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Child Neurology Curriculum

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Developing a Child Neurology Curriculum for School Nurses

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Abstract

Provision of comprehensive health services to children and adolescents is a central role for school nurses. Children with chronic health conditions are at the intersection of the health and education systems. Recently, educators, neurology care providers (MD/NP/PA) have initiated discussions about the impact of a child's health on their ability to learn. The purpose of this project was to develop a child neurology curriculum for school nurses. A needs assessment survey was distributed. The survey results revealed a need for further education and training in child neurology diagnoses. Four areas were chosen for curriculum development: *seizures/epilepsy, headaches/migraines, tics, and post-concussion management*. The Healthy Learner Model (HLM) and Child Neurology Process-Oriented Triage (ChiNePOT) are the conceptual frameworks used in this curriculum. Associated findings include the need of school nurses for pertinent evidence-based research to guide their practice, which will ultimately lead to a healthier learner.

Developing a Child Neurology Curriculum for School Nurses

School nurses have a central role in providing comprehensive health services to children and adolescents in their constituency, whether school or community based. For most children, school represents the second most influential environment in a child's life (American Academy of Pediatrics, 2008). School nurses are closely identified with the promotion of health among children and the development of the school as an environment conducive to health (Wainright, Thomas, & Jones, 2000). Medical and health care advances over the past quarter century have improved survival of children and adults from many previously fatal illnesses and conditions. Some childhood cancers now have a 90% five year survival rate. Formerly, individuals with cystic fibrosis only just survived their school years before succumbing to the effects of the disease. Now, children with cystic fibrosis are surviving into their fourth or fifth decades. Children with neurologic disorders have also been beneficiaries of these advances. Recent additions to the armamentarium of anticonvulsant medications allow for much improved seizure control, allowing children with epilepsy to attend school regularly. Additionally, new routes of administration of these medications permit immediate treatment at school, sometimes without paramedic and hospital involvement. Recent advances and new knowledge in the area of migraines and post-concussion management allow for improved assessment and symptomatic treatment of these conditions. These and other advances have created a cohort of children, teens, and young adults with chronic health conditions, all of which pose many challenges to parents, school nurses, school administrators, and health care practitioners.

There are many reasons for these challenges. Thies (1999) states that children with chronic health conditions are at the intersection of the health and education systems, which historically have operated in different realms with dissimilar, and sometimes conflicting,

philosophies. Historically, the school nurse has focused on health problems while the classroom teacher focuses on academics. Only recently have educators, physicians, and school nurses initiated discussions about the impact of a child's health condition on their ability to learn.

Background

Terminology

Schools are ethically and legally responsible to provide required health services during the school day in order that students can receive a free, appropriate public education.

The Education for all Handicapped Children Act (EHA) in 1975 established national standards for free, appropriate public education of children with disabilities which affect their education, delivered in the least restrictive environment. Subsequent legislation renamed this act the Individuals with Disabilities Education Act (IDEA). It was reauthorized in 1997 and again in 2004. It is also well known as Public Law 94-142.

The Rehabilitation Act of 1973 (Section 504) requires all schools that receive or benefit from federal financial assistance to provide reasonable accommodations to a student with a disability. Reasonable accommodations may include services provided by or supervised by a nurse such as medication administration, glucose monitoring, insulin administration, etc. Services must be designed to meet the individual educational needs of students with disabilities as adequately as the needs of others are met (National Association of School Nurses, 2006). The Americans with Disability Act of 1990 (ADA) defines disability as a physical or mental impairment that "limits one or more major life activities....." (www.ada.gov, 2009) and is also used in the provision of services to children and adolescents in schools.

