

Transitioning the Virtual Nursing Care for School Children With Diabetes Study to a Sustainable Model of Nursing Care

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From December 1, 2010, through May 31, 2013, the South Dakota Board of Nursing conducted a pilot study, "Virtual Nursing Care for Children with Diabetes in the School Setting." The findings from the study supported the use of the virtual nurse model of care as a safe and effective method of supervising and delegating diabetes nursing care tasks to unlicensed assistive personnel (UAP), including insulin administration. This article provides an update describing the 2014 changes made to the nursing delegation rules, the protocol established for registered nurses using the virtual nurse model of care, and the training program for UAP providing diabetes nursing care.

In South Dakota (SD) in 2008, legislative efforts were moving forward to pass a bill allowing unlicensed assistive personnel (UAP) to administer insulin and provide other diabetes care in the school setting without nursing oversight. This legislation was prompted by increasing numbers of children with insulin-dependent diabetes and concerns from parents regarding less-than-adequate care of children in schools where nurses were not present (Damgaard & Young, 2014). The proposed legislation was supported by SD's Diabetes Educators Association but opposed by SD's School Nurses Association, which expressed concerns regarding the safety of having UAP administer insulin. In response to the proposed legislation and the concerns, the SD Board of Nursing (BON) conducted a pilot study to examine the safety and efficacy of nurses delegating insulin administration to trained UAP in school settings.

The pilot study, "Virtual Nursing Care for Children with Diabetes in the School Setting," was conducted from December 1, 2010, through May 31, 2013 (Damgaard & Young, 2014). The study linked trained UAP in school settings with registered nurses (RNs) by means of technology. The technology allowed nurses to virtually delegate and supervise diabetes care tasks, including insulin administration, to trained UAP. Findings from the study supported the use of the virtual nurse model of care as a safe and effective method to supervise and delegate diabetes nursing care tasks to UAP, including insulin administration. This article provides an update on the progress of this project, policy changes, and requirements for the delegation of diabetes care tasks to UAP.

Literature Review

The literature revealed several similar studies on the delegation and safety of insulin administration. Owen (2009) suggested that greater flexibility is needed regarding who may administer insulin. As the

number of people with insulin-dependent diabetes grows, the number of people needing help with administering insulin grows as well. Owen described a community pilot project in the United Kingdom (UK) involving nursing delegation of insulin administration to trained health care assistants (HCAs). The project included a 1-day training session with the HCAs. Similar to the training provided in the Virtual Nurse study, topics included monitoring and control of diabetes, blood glucose monitoring, insulin injection techniques, hypoglycemia and hyperglycemia management, and nutrition. During the first 6 months of the UK project, 29 stable patients received insulin from an HCA without any adverse outcomes. Comments by HCAs on a survey after the project revealed that they felt supported by nurse leaders and valued for their contribution in helping meet patient needs. Nurse leaders' comments were also positive. Overall, the author believed the project was successful and demonstrated increased productivity and efficiency and improved patient care.

A study conducted by Livingstone, Wolper, and Rogers (2013) in 2010 examined the efficiency and safety of insulin administration for patients in community settings in the UK. Data were collected on more than 600 patients who were unable to administer their own insulin. Insulin was most frequently administered by the community nurse teams using insulin pens or other devices. The authors concluded that errors may be reduced by encouraging once-daily insulin injections, using consistent documentation, having individualized care plans, and developing protocols to respond to blood glucose results.

Marks, Wilson, and Crisp (2014) explored the management of type 1 diabetes in Australian primary schools. The authors promoted an intensive insulin therapy regimen using four injections of insulin daily or an insulin pump to reduce the risks of long-term health complications. The authors suggested that this type of insulin therapy requires diabetes care be integrated into a child's school day. Their study included sending a survey to parents of children with type 1

diabetes who were enrolled in kindergarten through second grade; 66 parents participated. The researchers were seeking to identify and assess the type of insulin therapy provided, who provided the insulin and other diabetes care tasks, and where the insulin and other care was provided. Results revealed that more than half of the children used insulin pumps. Most children who received insulin during the school day administered the medication themselves in the classroom. Children unable to self-administer insulin most often relied on teachers, parents, and teacher's aides to help them. The authors concluded that children who were prescribed insulin via a pump and children capable of administering their own insulin were more likely to receive intensive insulin therapy during the school day. The authors recommended providing a consistent approach to diabetes care using a collaborative process involving parents and school personnel to promote a safe environment for students with diabetes. The authors did not evaluate the knowledge level or competency of the teachers and aides who helped students with their insulin therapy.

