



12-17-2022

Educating School Nurses to Improve Bowel Continence in Children with Spina Bifida

McKinley J. Waugh

University of Tennessee, Knoxville, mjacks87@vols.utk.edu

Tracy L. Brewer

University of Tennessee, Knoxville, tbrewe12@utk.edu

Lisa Wagoner

Knox County Schools, lisa.wagoner@knoxschools.org

Follow this and additional works at: <https://trace.tennessee.edu/dnp>



Part of the [Congenital, Hereditary, and Neonatal Diseases and Abnormalities Commons](#), [Pediatric Nursing Commons](#), and the [Quality Improvement Commons](#)

Recommended Citation

Waugh, McKinley J.; Brewer, Tracy L.; and Wagoner, Lisa, "Educating School Nurses to Improve Bowel Continence in Children with Spina Bifida" (2022). *Graduate Publications and Other Selected Works - Doctor of Nursing Practice (DNP)*.

<https://trace.tennessee.edu/dnp/59>

This Article is brought to you for free and open access by the Nursing at TRACE: Tennessee Research and Creative Exchange. It has been accepted for inclusion in Graduate Publications and Other Selected Works - Doctor of Nursing Practice (DNP) by an authorized administrator of TRACE: Tennessee Research and Creative Exchange. For more information, please contact trace@utk.edu.

Educating School Nurses to Improve Bowel Continence in Children with Spina Bifida

McKinley J. Waugh

College of Nursing, University of Tennessee Knoxville

Author Note

I have no conflicts of interest to disclose.

Correspondence concerning this paper should be addressed to McKinley J. Waugh, 1286
Neyland Circle, Hixson, TN 37343, United States.

Email: mjacks87@vols.utk.edu

Abstract

Children born with spina bifida, a neural tube defect, can have associated loss of bowel control resulting in bowel incontinence. The National Patient Spina Bifida Registry found that 87% of those living with spina bifida had bowel incontinence, and less than 30% were bowel continent (Sawin et al., 2015; Wiener et al., 2017). Unfortunately, providers may never start a child living with spina bifida on a bowel management program. Evidence suggests that children with spina bifida should begin a bowel management program early, using a stepwise approach. School nurses, who interact with children living with spinal bifida while attending school, have an opportunity to provide support to children living with bowel incontinence but may lack knowledge and skills on bowel management. This evidence-based practice project aimed to educate school nurses in a county school district about the best bowel management guidelines for children attending school with spina bifida. The project's goal was to improve the lives of children with spina bifida, especially in school, by motivating school nurses to play a more active role in the child's bowel management routines towards increasing bowel continence. The Iowa Model of Evidence-Based Practice guided the steps of the project. Eighty-six school nurses received education about spina bifida and bowel management asynchronously via an online voiceover PowerPoint presentation. Nurses completed a pre-and post-knowledge test, and a significant improvement ($p < 0.001$) in test scores by approximately three points was seen from the pre-test to the post-test. Educating school nurses about spina bifida and bowel management made them better prepared to support and manage bowel incontinence in children living with spina bifida.

Keywords: spina bifida, neurogenic bowel, bowel incontinence, bowel management, school nurse

Educating School Nurses to Improve Bowel Continence in Children with Spina Bifida

Spina bifida is a complex, multisystem congenital defect resulting from abnormal neural tube formation during gestation. The prevalence of spina bifida globally ranges from 33.8 to 48.4 per 100,000 births (Ambatsumyan & Rodriguez, 2018). Spina bifida occurs in approximately three to six cases per 10,000 births in the United States (Freeman et al., 2017). This defect's impact depends on where the defect occurred on the spinal cord. There are three main types of spina bifida: myelomeningocele, meningocele, and spina bifida occulta. Of the three main types, myelomeningocele is the most severe form of spina bifida and accounts for 90% of spina bifida cases (Au et al., 2010). Myelomeningocele is the incomplete closure of the spinal neural tube that leaves exposed neural tissue with a sac containing cerebrospinal fluid protruding at the affected vertebrae level (Sandler, 2010). Complications associated with spina bifida include limited mobility related to no feeling in some or all parts of the legs, club foot, hydrocephalus, oculomotor disorders, executive function disorders, and urinary and bowel incontinence related to neurogenic bladder and bowel, respectively (Sandler, 2010). Of these problems, bowel incontinence tends to be a significant concern for parents and children with spina bifida. Those with myelomeningocele report lower continence rates compared to those with other forms of spina bifida, and therefore were the focus for this project (Freeman et al., 2017). The National Patient Spina Bifida Registry found that 87% had bowel incontinence of all the people living with spina bifida they received feedback from (Sawin et al., 2015).

Problem Description

Neurogenic bowel, the inability to control bowel movements due to nervous system complications, can cause constipation or fecal incontinence (Schletker et al., 2019). Consider if the neural defect is above the T12 level of the spinal cord. In that case, the person most likely has

a reflex bowel, which means they cannot feel when their bowel is full of stool. Hence, the anal sphincter, even though it remains tight, will reflexively open whenever the bowel is full without proper management (Coloplast, n.d.). A defect below the T12 level of the spinal cord results in flaccid bowel, meaning the anal sphincter muscle, which is typically closed, is relaxed and open, leading to spontaneous bowel movements. Other problems related to neurogenic bowel are common and include abdominal pain and distension, prolonged duration of bowel management, autonomic dysreflexia, hemorrhoids, anal fissures, and rectal prolapse (Coggrave, 2008). Neurogenic bowel is commonly associated with the most severe type of spina bifida, myelomeningocele (National Institute of Neurological Disorders and Stroke, n.d.). The first ten clinics in the National Spina Bifida Patient Registry found that less than 30% of patients were bowel continent (Wiener et al., 2017). More than any other factor, bowel incontinence can result in significant social stigma, decreased self-esteem, and severe health complications (Smith et al., 2016). Fifty percent of parents of children with spina bifida ranked the impact of bowel incontinence as their biggest concern (Beierwaltes et al., 2020).