The term "chronic health condition" is difficult to define. Thies (1999) reiterates that defining chronic conditions by medical diagnoses may seem obvious to some, but that approach

has several drawbacks. Most germane, medical diagnoses reflect a problem-oriented approach to treatment (“medical model”). Placing the focus on diagnosis and cure does not “capture the course of chronic illness, which can be uneven and unpredictable” (Thies, 1999). In the current healthcare milieu, treatment of chronic illness emphasizes management of symptoms, prevention of complications, and promotion of health. To complement these ideas, the difference between *medical services* and *health services* in the school setting is clearly described in the Position Statement “Medical Services vs. Health Services in the School Setting” (National Association of School Nurses, 2006). To summarize, medical services in the school setting are those activities rendered by a physician and/or other healthcare provider. Health services in the school setting are those activities rendered by a registered professional school nurse or other qualified person, which include, but are not limited to, implementation of IDEA and Section 504 requirements (National Association of School Nurses, 2006).

Clearly, federal law places the responsibility on schools to seek, identify, deem eligible, and provide for any and all students with special educational needs. Identification of this population, development of appropriate services, funding of such services, and evaluation of each aspect are all areas for future research and evaluation. In order to optimize educational performance, the child or adolescent with health care needs must have these needs met and be ready to learn, emotionally and physically.

Role of the School Nurse

The nurse owes the same duty to self as to others, including the responsibility to preserve integrity and safety, to maintain competence, and to continue personal and professional growth (American Nurses Association, 2009). Vought-O'Sullivan, Meehan, Havice, & Pruitt (2006) used Benner's *novice to expert* theoretical framework to explore continuing education (CE) as

critical to the professional development of school nurses (Benner, 1984). School nurse practice requires continuing education to ensure the application of advanced clinical knowledge and skills in the school setting. Currently there are 1591 credentialed school nurses in California, providing services to 6.3 million students (Spradling, 2009). Formal education and preparation of a school nurse may vary widely. In California, all school nurses must be credentialed by the time they have completed five years in the field. As with nurses in many settings, many school nurses face time constraints and financial barriers that prevent participation in CE experiences (Vought-O'Sullivan, Meehan, Havice, & Pruitt, 2006). CE is defined by NASN as a systematic professional learning experience developed to enhance knowledge, skills, and attitudes (National Association of School Nurses, 2006). Most importantly, the school nurse functions independently and meets a variety of health care needs for large numbers of students in an educational environment. Many times school nurses function without direct peer support and often are the only nurse in the school district, without back-up coverage.

NASN (2002) and AAP (2008) identify seven core roles that the school nurse fulfills to foster health and academic success. These seven goals are: 1) Provision of direct care to students, 2) Leadership for the provision of health services, 3) Screening and referral for health conditions, 4) Promotion of a healthy school environment, 5) Health promotion, 6) Leadership role for health policies and programs, and 7) Liaison between school personnel, family, health care professionals, and the community. School administrators must realize that CE (competency based or other) is financially and strategically important. "Educated school nurses provide cost-effective, quality health care that promotes academic success by keeping students healthy, in attendance, and mentally and physically prepared." (Vought-O'Sullivan, Meehan, Havice, & Pruitt, 2006, p. 8). Additionally, the school nurse assist schools in complying with legal

mandates (IDEA, ADA, etc.) in order to provide the student with an optimal educational experience in the least restrictive environment. Fagan (1995) as cited in Wainright, Thomas, & Jones (2000) identified four main constraints to the success of school nursing: inadequate education, absence of joint planning, lack of resources, and different perceptions of perceived value. A depth and breadth of knowledge of children and adolescents with and without chronic health problems is crucial knowledge for the school nurse to function effectively. Lack of resources contribute to this constraint. The majority of districts are challenged with an inadequate number of school nurses; those present cannot use time during the school year to obtain CE. Therefore, competency is compromised, and value is reduced. Last, but perhaps most important, is the perceived value of the school nurse. Practice based research on which to base decisions regarding the provision of school nursing and its nature of practice is lacking. Collection of data related to health outcomes, evaluation of outcome effectiveness research, demographic and epidemiologic data are all areas in which school nurses can and should participate in order to protect resources allocated to school health services (Broussard, 2004, Wainright, Thomas, & Jones, 2000).

