

## Special Article - Pediatric Nursing

# What Can Nurses Do About Pediatric Obesity and Type 2 Diabetes?

Samuel BP<sup>1\*</sup>, Crumb TL<sup>2</sup> and Eding DM<sup>3</sup><sup>1</sup>Congenital Heart Center, Helen Devos Children's Hospital of Spectrum Health, USA<sup>2</sup>Office of Clinical Research Operations, Offices of Research Administration, Helen Devos Children's Hospital of Spectrum Health, USA<sup>3</sup>Pediatric Intensive Care Unit, Helen Devos Children's Hospital of Spectrum Health, USA

**\*Corresponding author:** Samuel BP, Clinical Research Nurse, Congenital Heart Center, Helen Devos Children's Hospital of Spectrum Health, 100 Michigan NE (MC273), Grand Rapids, Michigan 49503, USA, Tel: 6162671014; Fax: 6164868636; Email: bennett.samuel@helendevoschildrens.org

**Received:** December 29, 2014; **Accepted:** February 15, 2015; **Published:** May 15, 2015

## Case Report

A 14-year old morbidly obese male, previously without medical history, presented to our emergency department with a 4-day history of vomiting, diarrhea, decreased appetite, lethargy, and altered mental status. He was taken to a local urgent care center four days prior to admission and was sent home on ondansetron, a medication to treat severe nausea and vomiting. He revisited the urgent care center as his parents noticed altered mental status with no improvement in symptoms. He was found to have serum blood glucose level of >700 mg/dL and transferred to our emergency department and later admitted to the pediatric intensive care unit. The patient had altered mental status, heart rate of 175 bpm, Kussmaul breathing, decreasing blood pressure, severe dehydration, weight at 125 kg (276 lbs) and body mass index of 46 kg/m<sup>2</sup>. An insulin drip and fluid bolus were initiated. The patient had no previous medical diagnosis, but family history was significant for Type 2 Diabetes Mellitus (T2D). The patient rapidly progressed into septic shock, hemodynamic instability requiring inotropic support, respiratory failure requiring mechanical ventilation and acute kidney failure requiring Continuous Veno Venous Hemodiafiltration (CVVHDF). He was diagnosed to have new onset T2D with diabetic ketoacidosis, necrotizing pancreatitis, obesity, acute respiratory distress syndrome, respiratory failure, multiple organ dysfunction syndrome, and decubitus pressure ulcer. He also developed seizures over the course of his hospital stay. After 20 inpatient days, a tracheostomy tube and permacath were placed. He remained on CVVHDF for 23 days before he could tolerate trials of intermittent hemodialysis. In total, in addition to nursing care, 19 specialists were consulted for his care and included pediatric intensive care medicine, endocrinology, blood management, gastroenterology, general surgery, hematology, infectious disease, nephrology, neurosurgery, psychology, ophthalmology, orthopedics, occupational therapy, physical therapy, pharmacy, rheumatology, urology, and wound. His condition improved and he was transferred to a rehabilitation center after 45 inpatient days.

## Abstract

Type 2 Diabetes (T2D), previously known as adult-onset diabetes, has dramatically increased in prevalence in children and young adults. A major factor is the rise in pediatric obesity that contributes to insulin resistance, the trademark characteristic of T2D. Children and young adults are at greater risk when there is a positive family history of T2D. We present a 14-year old male without previous medical history who was diagnosed to have new onset T2D and discuss the role of nurses in providing adequate education, assessment and care for at risk children and young adults.

**Keywords:** Obesity; Diabetes mellitus; Multiple organ dysfunction syndrome; Education; Follow-up; Advocacy

## Conclusion

According to Mekechuk and colleagues, childhood obesity is one of the primary pediatric health issues of the 21<sup>st</sup> century [1]. "Obesity can have adverse effects on virtually every organ system of the body. It is associated with neurological, endocrine, cardiovascular, pulmonary, gastrointestinal, and musculoskeletal complications. Obesity can also be associated with mental health issues such as poor self-esteem, anxiety, depression, social stigma and bias" [1]. Many factors contribute to obesity including media and advertising, friends and peers, increased screen time, sedentary lifestyle, emotional and mental health, sleep habits, nutrition, family dynamics around food, family function, genetic variability, and social and cultural beliefs and practices [1]. Pediatric T2D is a co-morbidity of obesity. Diabetes is the seventh leading cause of death in the United States. According to the American Diabetes Association (ADA), in 2012, 29.1 million Americans had diabetes. Approximately 208,000 Americans under the age of 20 are estimated to have diagnosed diabetes with an annual incidence of 18,436 with type I diabetes and 5,089 with T2D. Diabetes causes various complications especially in poorly managed patients including hypoglycemia, hypertension, dyslipidemia, cardiovascular disease, stroke, retinopathy, kidney disease, and neuropathy. The total cost of diagnosed diabetes in the United States in 2012 was \$245 billion. The average medical cost among people with diagnosed diabetes was 2.3 times higher than what expenditures would be in the absence of diabetes [2]. Acute care costs are expected to run high. This case encompassed 19 specialists that were consulted during one hospital admission for our patient. This admission represents the cost of undiagnosed diabetes in an at risk child and family. Diabetic Ketoacidosis (DKA) is a serious complication of diabetes that occurs when the body produces high levels of blood acids called ketones. It is important for pediatric nurses to have an understanding of DKA and recognize the symptoms early to avoid further complications like those experienced by our patient. This would also aid in the decline of the number of children who present with DKA as onset of diabetes

[3]. A finger-stick blood glucose level is recommended when a patient presents with symptoms of DKA. Other tests include blood electrolyte levels, urinalysis, chest x-ray, and an electrocardiogram to evaluate and effectively treat DKA. Components of an initial assessment must include the patient's chief complaint, current symptoms, family history, nutrition and activity patterns, skin conditions such as acanthosis nigricans, and sleep habits and patterns. A thorough physical examination includes assessment of cardiac and neurological function, foot examination with monofilament test, height, weight, body mass index, ophthalmoscopic examination, thyroid palpation, and vital signs [1-7]. The primary prevention of obesity prevents the development of co-morbidities that can have adverse effects on virtually every organ system of the body. Nurses have an important role in providing adequate education and support to children and young adults and their families as they are the primary face of interaction in both the inpatient and outpatient settings. Studies have shown the effectiveness of education with both medical providers and the public to reduce DKA at onset of diabetes [4,5,6]. Well child visits, school nurse interactions, and community forums are important settings for education. Key strategies include providing nutritional advice, steps for decreasing unhealthy caloric intake, increasing physical activity and access to weight management programs. Pediatric nurses must always take a holistic approach by involving the family members of

children and young adults and work with a multidisciplinary team to address this epidemic [7]. A clear understanding of obesity and its implications is beneficial for pediatric nurses to provide adequate education, assessment and care for at risk children and young adults.

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