This research addresses issues raised in SD: a growing number of people with insulin-dependent diabetes and a need to rely on unlicensed persons to provide diabetes care tasks and insulin administration. These studies lend support to the safety and efficacy of nurses delegating insulin administration and other diabetes care tasks in similar school and community settings.

South Dakota's Virtual Nurse Study

The Virtual Nurse project (Damgaard & Young, 2014) was intended to discover whether diabetes care tasks, including insulin administration, could be safely delegated to trained UAP using a virtual nurse model of care delivery. The study used a nonexperimental, exploratory approach with a survey before and after the study. The survey tools measured multiple variables, including satisfaction, safety, timeliness, communication patterns, responsiveness, and technological proficiency related to the virtual nurse model of care. A total of 31 students participated in the study. Inclusion criteria were as follows:

- The child had a diagnosis of type 1 or type 2 insulin-dependent diabetes.
- The child required insulin administration by injection or pump on a regularly scheduled or sliding-scale basis during the school day.
- The child was enrolled in an SD school that did not have a licensed nurse present every day to assist with insulin administration during lunch time.
- The school had the appropriate technology to connect with the virtual nurse.
- The school was able to identify UAP willing to participate.
- A parent or guardian signed the consent for the child to participate.

Essential components of the virtual nurse model of care were virtual nurses, technology, diabetes education for UAP, and clinical interventions and supervision.

Virtual Nurses

Six virtual RNs participated in the project. All were certified diabetes educators (CDEs) employed at two hospitals serving as the hub sites. The virtual nurses provided the UAP training and competency evaluation, delegated and supervised the diabetes care tasks, including insulin administration, to the UAP, assisted with the development of diabetes medical management plans, and evaluated the clinical outcomes of the UAP biweekly.

Technology

Participating schools were evaluated by technology consultants to determine network access and equipment needs. The consultants installed identical hardware and software in each school to ensure secure Internet connections to the hub sites. The consultants also trained the UAP and virtual nurses on the technology and provided help-desk support. Use of the technology allowed the virtual nurses to see and speak to the UAP and children and to supervise the care provided by the UAP.

Diabetes Education for UAP

The schools were responsible for selecting appropriate UAP willing to be involved in the study. A clinical nurse specialist, who was a CDE, designed the curriculum and training for the UAP. The basis of the curriculum was the 2008 version of the American Diabetes Association's (2008) standardized curriculum in *Diabetes Care Tasks at School: What Key Personnel Need to Know*. The training was a total of 10 hours, which included a competency evaluation.

Clinical Interventions and Supervision

Each student had an individualized diabetes medical management plan, and the virtual nurse delegated the diabetes care tasks to the UAP according to the student's individual plan. The amount of virtual nurse consultation and supervision provided to UAP was decided on an individual basis by the virtual nurse but consultation occurred no less than once a week. Diabetes care tasks delegated to the UAP included insulin administration, blood glucose monitoring, carbohydrate counting, activity monitoring, hypoglycemic and hyperglycemic recognition and treatment, and emergency glucagon administration. All clinical interventions were recorded and provided to the virtual nurses for a weekly analysis of the safety and efficacy of care.