Available Knowledge

Providers should begin establishing goals for bowel continence with parents as early as one or two years of age and begin education about the importance of fiber, fluids, exercise, oral and rectal interventions, such as laxatives and rectal stimulants, and timed bowel movements (Beirwaltes et al., 2020). Unfortunately, many children are not correctly started on a bowel management program by the recommended age of three to four, which has been shown to have social consequences related to stool soiling in front of peers at places like school or sleepovers (Schletker et al., 2019). Beyond social issues, failure to have bowel continence can also impact a child's psychological development (Costigan et al., 2019). Physically, a lack of a bowel

management program can impact the population's urinary tract. Constipation can put extra pressure on the bladder and urethra, making it harder to obtain urinary continence (Radojicic et al., 2019). One study found that only 40.9% of their participants started on a bowel management program at the proper toilet training age. The National Spina Bifida Patient Registry found that one-third of those with bowel impairment used no type of bowel management program at all (Sawin et al., 2015). Another study estimated that half of all the people born with neurogenic bowel could become continent with non-surgical techniques if the non-surgical methods are done consistently and adequately (Johnston et al., 2020).

School nurses have a vital role in assisting the child to reach educational goals and manage health concerns in the school setting, making them a perfect resource for the school-age spina bifida population (Beierwaltes et al., 2020). School nurses could facilitate continence and track bowel movements. Developing educational resources for school nurses could be an asset in the future care of the spina bifida population. Children with spina bifida are typically placed in conventional educational programs and school-based settings (Porter et al., 2009). Therefore, school nurses have an opportunity to assess, educate, and aid children living with spina bifida and their parents in managing their condition and comorbidities. Caring for children aids in the success and achievement in the learning process for children diagnosed with spina bifida (Toothaker & Cook, 2018). For school-aged children, assessment and education of how the family plans or is currently handling the child's bowel incontinence could make a difference in whether a child gains bowel continence in the school setting. In addition, school nurses could mitigate classroom embarrassment related to bowel movement accidents by developing a plan with the child and parents. Ultimately, school nurses being more involved in the child's bowel

management allows the child to focus more on excelling in school, reduces absenteeism, and possibly lessens social stigma and embarrassment (Jacobson et al, 2016).

Rationale

School nurses provide care coordination, health education and promotion, quality improvement, and critical thinking skills that benefit schools, families, the healthcare system, and children with chronic health conditions (National Association of School Nurses [NASN], 2020). Bowel incontinence is associated with decreased satisfaction and quality of life for children with spina bifida and their caretakers (Ambatsumyan & Rodriguez, 2018). Garmin and Ficca (2012) reported that the involvement of the school nurse in the identification, assessment, and treatment of children with elimination problems is an essential component of the care of school children. Furthermore, Sharpe (n.d.) suggests that a school nurse should develop an individualized healthcare plan for each child living with bowel incontinence. The plan should outline school-based health services provided to the child, personnel responsible for managing the plans, and any emergency procedures needed.

A review assessing school nurses' perceptions of barriers and facilitators to caring for children with chronic conditions found that many school nurses feel they lack knowledge about different chronic conditions (Uhm, 2020). Lack of information and adequate training was related to low confidence, feelings of doubt, and a sense of incompetence and anxiety in the school nurse. School nurses also reported a lack of access to evidence-based guidelines in school systems, making it harder to support children with chronic conditions.

The Iowa Model of Evidence-Based Practice was chosen to guide the implementation of this project. The Iowa Model of Evidence-Based Practice was developed to promote quality care to guide clinicians in evaluating and infusing research findings into patient care (Buckwalter et

al., 2017). The ability to effectively present evidence-based recommendations to staff is crucial for a proposed project's success. Using the Iowa Model of Evidence-Based Practice steps, the project lead identified a problem, defined the project's purpose, assembled a team, and appraised and synthesized evidence to implement and evaluate project outcomes.

Evidence Search and Appraisal

A PICOT question was developed based on the purpose and aims of the project. The search of the literature was conducted based on the following PICOT question: In children with spina bifida, how does a school-based bowel management program compared to no program affect bowel incontinence over six months? Using key elements of the PICOT question, PubMed, CINAHL, and Cochrane databases were searched. Keywords used were "Spina Bifida", "enema", "diet", "oral medication", "suppository", "bowel incontinence", "school nurse", "education" and "quality of life". The Boolean connector "OR" was used with "Spina Bifida", "myelomeningocele", "neurogenic bowel", and "spina bifida".

