Improving Emergency Department Management of Diabetic Ketoacidosis in Children: A Quality Improvement Project to Improve Insulin Timeliness in a Community-based Pediatric Emergency Department

Background:
Diabetic ketoacidosis (DKA) occurs in 26% of children with new-onset type 1 diabetes and is the leading cause of morbidity and mortality in children with diabetes. For patients with DKA, the main principles of management include rapid assessment and treatment with insulin and intravenous fluid administration. A nursing-led process was designed to improve identification of this high-risk population and expedite the delivery of insulin within one hour from insulin order and two hours from triage assessment.

Objectives:
To decrease the time to initiation of insulin for all DKA patients presenting to the pediatric emergency department (ED).

Methods:
Key stakeholders, including nursing, physician, and ancillary staff (i.e., child life, pharmacy, respiratory therapy) leaders, recognized the need for resource allocation and workflow improvements to expedite the identification and treatment of DKA patients. A multidisciplinary ED "Swarm Team", previously created to facilitate rapid mobilization of ED resources and enhance team communication and collaboration, was tasked with the evaluation and management of all DKA patients. All members of the "Swarm Team" underwent targeted education and training on DKA management. Ancillary tools, such as a DKA worksheet and pre-programmed timer, assisted team members in tracking desired time stamps/goals, specifically "triage-to-insulin" and "insulin order-to-insulin" administration. EPIC and worksheet-derived data was collected and trended for improvement opportunities.

Results:
There was a 39-minute (32%) reduction in the average time from "triage-to-insulin" administration for DKA patients (n=32). Additionally, we noted a 16-minute (28%) reduction in the average time from "insulin order-to-insulin" administration. Overall, an increase of 46% in the number of DKA patients who received insulin within 120 minutes of arrival was observed.

Discussion:
The development and utilization of a "Swarm Team" and clearly communicated process with defined time stamps/goals and ancillary tools improved patient care by reducing the time to insulin for DKA patients. Importantly, our "Swarm Team" model and associated interventions can be easily adapted and sustained for DKA patients and other high risk patient populations.