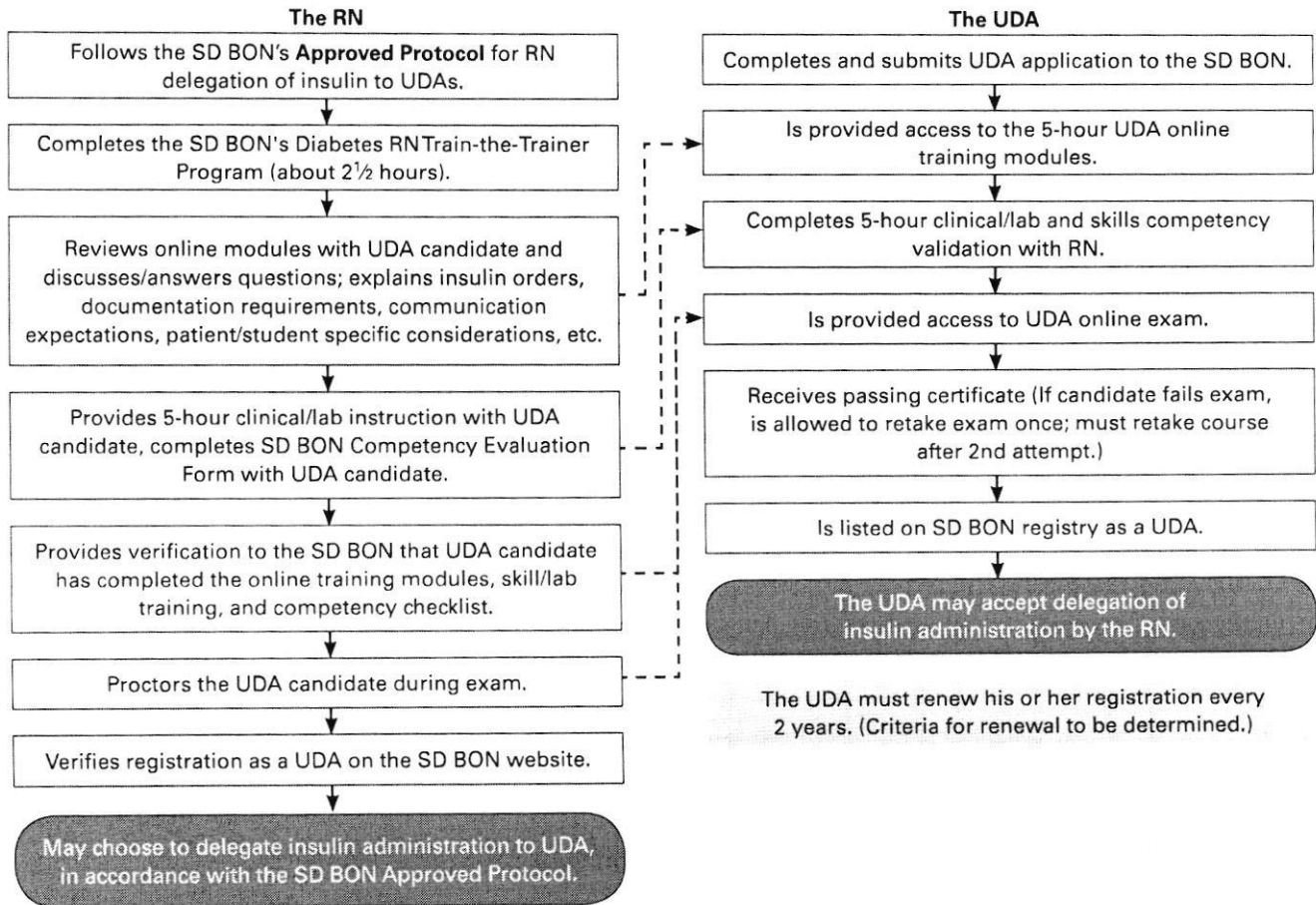
Results

Data revealed that 5,568 doses of insulin were administered safely by the UAP. Only one error was recorded. A wrong dose was administered because of inappropriate carbohydrate counting. Of the doses delivered, 61% were administered by insulin pump and 39% by pen or the syringe-and-vial method. Only 69 doses were administered by the syringe-and-vial method. Carbohydrate counting surfaced as an area of concern: Seventy percent of the UAP required assistance with this task. The UAP performed accurate blood glucose monitoring and responded appropriately to episodes of hypoglycemia and hyperglycemia. Overall,

FIGURE 1

Steps of RN Delegation and UDA Process of Insulin Administration

The following flowcharts show the necessary steps of the process the registered nurse (RN) must complete to delegate insulin administration and the unlicensed diabetes aide (UDA) must complete to administer insulin to children in the school setting.



clinical outcomes suggested RNs can safely delegate and supervise insulin administration to appropriately trained, competent UAP.

Surveys

Before and after the study, surveys were sent to the parents and participating school personnel to rate the perceived level of ability of the school to provide safe care to a child with diabetes using the virtual nurse model of care. Overall, the results showed large changes in both the parent's perceptions of the school's ability to provide safe care and in school personnel's perceptions of their ability to provide safe care. The survey findings complemented the clinical outcome data and supported the safety and efficacy of RNs delegating and supervising diabetes clinical care tasks, including insulin administration, to trained UAP using the virtual model of nursing care.