The Boolean connector "OR" was placed between "diet", "oral medication", and "suppository". The word "OR" was used between "bowel incontinence", "fecal incontinence", the British spelling "faecal incontinence", "encopresis", and "quality of life". The MeSH terms "Spina Bifida Cystica", "Enema", and "Neurogenic Bowel" were used. Truncation was used for "oral med*", "enema*", "suppository*", "diet*", "medic*", and "prescri*." Searches took place in February 2021 and June 2021. Ultimately, eight studies were included for critical appraisal and five were included in the literature synthesis.

Abstracts and articles were excluded for several reasons. Articles were excluded that only included adults as the population. For an article to be kept, the article had to include children in the spina bifida population and non-surgical bowel management techniques. Another reason for

exclusion was if the article only assessed surgical interventions for bowel management. If the article only assessed the quality of life related to bowel incontinence, the article was excluded.

The John Hopkins Nursing Evidence-based Practice (JHNEBP) model tools were used to guide critical appraisal, assign level, and assign quality ratings to the evidence obtained from the literature search. Articles addressing the PICOT question that met inclusion criteria were appraised using the appropriate research or non-research JHNEBP tool. Appraisal of Guidelines for Research and Evaluation II (AGREE-II) was used to appraise clinical practice guidelines.

Literature Review

Critical appraisal and synthesis of the evidence revealed good and consistent findings that young children with spina bifida, specifically myelomeningocele, should begin a bowel management program to help with their neurogenic bowel and associated constipation and fecal incontinence (Johnston et al., 2020; Kelly et al., 2020; Kilpatrick et al., 2019; Spina Bifida Association, n.d.; Velde et al., 2007; Velde et al., 2013). Research findings also indicated that not one specific bowel management technique is better than the other. Instead, a combination of more than one with an escalation from least invasive techniques to most invasive until continence is reached. Table 1 provides a synthesis of bowel management techniques in the research literature. Timed defecation, oral medications, and digital rectal stimulation were the most reported techniques.

The Spina Bifida Association provides information for healthcare professionals that guides the providers in evidence-based practice and expert opinion when caring for people living with spina bifida. They recommend a stepwise approach for bowel management of school-age children, sometimes using more than one technique, beginning with fiber and fluids, oral medications, and rectal stimulants, such as suppositories (Spina Bifida Association, n.d.). The

Table 1

Synthesis Table Bowel Management Techniques

Outcome: <i>Fecal Continence</i>	Kelly et al., 2020	Velde et al., 2013	Velde et al., 2007	Kilpatrick et al., 2019	Johnston et al, 2020
Timed Defecation	√, ↑ ^s	√	√*	∅	√
Oral Medications only	√, ↑ ^s	√	∅	√	√
Digital Rectal Stimulation	√, ≠	√	√*	∅	√
Suppositories	√, ≠	√	∅	∅	∅
Mini-enemas	√, ≠	∅	∅	∅	∅
Standard rectal enemas	√, ↑ ^s	∅	√	∅	∅
Manual disimpaction	√, ≠	√	√	∅	∅
Cone/balloon large volume enemas	√, ≠	√	∅	√	∅
Peristeen transanal irrigation	√, ≠	∅	∅	∅	∅
Antegrade enemas	√, ≠	√	∅	∅	∅
Pouched fecal diversion	√, ≠	∅	∅	∅	∅
Biofeedback	∅	∅	∅	∅	√
Anal Plug	∅	∅	∅	∅	√
Neuromodulation	∅	∅	∅	∅	√
Behavior Therapy	∅	∅	∅	∅	√
Sample Size	3670 patients	3071 patients/ 37 articles	80 patients	285 patients	114 articles
Level of Evidence	III	III	III	III	III
Quality of Evidence	A	B	B	B	B

Note: Legend: √-intervention included in article; ∅- not discussed in study; ↑ -increase; ≠- no difference; *-both techniques together.

medications, and rectal stimulants, such as suppositories (Spina Bifida Association, n.d.). The association recommends starting a program between the ages of three and five years old. Ultimately, various enemas and surgery are the Spina Bifida Association's other recommendations if the less invasive techniques fail to keep the child continent. The Spina Bifida Association also recommends utilizing the school nurse to aid in tracking bowel movements. The association emphasizes the vital role the school nurse plays in assisting the child to reach educational goals while managing health concerns.

Garmin and Ficca (2012) reported that the involvement of the school nurse in the identification, assessment, and treatment of children with elimination problems is an essential component of the care of school children. Sharpe (n.d.) suggests that a school nurse should develop an individualized healthcare plan for each child living with bowel incontinence. The plan outlines school-based health services provided to the child, personnel responsible for managing the plans, and any emergency procedures needed.

An integrative review assessing school nurses' perceptions of barriers and facilitators to caring for children with chronic conditions at school found that many school nurses feel they lack knowledge about different chronic conditions (Uhm, 2020). Lack of information and adequate training was related to low confidence, feelings of doubt, and a sense of incompetence and anxiety in the school nurse. School nurses also reported a lack of access to evidence-based guidelines in school systems, making it harder to support children with chronic conditions.

Specific Aims

The purpose of this evidence-based practice project was to educate school nurses on best bowel management guidelines for children with spina bifida and what the school nurse's role should be to best serve the population. The goal of the project was to improve the lives of

children with spina bifida, especially in school, by motivating school nurses to play a more active role in the children's bowel management routines, hopefully increasing bowel continence. Educating school nurses on managing bowel dysfunction in children diagnosed with spina bifida could lead to improved quality of life and increased social continence.