Evidence-Based Practice and School Nursing

Current school nurse practice is based on expert experience, oral tradition, and incorporation of basic public health principles. Adams and McCarthy (2005) identify that school nurse practice should be based on the best evidence available, which is usually data obtained from research. "In nursing, evidence-based practice is a process of combining the best evidence available with nursing expertise and patient and family preferences in order to determine optimum care." (Adams & McCarthy, 2005). School nurses, in their unique independent practice, are in a key position to incorporate research and scientific evidence into their practice.

To date, no known studies exist regarding the generation or adoption of evidence-based practice in school nursing. Because school nurses already have a high degree of autonomy and empowerment, they may be receptive to evidence-based research to further guide their practice. NASN and state school nurse organizations have developed position statements on various aspects of clinical school nursing. However, these documents are generally based on expert reports, opinions and statements, rather than rigorous research. Additionally, school nurse practice is subject to the interface of regulatory bodies which at times conflict with each other, i.e. Board of Registered Nursing versus Education Code. This complicates the undertaking and implementation of evidence-based data. School nurses 1) can be proactive in research development, 2) identify topics for research, 3) collaborate with nurse researchers in academic institutions. Most importantly, using evidence-based information to guide their practice reduces liability for substandard or negligent practice (Hootman, 2002).

Broussard (2004) identified barriers to school nursing research which include lack of standardization, lack of administrative support, and difficulty in gaining parental consent. Issues of confidentiality and ethics are also present and may hinder school nurse research. Common barriers such as lack of time, funding, and clerical assistance were also identified. Price, Telljohann, & King (1999) examined school nurses perceptions of and experience with school health research. A random sample (n=590) of school nurses with varied levels of education responded to the survey, over two-thirds were employed at the elementary school level. Three benefits of research were identified: adding new knowledge to school nursing issues, benefitting the health care of children at school, and helping peers do their jobs better. Many subjects also indicated they would increase involvement in research if someone would assist them.

Significance of Neurologic Concerns in the Child and Adolescent Population

The American Academy of Pediatrics (2008) identifies school nurses as well positioned to take the lead in health issues which affect a child's ability to be present at school and to learn. Some health related events that occur in schools are life threatening and require immediate action by a school nurse or designee. Other health related events in the school milieu are not life threatening, are chronic in nature, and may have a behavioral component. Still other health related issues may not be life threatening, nor chronic, but may impact a child's ability to fully participate in school for a period of time. The school nurse is uniquely placed to take responsibility for each of these potential scenarios. Olympia, Wan, & Avner (2005) surveyed 573 school nurses regarding their preparedness to respond to emergencies in children at school. The study examined compliance with emergency preparedness and readiness for potential mass disaster. Interestingly, school nurse responders reported more confidence in managing certain conditions (respiratory distress, bleeding, fractures, anaphylaxis, and shock). They identified less confidence in managing cardiac arrest, overdose, seizures, heat illness, and head injury.

The purpose of this project is to develop a child neurology curriculum for school nurses. A needs assessment survey was developed and sent to school nurses throughout the state of California via *surveymonkey*. Most, but not all respondents were members of the California School Nurse Organization (CSNO). The survey was also distributed to local school nurses who attended various professional meetings in Spring 2009. Prior to development and distribution of the survey, this researcher had identified four areas of need for further education and training of school personnel. These four had been identified from the researcher's 10+ years as a nurse practitioner in pediatric neurology as the conditions which most frequently elicited questions

from parents and school nurses. *Seizures/epilepsy, headaches/migraines, tics, and post concussion management* are the areas of concentration for this project.