Establishing a Protocol and Training Process

Upon completion of the study, the principal investigators shared the results with an advisory stakeholder council. The council, which consisted of CDEs, virtual nurses, a research advisor, parents of children with diabetes, primary care providers, school administrators, nursing administrators, and representatives of the SD Diabetes Coalition, SD School Nurses Association, SD Department of Health, and SD Nurses Association, met with the investigators throughout the study. The role of the council was to guide and assist with the implementation of the project and to identify and support policy recommendations for regulatory changes. After reviewing the results of the study, the advisory council supported making changes to the Administrative Rules of SD (ARSD) to allow the delegation of insulin administration to trained UAP. (See Figure 1.) The only stakeholder group that opposed this policy change was the SD School Nurses Association. Instead, it recommended a nurse be available in every school to administer insulin and provide other diabetes care tasks.

TABLE 1

South Dakota's Administrative Nurse Delegation Rules

- **20:48:04.01:09. Registration required for delegated medication administration.** A licensed nurse may delegate the administration of medications authorized under §§ 20:48:04.01:10 and 20:48:04.01:11 only to unlicensed assistive personnel who have a minimum of a high school education or the equivalent and who are registered with the Board. Registry status expires two years from the date of initial registration.
- **20:48:04.01:11. Medication administration tasks that may not be routinely delegated and require written protocol.** The following are medication administration tasks that may be delegated to unlicensed assistive personnel only in accordance with § 20:48:04.01:
 - (1) Administration of the initial dose of a medication that has not been previously administered to the client;
 - (2) Administration of medications on an as-needed basis, including schedule II controlled substances listed in SDCL 34-20B-16 and 34-20B-17 as provided in subdivision 20:48:04.01:10(3); and
 - (3) Administration of insulin by the subcutaneous route in accordance with §§ 20:48:04.01:16 and 20:48:04.01:17.
A registered nurse shall develop written protocol for the instruction and training of unlicensed assistive personnel and maintain the protocol on file.
- **ARSD 20:48:04.01:16. Written protocol required for the delegation of insulin administration by the subcutaneous route to unlicensed assistive personnel.** A written protocol for the delegation of insulin administration by the subcutaneous route to unlicensed assistive personnel is required prior to delegation by the registered nurse. The registered nurse must ensure that the following requirements are included in the protocol and are completed by the unlicensed assistive personnel:
 - (1) Completion of a five hour Board approved training in the following areas: (a) Diabetes basics; (b) Hypoglycemia; (c) Hyperglycemia; (d) Blood glucose monitoring; (e) Glucagon administration; (f) Insulin types and methods of administration; (g) Nutrition and physical activity; (h) Documentation; (i) Universal precaution
 - (2) Successful completion of a Board-approved written examination. A passing score of 85 percent is required on the test with an opportunity to retake the test one time. If a student fails on retake, additional instruction is required before further testing is allowed;
 - (3) Completion of minimum of 5 hours of clinical or laboratory instruction including the demonstration of individual competence utilizing a Board approved competency checklist in the following areas: (a) Blood glucose monitoring; (b) Insulin administration; (c) Glucagon administration; (d) Carbohydrate counting/diet management; (e) Universal precautions;
 - (4) Annual review of individual competence as identified in subdivision 20:48:04.01:16(3); and
 - (5) Current registration with the Board.
- **ARSD 20:48:04.01:17. Qualifications of the registered nurse for delegation of insulin administration by the subcutaneous route to unlicensed assistive personnel.** A registered nurse must meet the following criteria in order to delegate insulin administration by the subcutaneous route to unlicensed assistive personnel in accordance with §§ 20:48:04.01:11 and 20:48:04.01:16:
 - (1) Hold an active registered nurse license or privilege to practice in the state of South Dakota;
 - (2) Have two years of clinical nursing experience;
 - (3) Have written evidence to support demonstrated competence in the area of diabetes management in the past five years or completion of a diabetes train the trainer program approved by the Board; or
 - (4) Hold current specialty certification as a Certified Diabetes Educator (CDE).

Source: South Dakota Legislature. (2015). *Administrative rule. Delegation of nursing tasks*. Retrieved from <http://legis.sd.gov/Rules/DisplayRule.aspx?Rule=20:48:04.01>

With input from the advisory council, new rules were successfully promulgated in ARSD Chapter 20:48:04.01 and implemented on July 1, 2014 (See Table 1). SD's nursing delegation rules (SD Legislature, 2015) are organized into three sections:

1. Allowed delegation of medication administration.
2. Medication tasks that may not be routinely delegated and require written protocols.
3. Medication administration tasks that may not be delegated.

The first section allows nurses to delegate medications administered by the oral, rectal, topical, vaginal, or inhalation routes.

