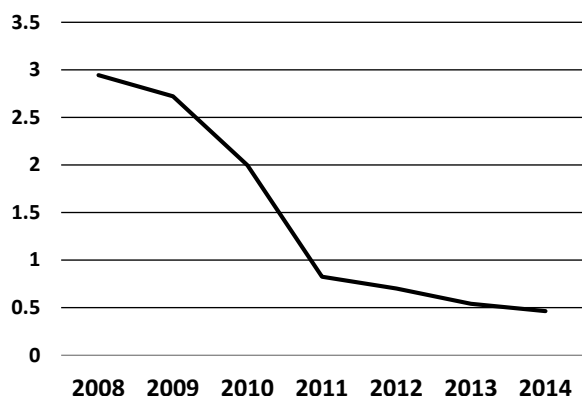
During the process of hypoglycemia vigilance and analysis since the implementation of the glucose monitoring in 2009, barriers for the adequate assistance of our patients were seen. One of the most important noticed issues were fasting and nutritional changes that were not correctly observed or expected. For that reason a complete engagement of nutritional team was essential, monitoring not only what is prescribed but also the real intake of carbohydrate of each patient that has potential risk of hypoglycemia and signaling to the nurse staff the correct timing of the meal, essential information for the correct timing on glucose control and bolus insulin injection. Other major barriers found were use of drugs that could interfere with glycemic control (an alert system integrated with the hospital pharmacy is currently being implemented) and deficiencies of the care transition for patients from different hospital areas (a special team is being formed to improve the care transitions inside the hospital complex).

**\*Corresponding author:** Dr. Jose Antonio Maluf de Carvalho, Chronic Conditions and Elderly, Hospital Israelita Albert Einstein, Sao Paulo, 05410-000, Brazil, Tel: 55/11/21511317; 55/11/994088483; E-mail: [jose.carvalho2@einstein.br](mailto:jose.carvalho2@einstein.br)

**Received** March 28, 2015; **Accepted** May 12, 2015; **Published** May 16, 2015

**Citation:** Daher G, de Paulo RB, Ribeiro RS, de Carvalho JAM (2015) A Brazilian Experience with a Diabetes Program for Patient Safety in a Tertiary Hospital. J Diabetes Metab 6: 549. doi:10.4172/2155-6156.1000549

**Copyright:** © 2015 Daher G, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.



**Figure 1:** Hypoglycemia rate: number of hypoglycemic episodes (blood glucose <60mg/dL) divided by the number of all glycemic records.

Since the implementation of the Diabetes Program a hypoglycemia index rate directly related with patient security was generated. This rate is part of the hospital security dashboard. This index is defined by the absolute number of hypoglycemic episodes divided by the absolute number of all the glycemic records performed on the adult units monitored by the Program. Since 2008 hypoglycemia rate has decreased in 80% (Figure 1), ensuring the improvement on the quality and safety assistance provided by the actions taken.

Protocols for the management of hyperglycemia were also introduced during the same period. Patients on the critical care unit that have glycemic values above 180 mg/dL are eligible for an intravenous insulin algorithm, aiming a glucose target of 140-180 mg/dL. This protocol is started by the unit's medical staff, being afterwards directly conducted by the unit nurse staff using an electronic online calculator.

Ward hyperglycemic patients are also eligible for a subcutaneous insulin protocol, that begins with a basal-bolus insulin protocol defined by the patient weight and after that is adjusted by the Diabetes Program according to the glycemic control presented.

All patients under any insulin protocol are directly managed by the Diabetes Program nurses and physicians and hyperglycemia and normoglycemia index rates are also monitored on a daily basis and are part of the Diabetes Program indicator.

After the implementation and success presented by these actions on December 2013, the Hospital Israelita Albert Einstein was the first hospital outside the United States of America to have its Diabetes Program certified by the Joint Commission International. After the accreditation, actions are being taken to increase the protocol use and improve glycemic control, specially the hyperglycemia index. Specific programs and educational initiatives (ex. An online video platform) are being developed to provide direct patient education and empowerment and, by so, guaranteeing continuous excellence assistance to the diabetic and hyperglycemic patient admitted to our hospital.

## References

1. International Diabetes Federation Diabetes Atlas 6th edition. 2014 update.
2. MS/SVS/CGDANT-VIGITEL: Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico.
3. Brazilian National Population Projection (2015).
4. Wexler DJ, Nathan DM, Grant RW, Regan S, Van Leuvan AL, et al. (2008) Prevalence of elevated hemoglobin A1c among patients admitted to the hospital without a diagnosis of diabetes. *J Clin Endocrinol Metab* 93: 4238-4244.
5. Lisboa HRK, Souilljee M, Cruz CS, Zoletti L, Gobbato DO (2000) Prevalência de hiperglicemia não diagnosticada nos pacientes internados nos hospitais de Passo Fundo, RS. *Arq Bras Endocrinol Metab* 44: 220-226.
6. Cook CB, Kongable GL, Potter DJ, Abad VJ, Leija DE, et al. (2009) Inpatient glucose control: a glycemic survey of 126 U.S. hospitals. *J Hosp Med* 4: E7-7E14.
7. Kosiborod M, Inzucchi SE, Spertus JA, Wang Y, Masoudi FA, et al. (2009) Elevated admission glucose and mortality in elderly patients hospitalized with heart failure. *Circulation* 119: 1899-1907.
8. Umpierrez GE, Hellman R, Korytkowski MT, Kosiborod M, Maynard GA, et al. (2012) Management of hyperglycemia in hospitalized patients in non-critical care setting: an endocrine society clinical practice guideline. *J Clin Endocrinol Metab* 97: 16-38.
9. Falciglia M, Freyberg RW, Almenoff PL, D'Alessio DA, Render ML (2009) Hyperglycemia-related mortality in critically ill patients varies with admission diagnosis. *Crit Care Med* 37: 3001-3009.
10. Moghissi ES, Korytkowski MT, DiNardo M, Einhorn D, Hellman R, et al. (2009) American Association of Clinical Endocrinologists; American Diabetes Association. American Association of Clinical Endocrinologists and American Diabetes Association consensus statement on inpatient glycemic control. *Diabetes Care* 32: 1119-1131.
11. American Diabetes Association (2004) Hospital admission guidelines for diabetes. *Diabetes Care* 27 Suppl 1: S103.
12. Hirsch IB, Paauw DS, Brunzell J (1995) Inpatient management of adults with diabetes. *Diabetes Care* 18: 870-878.