Each year, approximately 200,000 people in the United States will be diagnosed with epilepsy, 45,000 of these new cases will be school-age children (O'Dell & O'Hara, 2007). Epilepsy remains the third most common serious pediatric neurologic disorder after mental retardation and cerebral palsy. School nurses have greater confidence responding to asthma and fractures and less confidence with seizure management at school. Many children and adults with epilepsy have well controlled seizures, however, 30-40% continue to have seizures despite treatment (O'Dell & O'Hara, 2007). Also, anyone with epilepsy can experience a breakthrough seizure at any time, for idiopathic or other reasons (e.g. fever or concurrent illness, mild head injury). Price, Murphy, & Cureton (2004) used a pre- and post-test design to examine the effects of seizure education on educators' knowledge of seizures, knowledge of seizure management, and self-efficacy scores. Two content experts presented the seizure education program to participants. Findings supported the hypothesis that educators would have significantly increased post-test scores related to seizure management. These findings supported the need for repeated seizure education programs on an frequent, regular basis. This study included only educators, not school nurses. Certainly school nurses can benefit from ongoing education regarding epilepsy, seizure management, medication management (daily anticonvulsant medication and rescue medications used for seizures), post-seizure evaluation, and emergency management.

Children and adolescents experience headaches. In fact, headaches are a common reason for school absences. Bille's (1962) classic study found that 40% of children have headaches by age 7 years, and 75% have them by age 15 years. Migraine prevalence is 5-10% in children

younger than 15 years; recent evidence and anecdotal experience suggest that migraine prevalence is rising. Once a clinician has excluded an acute or chronic illness beyond headache (e.g. brain tumor), attention turns to pain and symptom management (Rosenblum & Fisher, 2001). Children and adolescents can have sporadic migraine headaches which may cause school absence. In between episodes, the symptoms abate and the child is able to attend school.

Migraine headaches respond well to abortive and prophylactic medication for management. However, in some cases, migraines transform into a chronic nonprogressive headache pattern. These headaches become refractory to treatment and often require a multidisciplinary approach to limiting morbidity and school absences related to headache. The school nurse is often a key player in ensuring the child's attendance at school and/or creating alternate methods for the student to obtain necessary credits and classes. Often students may perceive some secondary gain from school absence; the school nurse is in a unique position to assess the student, family, and academic needs.

Tics and Tourette Syndrome, while not life threatening, can be very distressing to students, families, teachers, and school nurses. Tics generally start between 6-7 years of age. First tics are usually facial and then become accompanied by motor and vocal tics. Tourette Syndrome (TS) is estimated to occur in at least 1% of all children; there are approximately 750,000 children with TS in the United States (Zinner, 2004). The diagnostic criteria for TS is specific including both motor and vocal tics, tics occurring many times a day, no tic-free-period of more than three consecutive months without resumption, onset before 18 years, and the ruling out of direct physiologic effects of a substance (e.g., stimulant) or medical condition (e.g., encephalitis) (American Psychiatric Association, 2000).

While a small population of children and adolescents have TS, a much larger population may have transient tics. One estimate is that 20-25% of the population have tics at some point during their lives. Tics are generally temporary and disappear after a short time (Tourette Syndrome Association, 2009). With Tourette Syndrome the tics remain, and can remit and exacerbate. Tics are not life threatening but can be bothersome to teachers, parents, and students. Generally, children with tics are not treated with medication unless the tics are socially or physically debilitating. If so, debilitation is generally in the teen years. Since tics are not harmful and rarely require medication, it is imperative that teachers, school nurses, and parents understand the etiology and course of tics, so that the child can continue with his or her studies without undue attention being given to the transient tics.

Athletes are one group of school age students at risk for head injuries (Meehan & Bachur, 2009). Concussion and traumatic brain injury in children and adolescents is an increasingly controversial topic in schools and sports programs. The vast majority of people playing contact or collision sports are under the age of 19. Many individuals either discontinue their sport at that age or move up to a semi-professional level. Therefore it is important to understand age related concussion risk, management, and how the athlete can safely return to play (Russo Buzzini & Guskiewicz, 2006). The Centers for Disease Control and Prevention estimates and other epidemiologic projections indicate that 250,000-300,000 sports related concussions occur in children annually in the United States (Cantu, 1998; CDC, 2007; Russo Buzzini & Guskiewicz, 2006). Kelly & Rosenberg (1997) state that three main issues must be addressed by any return to play guideline: 1) appropriate management at time of injury, 2) prevention of catastrophic outcome related to brain swelling, and 3) avoidance of cumulative brain injury related to repeated concussions. Additionally, these authors recommend adoption of a single concussion

grading scale to advance clinical research into the incidence of concussion and development of permanent neurologic dysfunction.