Methods

Context

The Iowa Model of Evidence-Based Practice was the process model that guided the implementation of the project. The project took place in a large public school district in eastern Tennessee. The county consists of eighty-one schools: fifty elementary schools, sixteen middle schools, sixteen high schools, and six special schools. The county has over 8,000 employees and serves approximately 61,526 students from prekindergarten to twelfth grade (Tennessee Department of Education, n.d.). Roughly 14.1% of students have a disability in the county. There are 19 students with spina bifida enrolled in the school district. The health services supervisor approved the project with the school district.

Participants

Eighty-six school nurses participated in the project (Table 2). The mean age for the participants was 44.96 ($SD = 9.54$) years old. The school nurses who participated were predominately female (96.6%), with a low number of males (3.4%). Most school nurses had an associate's or bachelor's degree. The average time the participants had been a nurse was 16.4 ($SD = 9.30$) years, and the mean length of time as a school nurse was 8.53 ($SD = 6.21$) years. Participants were generally somewhat confident in assisting a child with their bowel management program for a child living with spina bifida. Only 10.3% of the school nurses reported helping a child living with spina bifida multiple times a day, with 23% reporting never

interacting with a child who has spina bifida, and 34.5% reporting not having any children at their school living with spina bifida.

Table 2

Demographics and Characteristics

Characteristic	
Age in years	$M = 44.96 (SD = 9.54)$
Gender	
Female	96.60%
Male	3.40%
Race	
White	82.80%
Black	10.30%
Hispanic	2.30%
Asian	1.10%
American Indian/Alaskan Native	3.40%
Degree Held	
Associate's	50.60%
Bachelor's	44.60%
Master's	4.80%
Years as a nurse	$M = 16.44 (SD = 9.30)$
Years as a school nurse	$M = 8.53 (SD = 6.21)$
Interaction with students living with spina bifida	
Never	23%
Occasionally	23.90%
Once a week	1.10%
Everyday	1.10%
No students are living with spina bifida at my school	10.3%

Intervention Process

An educational module was made available May 1, 2022, through May 13, 2022, to the school nurses. The education took place asynchronously, and the education module consisted of a PowerPoint with voiceover. The module was approximately twenty minutes long. The education was split into three segments. The first part of the module consisted of a basic overview of spina bifida. Spina bifida was defined. Then the different types of spina bifida, prevalence, causes and preventions, and body systems spina bifida impacts were discussed. The second part of the module focused on neurogenic bowel and associated bowel incontinence and constipation. The recommendation for children to have a bowel management program was presented using the evidence to support the recommendation. The consequences of not having a bowel management program were also presented. Various bowel management techniques were shared. Based on the evidence, a stepwise approach was shared as the best way to approach bowel management in children with spina bifida. The third and final focus was on the school nurse's role. The National Association of School Nurses' definition of school nursing was presented. Expert opinions and lower-level research were presented to describe the critical role school nurses should play in bowel management for children with spina bifida. The school nurse's role of educating the rest of the staff and students was presented. Finally, the PowerPoint presentation concluded with emphasizing the excellent position school nurses are in to possibly be one of the first healthcare workers to tell parents and their children the importance of starting a bowel management program early.

To evaluate the school nurses' understanding, a knowledge test was used. The test was given to the school nurses directly before the education via a link on the first slide of the PowerPoint and directly after completing the education via a link on the last slide. Currently,

there is no knowledge test or survey for healthcare providers on bowel management that could be used with school nurses. Therefore, a 12-item pre/post-knowledge test was created based on essential information in the module. Two experts with experience managing incontinence issues in children with spina bifida reviewed the test and provided feedback. An expert in pediatrics and academia also reviewed the test. The expert review ensures the knowledge test targets school nurses' knowledge of spina bifida and bowel management (Arora, 2017). The project lead incorporated all feedback based on the reviewer's expertise to determine face validity of the knowledge test.

Knowledge Test

The knowledge test was created using Qualtrics, which is a web survey tool that meets IRB requirements for collecting and storing data and is Family Educational Rights and Privacy Act (FERPA) and Health Insurance Portability and Accountability Act (HIPAA) compliant (University of Tennessee, n.d.). The knowledge test begins with questions assessing general understanding of spina bifida. As the school nurses progressed through the knowledge test, the questions became more focused on evaluating the nurses' knowledge of neurogenic bowel and bowel management.

The knowledge test consists of twelve questions for assessing the school nurses' knowledge on spina bifida and bowel management (Table 3). There were an additional nine questions included on the pre-test for collecting demographic information. The posttest only consisted of the twelve content questions. There are four true and false questions, nine multiple choice questions, two open-ended demographic questions, five select all that apply questions, and one matching question.

Table 3*Knowledge Test Questions*

Question Number	Question
1	True or False: Spina bifida is a complex single-system congenital disability resulting from abnormal neural tube formation.
2	Match the types of spina bifida with the correct definition.
3	Select all the symptoms that are commonly associated with myelomeningocele
4	True or False: Conditions associated with neurogenic bowel are bowel incontinence and constipation.
5	Of the options below, which is the best age range for a child with spina bifida to start a bowel management program?
6	True or False: Bowel incontinence can impact urinary incontinence.
7	Select all that apply: Symptoms and problems associated with bowel incontinence include
8	Select all that apply: Which of the following are techniques that may be used to gain bowel continence in children with spina bifida?
9	True or False: Bowel incontinence can only be managed using surgical procedures.
10	A student with spina bifida and neurogenic bowel comes to the school nurse's office. The student updates the school nurse that their primary care provider recently started a bowel management program. Which of the following options best represents the order of bowel management techniques you understand the provider may have suggested using a stepwise approach?
11	Which of the following is true about children living with spina bifida and achievement of bowel continence (may select more than one option)?
12	Select the best strategies school nurses can provide to support children with neurogenic bowel and their families.

