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Original Article

Time and department distribution of hypoglycemia occurrences in hospitalized diabetic patients



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ABSTRACT

Hypoglycemia occurred on hospitalized patients would result in severe complications. So we monitored the blood glucose of hospitalized patients with diabetes in 14 clinical departments from January to December 2013. Totally 105728 cases of blood glucose were monitored and 1374 cases of hypoglycemia were detected. The incidence of hypoglycemia was 1.29%. Among which, 317 cases of severe hypoglycemia were detected and the incidence of severe hypoglycemia was 0.29%. The peak periods of hypoglycemia were 0:00–2:00, 22:00–24:00, 2:00–4:00, 8:00–10:00 and 10:00–12:00. The symptomatic hypoglycemia accounted for 47.01%, The asymptomatic hypoglycemia accounted for 52.98%. The incidence of hypoglycemia was 1.49% in medical departments and 0.87% in surgical departments. It is suggested to be vigilant of high risk periods of hypoglycemia, detect and treat asymptomatic hypoglycemia timely and rationally administer antidiabetics to prevent hypoglycemia.

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1. Introduction

Diabetes is one of the most common chronic diseases. In 2010, 9.7% of the Chinese population had been diagnosed with diabetes mellitus [1]. Several studies have observed a high

occurrence rate of hypoglycemia in hospitalized diabetic patients [2–4]. Cryer et al. [5] determined that a serious iatrogenic hypoglycemic event could offset the benefits of maintaining normal blood glucose throughout a patient's life. Hypoglycemia can decrease the function of many systems. It has been shown to induce myocardial infarctions and strokes,

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and can cause falls, fractures and other injuries. In some cases, these conditions can lead to death [6,7]. Hypoglycemia severely affects patient energy levels and increases the amount of time for a patient to regain normal everyday functioning [8]. In order to prevent these side effects caused by hypoglycemia, it is crucial to analyze the incidence of hypoglycemia in hospitalized patients. The purpose of this study was to investigate when hypoglycemia was most likely to occur and which departments had the highest occurrence of hypoglycemia in hospitalized diabetic patients.

2. Materials and methods

2.1. Subjects

Patients that were hospitalized during January 2013 to December 2013 were eligible for this study. We enrolled patients in this study that were 18 years old or older, capable of communication the Nurses' Health education, met the WHO 2-diabetes mellitus diagnostic criteria (1999), and volunteered to participate in the study. All patients used oral hypoglycemic agents or received insulin injections to control their blood sugar.

We excluded patients from the study if they presented with acute complications of diabetes (e.g. diabetic ketoacidosis, nonketotic diabetic coma, lactic acidosis), gestational diabetes, severe cardiovascular disease (e.g. congestive heart failure or any cardiovascular/cerebrovascular event occurring within three months of the study), acute trauma (e.g. accident), limb movement disorder (e.g. paralysis), severe liver disease, severe renal dysfunction, acute and chronic infections, or unable to monitor their blood sugar.

This study used a convenience sampling method that selected 1392 hospitalized diabetic patients. Patients were selected from the Departments of Endocrinology, Neurology, Respiratory, Cardiology, Nephrology, Oncology, elderly Ward, Gastroenterology, Neurosurgery, General Surgery, Hepatobiliary Surgery, Thoracic Surgery, Orthopedic Surgery, and Urologic Surgery.

2.2. Study methods

2.2.1. Blood glucose monitoring method

The patient's blood glucose was monitored by the same brand of bedside blood glucose meters throughout the duration of their hospitalization. Every morning the meters were calibrated to ensure the accuracy of the measurement. All nurses received formal training in order to use the blood glucose meters as specified.

2.2.2. Blood glucose monitoring time

The patient's doctor determined the frequency that their blood glucose was monitored. Blood glucose was monitored four, five, or eight times per day. All patient's had his or her blood glucose measured before lunch, before dinner, before night sleeping, and fasting. Additional measurements were taken at 15:00, and/or after each meal (breakfast, lunch, and dinner) if required by the doctor. If hypoglycemia was present

(symptoms described below), then the blood glucose was measured.

Hypoglycemia was defined as blood glucose ≤ 3.9 mmol/L and severe hypoglycemia was defined as blood glucose ≤ 2.8 mmol/L. (Type 2 Diabetes Prevention Guide (2010 edition)) Symptomatic hypoglycemia was defined as patients presenting with palpitations, sweating, tremors, hunger, weakness, pale skin, headache, dizziness, blurred vision, and/or disturbance of consciousness. Patients with asymptomatic hypoglycemia were not in any discomfort and were alert. When hypoglycemia was present, conscious patients were immediately given sugary foods or drinks, or 20 mL of an oral 50% glucose solution. Unconscious patients or those with dysphagia were immediately injected with 20 mL of 50% glucose. The patient's blood glucose was monitored after 15 minutes. Treatment and monitoring was repeated until the patient's blood glucose returned to normal.

2.2.3. Data collection methods

We designed a questionnaire to collect general patient information including the patient's age, name, level of education, date of diabetes diagnosis, department and time of admission, drug treatment, and discharge time. OTDMS (diabetes management software) was installed to analyze the data in the 14 hospital departments.

2.3. Statistical analysis

SPSS 18.0 statistical software (SPSS Inc. Released 2009. PASW Statistics for Windows, Version 18.0. Chicago, IL: SPSS Inc.) was used to analyze the data. The X^2 test was used to compare the distribution of hypoglycemia between the hospital departments.

3. Results

3.1. Patient demographics

There were 835 male patients and 537 female patients enrolled in the study. Their ages ranged from 18 to 97 years (average of 52 years \pm 19 years). The majority of patients completed junior high or higher (30.8% completed college, 37% completed high school, 32.1% completed junior high school, and 9.1% completed primary school). The length of time since the patient's diabetes diagnosis ranged from 0 to 53 years (average of 26 years \pm 13 years). The duration of the patient's hospital stay ranged from 7 to 21 days with an average stay of 13.5 days.

3.2. Hypoglycemia cases in diabetic hospitalized patients

From January 2013 to December 2013, a total of 105,728 blood glucose measurement readings were collected in the 14 hospital departments. Of these measurements, 1.29% (1374 readings) were classified as hypoglycemia and 0.29% (317 readings) were classified as severe hypoglycemia.

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