The second section permits nurses to delegate certain medication tasks but only with a written protocol in place. Protocols are required to delegate the administration of the initial dose of a medication not previously administered and to delegate medication

ordered on an as-needed basis. This section was amended to allow a nurse to delegate insulin administration with a written protocol in place and according to two new rules, ARSD 20:48:04.01:16 and 20:48:04.01:17. The written protocol was developed with the guidance of the advisory council and subsequently approved by the BON. (See Table 2.)

The third section of the delegation rules, medication administration tasks that may not be delegated, was also amended. This section prohibits nurses from delegating certain tasks, including administering Schedule II controlled substances from a locked stock supply, administering medications via a tube inserted in a cavity in the body, calculating medication doses, administering medications via inhalation route in a complex nursing situation, and administering medications by the intramuscular, intradermal, intravenous, or subcutaneous routes. An

TABLE 2

Protocol for RN Delegation of Insulin Administration to UAP

- A. Only a registered nurse (RN) may delegate the task of administering insulin by the subcutaneous route to unlicensed assistive personnel (UAP). The RN must have the following:
1. An active South Dakota (SD) RN license or a multistate compact license with privilege to practice in SD.
 2. Evidence on file of a minimum of 2 years of clinical nursing experience.
 3. Evidence on file of meeting at least one of the following three options:
 - a. Current specialty certification as a certified diabetes educator.
 - b. Written evidence to support demonstrated competence in diabetes management within past 5 years, for example, providing individual or group diabetes self-management education, providing community or health professional education related to diabetes management, serving as a resource to nurses and other health professional staff on diabetes education.
 - c. Completion of the BON-approved Diabetes Train-the-Trainer Program, which takes approximately 2½ hours
 - This course is a good resource and is available at no cost.
 - Completion of annual continuing education on diabetes management topics is recommended.
- B. The delegating RN is accountable for doing the following:
1. Delegating in accordance with general criteria for delegation listed in the Administrative Rules of South Dakota (ARSD) 20:48:01.01:01 and delegating insulin administration only when a licensed nurse is not physically present on site to administer the insulin.
 2. Supervising the UAP and establishing initial competency and ongoing competency.
 - a. The RN must supervise in accordance with the conditions listed in ARSD 20:48:04.01:02.
 - b. The RN must meet with the UAP at least twice a week, at a mealtime, for at least 15 minutes per meeting for the first month after the UAP complete the diabetes aide training to assist the UAP with carbohydrate counting, glucose monitoring, and insulin administration.
 - c. The RN must outline in the patient's plan of care or medical management plan the frequency of consultation between the RN and UAP that will occur following the first month. The frequency of the consultation will be unique to each patient's/student's needs but will occur no less often than once a week.
 - d. The RN must be available via electronic communication for all mealtimes.
 3. Having written evidence on file demonstrating that the UAP has met the following criteria prior to delegating insulin administration to the UAP (pursuant to ARSD 20:48:04.01:16):
 - a. Evidence of completing the 5-hour BON-approved training curriculum, including the following topics: diabetes basics, hypoglycemia, hyperglycemia, blood glucose monitoring, glucagon administration, insulin types and methods of administration, nutrition and physical activity, documentation and universal precautions.
 - b. Evidence of completing 5 hours of clinical or laboratory instruction supervised by an RN that meets the requirements listed in Item 1 above. The clinical or laboratory training must have included the demonstration of the individual UAP's competence using the BON-approved competency checklist form on the following tasks: blood glucose monitoring; urine ketone monitoring, carbohydrate counting; insulin administration via syringe, pen device, and pump; and glucagon administration.
 - c. Evidence of successfully passing the BON-approved Unlicensed Diabetes Aide examination.
 - d. Evidence of annual UAP competency validation on the completed competency checklist form, which should be maintained at the facility.
 - e. Evidence that the UAP are listed on the BON's Unlicensed Diabetes Aide Registry to administer insulin. Only persons registered are authorized to accept the delegated task of administering insulin by the subcutaneous route. Registration requirements include submission of application, verification of high school education or equivalent, and passing the BON-approved examination.

Source: South Dakota Legislature. (2015). Administrative rule. Delegation of nursing tasks. Retrieved from <http://legis.sd.gov/Rules/DisplayRule.aspx?Rule=20:48:04.01>

exception was added to this rule to allow nurses to delegate subcutaneous administration of insulin as authorized in ARSD 20:48:04.01:11. Another rule, ARSD 20:48:04.01:09, was amended to require a nurse only delegate medication administration to UAP registered with the BON. This change allows the BON to create a registry for medication aides and a second registry for diabetes aides.

