

Improving Knowledge about Hypoglycemia and Glucagon among School Personnel in Rural Southeastern Ohio

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Background

- In rural southeastern Ohio, full-time school nurses are in short supply.
- Due to the shortage of school nurses, school personnel have been asked to step in and provide some level of medical care.
- For children with diabetes, this may include insulin injections, blood glucose monitoring, hypoglycemia treatment, and glucagon administration.
- Hypoglycemia can be caused by a missed meal, too much exercise, or not enough food for the amount of insulin children have taken.
- If not treated immediately, hypoglycemia can become severe leading to a loss of consciousness, seizure, coma, or death; a child will need a glucagon injection to restore blood glucose levels to normal.
- Thus, school personnel need training on diabetes, hypoglycemia, and glucagon administration.
- The purpose of this study was to assess the effectiveness of an interactive training program designed to increase knowledge about diabetes and glucagon administration.

Methods

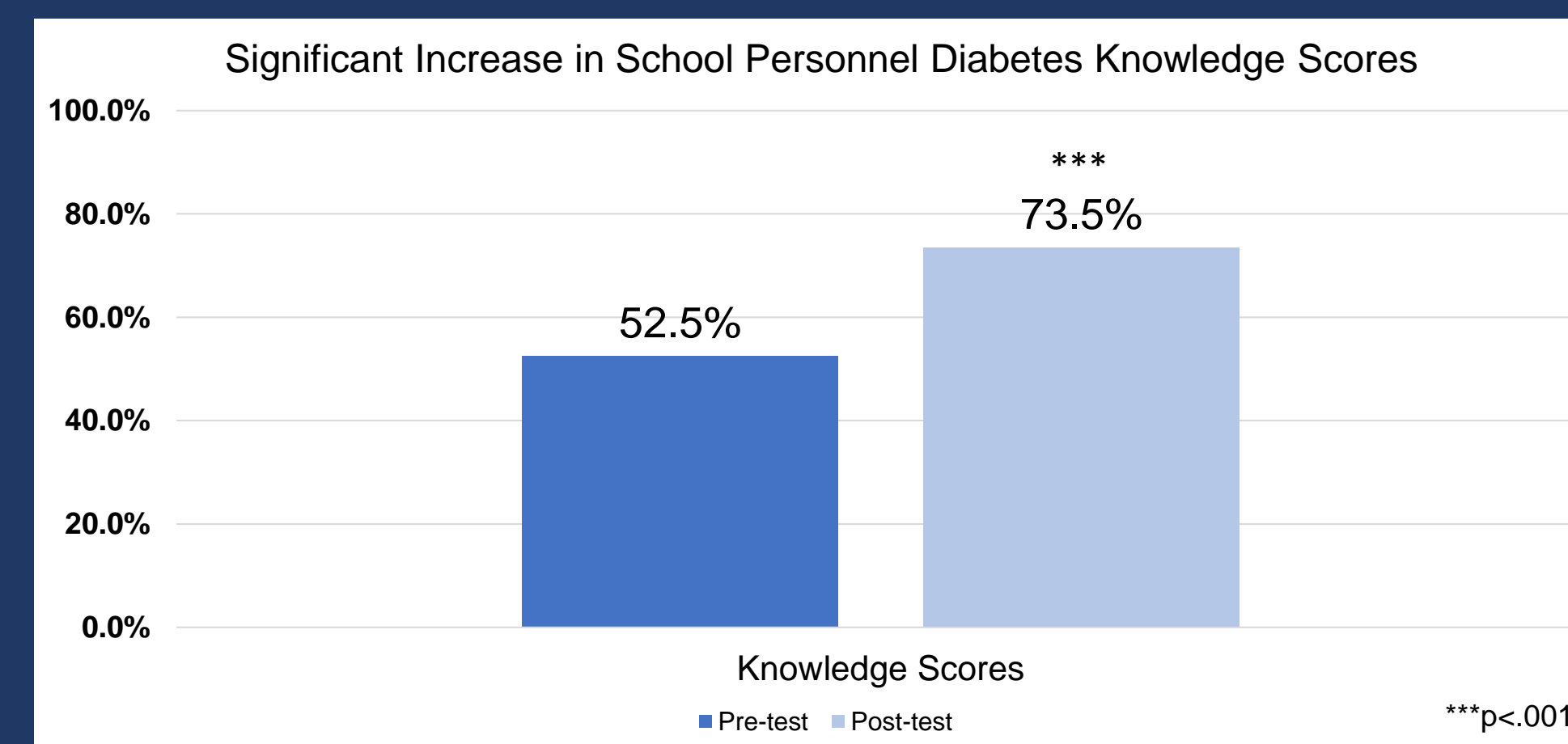
- One-hour hypoglycemia and glucagon training program was developed by a physician, certified diabetes educator, and behavioral diabetes specialist.
- School personnel completed pre- and post-surveys to measure prior experience with diabetes and diabetes-related knowledge.