To date, return to play decisions are still based on experience, not evidence. Theye & Mueller (2004) wisely state that the decision to allow an athlete to return to play must be multifactorial. Several factors including but not limited to prior concussions, time since last concussion, symptoms at rest or with exertion, neurocognitive testing, and academic performance prior to the injury must be assessed. The use of objective assessments (neurocognitive testing, mental status, retrograde amnesia, etc.) should be used in conjunction with qualitative information. Cantu (2001) concludes that all guidelines agree that an athlete must be free of post traumatic symptoms AND of all postconcussive symptoms at rest and with exertion. Approving return to play when a child or adolescent athlete has these symptoms would be against all current guideline recommendations. However, provider clinical decision making in 2009 is still based on anecdotal experience and expert opinion, NOT systematic research.

School nurses and administrators must be aware of current return to play recommendations for children and adolescents. School personnel also must have the knowledge to assess a child immediately who has had a sport related or other head injury and to provide triage appropriately. Acute head injury treatment and triage is beyond the scope of this paper. Many of the morbidities associated with mild concussion are invisible. Memory loss, concentration problems, academic performance prior to and after injury are all areas with which the school nurse must have familiarity in order to act as a student advocate. As stated previously, school nurses in the Olympia, Wan, & Avner (2005) study reported less confidence in managing head injury than other conditions. Because research involving post-concussion is constantly evolving, much information will be new to school nurses and other child health care providers.

Development of a child neurology curriculum for school nurses is the second phase of a larger project, development of Child Neurology Telephone Encounter Guides (TEG) (Sprague-McRae, K, & Morrison, 2009). Development of the TEG was done in 2008-2009 with support from the Association of Child Neurology Nurses, Child Neurology Foundation, and San Jose State University. The TEG was published in 2009.

Review of the Evidence

To date, a child neurology curriculum for school nurses does not exist. Other condition-specific, school based initiatives exist (Centers for Disease Control and Prevention, 2007; Food Allergy and Anaphylaxis Network, 2009; National Association of School Nurses, 2006; National Asthma Education and Prevention Program, 2009). However, none are specifically designed for school nurses caring for children with neurologic disorders, and certainly no known resource exists for teachers who are with these children 6-8 hours per day. The Heads-Up curriculum (CDC, 2007), offers practical information for parents, health professionals, teachers, and coaches regarding prevention of and immediate management of sport-related concussion. The Epilepsy Foundation (EF) publishes a School Nurse Training Program, “Managing Students With Seizures,” and provides various documentation forms and a fact sheet about epilepsy on the website (Epilepsy Foundation, 2009). Additional information including videos, book, pamphlets, are available at the organization’s website. There is also information available about headaches in school children , and some information regarding tics and Tourette Syndrome for the teacher or school nurse. However, no comprehensive educational tool covering child neurology conditions has been developed.