UDA Training and Proficiency Development

To help persons meet the requirements for becoming a registered unlicensed diabetes aide (UDA) and accept the delegated task of insulin

administration, the BON developed standardized training and testing. The BON contracted with two CDEs to help develop the RN train-the-trainer course, a 5-hour UDA training course, and the UDA final examination.

The RN train-the-trainer course consists of completing the UDA training modules and additional modules on delegation considerations, documentation considerations, and competency assessment and validation. Included in the modules are delegation scenarios, documentation forms, a carbohydrate counting form, and a required skills competency checklist. Training also provides resources for accessing

helpful diabetes websites, local and national diabetes groups, and companies to contact for training supplies.

The UDA course consists of modules on legal considerations, diabetes basics, nutrition, carbohydrate counting and physical activity, blood glucose monitoring, insulin basics, methods of insulin administration, hypoglycemia, glucagon administration, hyperglycemia and ketones, documentation, and universal precautions. Videos were developed to complement the didactic information and include topics on carbohydrate counting, blood glucose testing, insulin administration using an insulin pump, insulin administration using a vial and syringe, insulin administration using a pen device, and glucagon administration. The delegating RN is accountable for completing a 5-hour skills lab with the UAP and for validating skills performance using a checklist developed by the BON. The checklist documents competency in five training areas: blood glucose monitoring, urine ketone testing, carbohydrate counting, insulin administration, and glucagon administration. The UAP must complete the training and skills performance before sitting for the final UDA examination.

The UDA examination is a standardized test developed by the BON and the two CDEs. The test plan was based on the training and includes weighted categories on the following content: diabetes basics, hypoglycemia and hyperglycemia, glucagon administration, documentation, and universal precautions; blood glucose monitoring; insulin types and methods of administration; and nutrition, carbohydrate counting, and physical activity. A total of 80 questions were written, validated using recent literature, and placed into a master test pool in one of the weighted categories. Ten additional items were written and validated as pretest items. After the BON approved the test plan, two examinations were created. Each has a total of 50 items, 40 different master test pool questions and 10 pretest items. After an applicant completes the online examination, he or she receives either a pass or a fail. Applicants who fail are allowed to retake the alternative examination once. An applicant who fails the second examination must receive additional training.

After successfully completing all training and testing requirements, the UAP are placed on the BON's registry. RNs and employers may verify that a person is registered on the BON's website. Once registered, the UDA may accept the delegated task of insulin administration by a qualified RN according to the protocol. The new rule also requires UDAs to renew their status on a biennial basis.

Currently, the BON is in the process of obtaining a fully integrated online testing and training system that will interface with the current licensure information system. The BON estimates the development process will take approximately 4 months. Meanwhile, the training is provided to UDA applicants and RNs via printed booklets and DVDs.

Sustainability

Transitioning the Virtual Nursing Care for School Children with Diabetes project into a sustainable model of nursing practice was important to the researchers, consultants, and advisory council from

the beginning of the project in 2010. Sustainability became a reality when the rules were changed, allowing RNs to delegate insulin administration. Now that UDA training and registration are in place, the Virtual Nurse project is ready to continue. The BON was very grateful to turn the project over to the SD Diabetes Coalition, which responded to the call for sustainability and adopted the goal of supporting insulin-dependent persons who cannot provide diabetes care for themselves in settings where nurses are not present to administer insulin (SD Diabetes Coalition, 2015). The coalition applied for and was awarded several small grants and received donations from supporters totaling more than \$17,000. This money will be used to administer and market the Virtual Nurse program and to provide educational training to UDAs at 17 schools in SD for the 2015–2016 school year. Additionally, the SD Diabetes Coalition may continue gathering data on UDA outcomes to allow for necessary modifications in the BON protocol on training or RN oversight of the UDA.

Conclusion

The Virtual Nursing Care for School Children with Diabetes Study underscores the importance of conducting evidence-based nursing regulatory research. Data from this study supported policy changes minimizing the legal barriers to continuing RN delegation of insulin administration beyond the pilot project and allowing the transition to a sustainable new model of nursing care in SD. The value of continuing the Virtual Nurse program will likely be realized by a growing number of persons diagnosed with insulin-dependent diabetes in SD.

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