Figure 1. Materials used in the training session. **(A)** Glucagon demonstration kits provided by Eli Lilly were given to participants after the PowerPoint presentation. Participants were encouraged to practice with the glucagon demonstration kit based on the glucagon administration protocol provided in the PowerPoint presentation. **(B)** Hypoglycemia kits were provided to the school as part of Ohio University's child diabetes navigation program. Each kit contains a blood glucose monitor, test strips, alcohol swabs, bandages, gloves, fruit juice, glucose tabs/gel, cheese crackers, meal bars, and a calorie, fat & carbohydrate counter. Photographs were taken by Sophia Mort, PhD.

Conclusions

- **Following the one-hour hypoglycemia and glucagon training, school personnel significantly improved their diabetes knowledge score (mean improvement=21.0%, t-value=6.555, p<0.001).**
- **School personnel need to learn about diabetes emergency care in order to assess and treat children's hypoglycemia during school hours.**
- **These findings underscore the value of training school personnel on how to actively assess and manage the risk of hypoglycemia in children with diabetes.**



Results

- 48 individuals participated in the study (age=44.2±12.0 years, 54.2% female, 93.8% white, 70.2% teachers, years experience =12.7±8.9).

Table 1. Mean Differences between Pre- and Post Diabetes Knowledge Questions (n=48)

Test Question	Correct Answer	Pre-test % Correct (n)	Post-test % Correct (n)	p-value
1. What is type 1 diabetes?	The body cannot produce any insulin	50.0 (24)	70.8 (34)	p=0.525
2. Which of these is not a symptom of type 1 diabetes?	Low back pain	58.3 (28)	95.8 (46)	p=0.087
3. Glycosylated hemoglobin or A1C is a test that measures your average blood glucose level for the past:	2-3 months	27.1 (13)	77.1 (37)	p=0.126
4. Which of these is NOT a method of taking insulin?	Insulin tablets	70.8 (34)	89.6 (43)	p=0.573
5. What is hypoglycemia?	When glucose levels have dropped very low	70.8 (34)	75.0 (36)	p=0.010*
6. Which of the following are signs and symptoms of hypoglycemia? Please circle all that apply.	Shakiness, nervousness/anxiety, sweating, confusion, blurred/impaired vision, & irritability	58.3 (28)	66.7 (32)	p=0.038*
7. Which one of the following will most likely cause low blood glucose or hypoglycemia?	A heavy exercise session	43.8 (21)	70.8 (34)	p<0.001*
8. Which of these behaviors is the most important part to managing a person's type 1 diabetes?	All three are equally important (taking insulin, managing a healthy diet, getting regular exercise)	83.3 (40)	87.5 (42)	p=0.242
9. What is glucagon?	A hormone that raises a person's blood glucose	47.9 (23)	64.6 (31)	p=0.002*
10. You should administer a glucagon injection for all the following symptoms EXCEPT:	A person with diabetes has blurred vision from hyperglycemia	14.6 (7)	37.5 (18)	p=0.045
Total Score		52.5 (0)	73.5 (6)	p<0.001*

Future Directions

- To adapt to the circumstances of the COVID-19 pandemic, we created an online virtual reality training program for school personnel.
- We will evaluate the effectiveness of this online virtual reality hypoglycemia and glucagon training program with school personnel.

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This project is supported by the Health Resources and Services Administration (HRSA) of the U.S. Department of Health and Human Services (HHS) under Grant No. D04RH31792.