Outcome Measures, Data Collection, and Analysis

The outcome measures of this project aimed to measure school nurses baseline knowledge of spina bifida and best approaches to a bowel management program and again after completing an educational module. Data were collected from the pre- and post-knowledge tests. Participant responses were exported from Qualtrics directly to the Statistical Package for the Social Sciences (SPSS) version 27 software.

Differences in school nurses' knowledge of spina bifida and bowel management from pre- and post-knowledge test scores were analyzed using an independent t-test (Sylvia & Terhaar, 2014, p. 41). To interpret the reliability of the knowledge test, Kuder Richardson Formula 20 was used. Demographic responses were analyzed using descriptive statistics and measures of central tendency, mean, median, mode, and standard deviation. A difficulty index and discriminatory index were also analyzed for each knowledge-based test question.

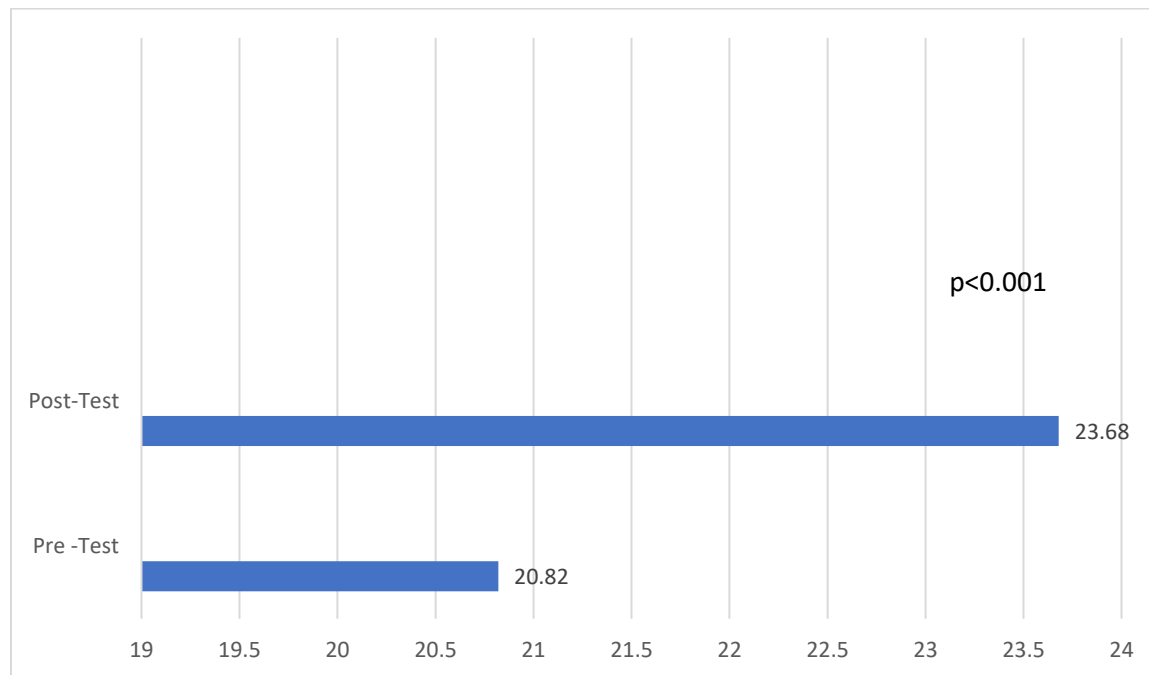
Ethical Considerations

Determination from the University of Tennessee Institutional Review Board (IRB) was sought prior to the implementation of this project. This project was determined not to meet the definition of human subject's research and thus did not require IRB review. The county school district's research committee also approved the project.

Results

The total points possible for the pre- and post-knowledge test was 27 points after excluding two questions. Questions eleven and twelve were excluded from analysis because they had been mis-keyed in Qualtrics. Eighty-six nurses completed the pre-test, and 85 nurses completed the post-test. Nurses averaged a score of 77% on the pre-knowledge test ($M = 20.82$, $SD = 2.76$), range: 11-25 points and 87% post-knowledge test ($M = 23.68$, $SD = 2.45$), range: 12-27 points. After school nurses completed the educational module, there was a 10% improvement in test scores ($p < .001$). (Figure 1).

The knowledge test consisting of 27 items was found to be marginally reliable (KR20 = .64). A Kuder Richardson 20 formula of .70 or higher would indicate a reliable test; however, reliability may be affected when there is little variability in the scores. Therefore, an item analysis was conducted on the post-knowledge test results. A difficulty index showed that 41%

Figure 1*Pre-test versus Post-test Scores*

of questions were of ideal difficulty (range of 66-88%), but most items were easier questions (range of 92- 100%). Participants found one true/false question difficult (46%), and to the surprise of the project lead, the question was the definition of spina bifida. Eighteen out of the 27 questions discriminated poorly, falling below .19. Most of these items had a difficulty index of 90% or greater (see Table 3).