Conceptual Framework

Erickson, Splett, Mullett, & Heiman (2006) developed the Healthy Learner Model for Student Chronic Condition Management (HLM). This model is proposed as a bridge between the medical model that focuses on the clinical setting and the school initiatives that focus on the school environment. The HLM is an integrated, coordinated effort to optimize the health status and support the academic success of children with chronic conditions. The authors further describe a chronic condition as one which has: 1) long term impact on a child including limitation of activities, 2) need for ongoing medical care, 3) medication requirement for ongoing control of the condition, 4) need for treatment, adaptation or special assistance at home or school, and 5) a need for technology assistance. The HLM identifies seven essential elements to ensure high quality care and positive outcomes for students with chronic conditions. The elements are: a) leadership; b) evidence-based nursing practice; c) capacity building; d) chronic disease resource nurse; e) the healthy learner; f) partnership with families; g) partnership with health providers (see Figure 1). Inherent to the model are two requisites that are not elements but are inherent to the model. The first is a professional school nurse with a baccalaureate degree who possesses knowledge, skills, and expertise in all pertinent areas. The second requisite is evaluation. Evaluation provides ongoing data to assess process and outcomes and to guide program decisions. This model enhances practice by enabling the school nurse to function with a higher knowledge base (Erickson C. D., Splett, Mullett, & Heiman, 2006).

The HLM has been replicated in two areas. The authors of the HLM developed the Healthy Learner Asthma Initiative (HLAI) within the HLM. The availability of widely accepted national evidence-based asthma guidelines was a trigger for action and provided a basis for cooperation between the local school and health care systems. A wide range of intervention

strategies were used to educate students, parents, school health staff, coaches and others. These included direct care, a didactic curriculum, newsletter, wallet size first aid card, etc. The authors state that criteria to consider when employing the HLM are the prevalence of the condition, intensity of school nurse time and expertise required, impact on student attendance, student performance, student safety, and requirements for student needed accommodations during school hours. “School nursing practice, guided by evidence-based principles and informed by ongoing evaluation, results in high-quality care for children and promotes educational success, including improved attendance and active participation in learning” (Erickson C. D., Splett, Mullett, Jensen, & Belseth, 2006).

Sawyer (2002) and Youssef, Murphy, Schuckalo, Intile, & Rosh (2007) surveyed school nurses regarding managing acute and chronic health issues in the school setting. Sawyer found that the school nurses were not as comfortable with health issues that required a higher level of expertise and assessment. Youssef et. Al. examined the perceptions of school nurses related to their knowledge and the need for educational programs to build their knowledge base. These studies assist in documenting the need for professional education in the school nurse specialty area.

The utility of professional education regarding other commonly seen childhood conditions in schools is encouraging. A study of 336 school nurses in Iowa demonstrated significant improvement in knowledge and understanding of growth disorders in respondents who received an educational reference tool (Williams, McCarthy, Bragadottir, & Reed, 2002). All of these studies suggest that school nurses are receptive to learning and that efforts to teach and provide information are likely to be successful.

The need for triage expertise is well documented in the literature. Educators' perceptions of the impact of having children with different chronic health conditions in the classroom was studied by Olson, Seidler, Goodman, Gaelic, & Nordgren (2004). Teachers and other school personnel in 23 elementary schools were surveyed using a Likert scale about the impact of having a child with a chronic condition in the classroom. The six chronic conditions identified were: AIDS, asthma, congenital heart disease, diabetes, leukemia and epilepsy. In disease-by-disease comparisons, AIDS and epilepsy were seen as having more impact overall than any of the other chronic health conditions (all P values <.01). Educators especially had concerns about epilepsy, and felt that students with epilepsy needed the most special attention from teachers.

Barrett (2001) evaluated the effectiveness of a nurse-led educational intervention for 324 teachers on their knowledge of and anxiety about management of children having health emergencies. Specifically, breathing difficulties, seizures, and choking were identified as the most common health emergencies seen by these subjects. A quasi-experimental design was employed using two non-equivalent groups. The hypothesis was that teachers in the treatment group would demonstrate greater knowledge and lessened anxiety than those in the control group. Results showed a statistically significant difference between the two groups, indicating that the treatment group experienced a greater decrease in anxiety and a greater increase in knowledge than the control group. The study supported the hypothesis, and anxiety remained lowered 4 months after the intervention.

Child Neurology Process Oriented Triage

The Healthy Learner Model (HLM) emphasizes partnerships linking providers, families, and schools. These linkages are imperative to optimize student health and school performance, making them healthy learners (Erickson, Splett, Mullett, & Heiman, 2006). The HLM offers a

framework for schools and the community to ensure that students with chronic health conditions are healthy, attend school, and are ready to learn.