Discussion

Providing education to school nurses about spina bifida and bowel management significantly increased the school nurses' knowledge about the topic. There was a significant improvement in scores despite the removal of two questions. These two questions were intended to select all options that apply but were incorrectly keyed, so the nurses could only choose one answer. The improvement by three points indicates that educating school nurses about spina bifida and bowel management did increase their knowledge on the topics.

Table 3*Difficulty Index and Discrimination Index*

Question	Difficulty Index	Discrimination Index
1	.46	.46
2	.95	.14
3	.86	.36
4	.86	.36
5	1.00	.00
6	.93	.18
7	.98	.07
8	.88	.25
9	.67	.07
10	.89	.25
11	.98	.07
12	.96	.07
13	.95	.11
14	.95	.11
15	.98	.00
16	.82	.14
17	1.00	.00
18	.95	.11
19	.85	.32
20	.94	.14
21	.99	.04
22	.92	.18
23	.66	.50
24	.66	-.11
25	.78	.46
26	.95	.11
27	.86	.32

Regarding the knowledge test, a Kuder Richardson Formula 20 (KR-20) of greater than 0.70 or greater indicates a reliable test. The Kuder Richardson Formula 20 in this project was found to be 0.64 on the post test. This KR-20 result could be related to the low variability in scores. The discrimination index ranges from -0.11 to 0.46 indicate a lack of variability in the scores. Difficulty on the posttest ranged from 0.46 to 1.00 which indicates that most questions were relatively easy items. In the future, to ease the answering of questions, it is recommended that all questions be changed to multiple choice questions rather than select all that apply and true and false questions.

There is scarce literature concerning school nurses' knowledge of spina bifida and bowel management. However, there have been studies addressing educating school nurses on other health conditions. One study addressed educating school nurses, through an education session with pre-and post-surveys, about Human papillomavirus (HPV) and the importance of the HPV vaccine (Tucker et al., 2021). Tucker et al. (2021) found that 89.9% of the school nurses who participated in an educational intervention had increased knowledge at the conclusion. In another study, authors examined school nurses' knowledge of sickle cell disease (Shook et al., 2021). While this study did not include the education of the school nurses', the authors found that school nurses report a lack of knowledge on sickle cell disease—a paucity of evidence addresses educating school nurses on chronic diseases. However, several studies found conclusive results pointing to the need for continuing education and educating school nurses about various chronic diseases (McCabe et al., 2019; Shook et al., 2021; Tucker et al., 2021). This evidence-based practice project is an example of how educating school nurses regarding chronic disease management can increase knowledge and, hopefully, improve care for children living with chronic disease in schools.

Implications for Practice

Based on the findings of this evidence-based practice project, educating school nurses on spina bifida and bowel management can significantly improve school nurses' knowledge to assist children who live with spina bifida in starting or maintaining a bowel management program. The school nurses may now broach the topic of bowel management with parents and the child at the beginning of the school year to assist the parent and child. The nurses' new knowledge may help them assist other children with bowel incontinence or constipation unrelated to spina bifida and neurogenic bowel.

In the future, the expansion of education could include case studies or a skills day. The goal is to impact the children who live with spina bifida directly. Moving forward, school districts, including the one this project took place in, could begin tracking children who live with spina bifida. Examples of what the districts could track include whether a child is on a bowel management program and how school nurses are assisting with bowel management plans.

The sustainability of this project will include the nurses employed by the county school reviewing the educational module yearly. Remediation will benefit the nurses unable to participate in the initial project. In addition, the module will be used for onboarding of future nurses that the schools employ. The project lead provided the schools with an executive summary that includes key takeaways from the project as well as the results of the project. In addition, an infographic with web links to resources and information on where school nurses can access the latest recommendations on caring for and assisting a child living with spina bifida with bowel management strategies.

Limitations

There are several noted limitations to this project. One limitation is that there was no available valid knowledge test on spina bifida and bowel management, so a test had to be created and validated. Creating a new test gives way to the need for further evaluation and updates to the knowledge test for future use—another limitation involved excluding two of the twelve questions from the analysis. The two questions removed were miss keyed during test construction in Qualtrics. As a result, participants could not select all that apply to these two questions. Instead, these two questions had to be answered by the nurse choosing a single answer. The two questions specifically addressed how the school nurses can help children who live with spina bifida offering more insight into whether the nurses knew how they could help children at school with bowel management after the education.

There was no question on the post-knowledge test asking the school nurses to rank their confidence in caring for and assisting a child living with spina bifida in their bowel management routine. Since no question regarding confidence was included, it is unknown if the nurses' confidence improved after receiving the education. However, there was a significant improvement in test scores, suggesting an improvement in knowledge of spina bifida and bowel management. For future projects, asking a post question regarding confidence is recommended. Another limitation was that the post-test was given immediately after the education. Since the post-test was given directly after the education, there was no way to measure knowledge retention over time.

Conclusion

True bowel continence may not be possible for the spina bifida population but limiting the amount of accidental stool loss and increasing quality of life is a significant goal for children with spina bifida concerning bowel management. Bowel management programs, no matter what

technique, and beginning a program at the proper age are two primary features for children with spina bifida gaining bowel continence. School nurses encounter students from various backgrounds battling different health conditions. School nurses have a unique opportunity to assess, assist, and educate parents and children living with spina bifida more frequently than providers practicing in a clinic or inpatient setting. School nurses could provide the missing link for the spina bifida population gaining bowel continence when supplied with the information to do so, as the nurses were in this project. Educating school nurses in other counties across the nation could prove to be beneficial in helping school nurses be able to better assist their students who live with bowel incontinence or constipation.

References

- Ambatsumyan, L. & Rodriguez, L. (2018). Bowel management in children with spina bifida. *Journal of Pediatric Rehabilitation Medicine*, *11*(4), 293–301.
<https://doi.org/10.3233/PRM-170533>
- Au, K. S., Ashley-Koch, A., & Northrup, H. (2010). Epidemiologic and genetic aspects of spina bifida and other neural tube defects. *Developmental Disabilities Research Reviews*, *16*(1), 6–15. <https://doi.org/10.1002/ddrr.93>
- Arora, C., Sinha, B., Malhotra, A., & Ranjan, P. (2017). Development and validation of health education tools and evaluation knowledge tests for improving patient care in lifestyle related diseases. *Journal of Clinical and Diagnostic Research: JCDR*, *11*(5), JE06–JE09.
<https://doi.org/10.7860/JCDR/2017/28197.9946>
- Beierwaltes, P., Church, P., Gordon, T., & Ambartsumyan, L. (2020). Bowel function and care: Guidelines for the care of people with spina bifida. *Journal of Pediatric Rehabilitation Medicine*, *13*(4), 491–498. <https://doi.org/10.3233/PRM-200724>
- Buckwalter, K., Cullen, L., Hanrahan, K., Kleiber, C., McCarthy, A., Rakel, B., Steelman, V., Tripp-Reimer, T., & Tucker, S. (2017). Iowa model of evidence-based practice: Revisions and validation. *Worldviews on Evidence-Based Nursing*, *14*(3), 175–182.
<https://doi.org/10.1111/wvn.12223>
- Coggrave M. (2008). Neurogenic continence. Part 3: bowel management strategies. *British Journal of Nursing*, *17*(15), 962–968. 10.12968/bjon.2008.17.15.30698.
- Coloplast (n.d.). *How the bowel works*. <https://www.coloplast.co.uk/about-us/landing-pages/how-the-bowel-works/>

- Costigan, A. M., Orr, S., Alshafei, A. E., & Antao, B. A. (2019). How to establish a successful bowel management programme tertiary paediatric centre experience. *Irish Journal of Medical Science*, 188(1), 211–218. <https://doi.org/10.1007/s11845-018-1819-9>
- Dang, D. & Dearholt, S.L. (2018). *Johns Hopkins nursing evidence-based practice: Model and guidelines* (3rd ed.). Sigma Theta Tau International.
- Finkelman, A. (2018). *Quality improvement: A guide for integration in nursing*. Jones & Bartlett Learning.
- Freeman, K., Castillo, H., Castillo, J., Liu, T., Schechter, M., Wiener, J., Thibadeau, J., Ward, E., & Brei, T. (2017). Variation in bowel and bladder continence across US spina bifida programs: A descriptive study. *Journal of Pediatric Rehabilitation Medicine*, 10(3-4), 231–241. <https://doi.org/10.3233/PRM-170450>
- Gillooly, D., Mahat, G., & Paradiso, P. (2020). Parents' perception of the school nurse's role. *Journal of Advanced Pediatrics and Child Health*, 3, 064-067. <https://doi.org/10.29328/journal.japch.1001021>
- Institute for Healthcare Improvement (IHI). (2020a). *PFC 101: Introduction to patient-centered care*. [IHI Open School Module]. https://education.ihl.org/topclass/topclass.do?CnTxT-105061775-contentSetup-tc_student_id=105061775-item=12718-view=1#
- Johnston, A. W., Wiener, J. S., & Todd Purves, J. (2020). Pediatric neurogenic bladder and bowel dysfunction: Will my child ever be out of diapers? *European Urology Focus*, 6(5), 838–867. <https://doi.org/10.1016/j.euf.2020.01.003>
- Kelly, M. S., Wiener, J. S., Liu, T., Patel, P., Castillo, H., Castillo, J., Dicianno, B. E., Jasien, J., Peterson, P., Routh, J. C., Sawin, K., Sherburne, E., Smith, K., Taha, A., & Worley, G. (2020). Neurogenic bowel treatments and continence outcomes in children and adults

- with myelomeningocele. *Journal of Pediatric Rehabilitation Medicine*, 13(4), 685–693.
<https://doi.org/10.3233/PRM-190667>
- Kilpatrick, J. A., Zobell, S., Leeftang, E. J., Cao, D., Mammen, L., & Rollins, M. D. (2020). Intermediate and long-term outcomes of a bowel management program for children with severe constipation or fecal incontinence. *Journal of Pediatric Surgery*, 55(3), 545–548.
<https://doi.org/10.1016/j.jpedsurg.2019.10.062>
- Maenpa, T. & Astedt-Kurki, P. (2008). Cooperation between parents and school nurses in primary schools: parents' perceptions. *Scandinavian Journal of Caring Sciences*, 22(1), 86–92. <https://doi.org/10.1111/j.1471-6712.2007.00527.x>
- McCabe, E. M., McDonald, C., Connolly, C., & Lipman, T. H. (2019). A review of school nurses' self-efficacy in asthma care. *The Journal of School Nursing : The Official Publication of the National Association of School Nurses*, 35(1), 15–26.
<https://doi.org/10.1177/1059840518808886>
- Nilsen, P. (2015). Making sense of implementation theories, models, and frameworks. *Implementation Science*, 10(53), 1-13. <https://doi.org/10.1186/s13012-015-0242-0>
- Porter, P., Obst, B., & Zabel, A. (2009). *A guide for school personnel working with students with spina bifida*. The Specialized Health Needs Interagency Collaboration.
<https://www.kennedykrieger.org/sites/default/files/library/documents/community/specialized-health-needs-interagency-collaboration-shnic/guide-school-personnel-spina-bifida.pdf>
- Radojicic, Z., Milivojevic, S., Milic, N., Lazovic, J. M., Lukac, M., & Sretenovic, A. (2019). Impact of bowel management in alleviating symptoms of urinary incontinence in patients

- with spina bifida associated with overactive bladder and detrusor sphincter dyssynergia. *BJU International*, 123(1), 118–123. <https://doi.org/10.1111/bju.14414>
- Sandler A. D. (2010). Children with spina bifida: key clinical issues. *Pediatric Clinics of North America*, 57(4), 879–892. <https://doi.org/10.1016/j.pcl.2010.07.009>
- Sawin, K., Liu, T., Ward, E., Thibadeau, J. Schechter, M., Soe, M., & Walker, W. (2015). The national spina bifida patient registry: Profile of a large cohort of participants from the first 10 clinics. *The Journal of Pediatrics*, 166(2), 444–450.
- Schletker, J., Edmonds, T., Jacobson, R., Ketzer, J., Hall, J., Trecartin, A., Peña, A., & Bischoff, A. (2019). Bowel management program in patients with spina bifida. *Pediatric Surgery International*, 35(2), 243–245. <https://doi.org/10.1007/s00383-018-4403-5>
- Sharpe, D. (n.d.). Best practice recommendation for the care and management of students with bowel/bladder incontinence. *The University of Vermont Continence Project*. <https://www.uvm.edu/sites/default/files/Center-on-Disability-and-Community-Inclusion/ContinenceBestPracticeRecommendationsfortheCareandManagementofStudents.pdf>
- Shook, L. M., Mosley, C., Farrell, C. B., Connelly, A., & Jones, C. L. (2021). Educational needs of school nurses regarding the evidence-based management of sickle cell disease. *International Journal of Environmental Research and Public Health*, 18(21), 11641. <https://doi.org/10.3390/ijerph182111641>
- Smith, N., Neville-Jan, A., Freeman, K., Adams, A., Mizokawa, S., Dudgeon, B., Merkens, M., Walker, W. (2016). The effectiveness of bowel and bladder interventions in children with spina bifida. *Developmental Medicine and Child Neurology*, 58(9), 979–988. <https://doi.org/10.1111/dmcn.13095>

Spina Bifida Association (n.d.). *Guidelines for the care of people with spina bifida*.

<https://www.spinabifidaassociation.org/guidelines/>

Sylvia, M. & Terhaar, M. (2014). *Clinical analytics and data management for the DNP*. Springer Publishing Company.

Tennessee Department of Education (n.d.). *Knox county*.

<https://reportcard.tnedu.gov/districts/470>

Toothaker, R., & Cook, P. (2018). A review of four health procedures that school nurses may encounter. *NASN school nurse (Print)*, 33(1), 19–22. <https://doi-org/10.1177/1942602X17725885>

Tucker, J., Sarsfield, E., Choi, K. Y., & Goyal, N. (2021). Educating school nurses about human papillomavirus (HPV) associated cancers and the importance of HPV vaccination.

Journal of Community Health Nursing, 38(4), 201–208.

<https://doi.org/10.1080/07370016.2021.1972244>

Uhm, J., Choi, M., & Lee, H. (2020). School nurses' perceptions regarding barriers and facilitators in caring for children with chronic diseases in school settings: A mixed studies review. *Nursing & Health Sciences*, 22(4), 868–880.

<https://doi.org/10.1111/nhs.12786>

University of Tennessee (n.d.). *File sharing and storage*. <https://oit.utk.edu/storage/>

Velde, S. V., Biervliet, S. V., Bruyne, R. D., & Winckel, M. V. (2013). A systematic review on bowel management and the success rate of the various treatment modalities in spina bifida patients. *Spinal cord*, 51(12), 873–881. <https://doi.org/10.1038/sc.2013.123>

Velde, S.V., Van Biervliet, S.V., Renterghem, K.V., Laecke, E.V., Hoebeke, P., & Winckel, M.V. (2007). Achieving fecal continence in patients with spina bifida: A descriptive

cohort study. *The Journal of Urology*, 178(6), 2640–2644.

<https://doi.org/10.1016/j.juro.2007.07.060>

Wiener, J., Suson, K., Castillo, J., Routh, J., Tanaka, S., Liu, T., Ward, E., Thibadeau, J., Joseph, D., & Registry, N. (2017). Bowel management and continence in adults with spina bifida: Results from the National Spina Bifida Patient Registry 2009-15. *Journal of Pediatric Rehabilitation Medicine*, 10(3-4). <http://doi.org/10.3233/PRM-170466>