The Child Neurology Curriculum for School Nurses was derived from the Child Neurology Telephone Encounter Guides (Sprague-McRae, Rosenblum & Morrison, 2009). These Guides employ the Process Oriented Triage conceptual model. The two models (HLM) and Child Neurology Process-Oriented Triage (ChiNePOT) complement each other. (see Figure 2) The HLM answers the question: *Why* is this curriculum necessary? The ChiNePOT answers the question: *How* is the curriculum best presented?

Triage has historically been defined as a) the sorting of and allocation of treatment to patients and especially battle and disaster victims according to a system of priorities designed to maximize the number of survivors, and b) the sorting of patients (as in an emergency room) according to the urgency of their need for care (www.merriam-webster.com). In the context of this project, the concept of “triage” is modified. The context refers to non-acute systematic, multi-dimensional and multilevel data collection which requires review of symptoms, identification of priorities and development of interventions when caring for children with neurologic problems. Process Oriented Triage is a structural format, thought process, or framework for the teaching and learning of disease-specific information, and developing action plans linking health care providers, families, and the school. Merging process and content in a global way allows for adaptability in a variety of patient care settings. The Process Oriented Triage Model lends itself to chronic condition management, in concert with the HLM. The three elements of ChiNePOT are: knowledge, skill, and judgment. A thorough knowledge base is required to understand and synthesize pathophysiologic and pharmacologic elements of care. Skill at data collection from the patient or parent, and other health professionals, is also central in

employing this model in this context. Clinical judgment is the final overriding principle of the Process Oriented Triage Model. Knowledge and skill are crucial but the practitioner must also appropriately interpret data to swiftly render safe, effective care. This combination of knowledge, skill and judgment ultimately enhances the child's potential to be a healthy learner.

Implementation Plan

Purpose and Research Question

The purpose of this project is to develop a child neurology curriculum for school nurses consisting of annotated Power Point® lectures and then to measure the effectiveness of the curriculum. School nurses who have been taught the content will:

- 1) demonstrate increased knowledge of etiology, epidemiology, and treatments for common neurologic conditions, 2) report increased confidence in clinical judgment when caring for students with common neurologic conditions, and 3) demonstrate leadership in the use of evidence-based practice to foster healthy learning for students.

Seizures/epilepsy, headaches/migraines, tics, and post concussion management were the areas of concentration throughout this project. A needs assessment survey was developed by this researcher to obtain demographic and other pertinent data, including the school nurses' greatest concerns and questions with the child neurology population.

Research Design

A predictive correlational design was used in this project. This design facilitated identification of many interrelationships in a situation in a short time. It predicted the value of one variable based on values obtained from another variable (Burns & Grove, 2009). This study provided a curriculum to be taught and interventions to be implemented.

Population and Sample

School nurses were recruited through convenience sampling to complete the survey. This population was easily accessible and interested in the topic being studied. Convenience sampling may be biased due to self selection. Nurses were invited to participate in the project at various local school nurse meetings in Northern California. Flyers and email invitations were circulated to elicit interest and participation. Participation in the project was voluntary without compensation. Approval from the Institutional Review Board at the University of San Francisco was requested and waived.

Methods and Procedures

Subjects (n=31) were directed to surveymonkey.com for access to the Needs Assessment of Child Neurology Topics for the School Nurse survey (see Appendix A). The survey is a 15 question tool consisting of multiple choice questions and Likert scales, with room for narrative responses. Reliability and validity were not determined through pilot testing although the tool was reviewed by experts in the field. Tool development was completed by this researcher. Protection of human subjects and human subject data took place inherently via surveymonkey.com (Surveymonkey. com, 2009).

Survey data was easily downloaded into a spreadsheet and database format from the online server. Descriptive statistics were used including frequency distributions and raw percentages to examine data. Demographic data was obtained and analyzed. A consulting statistician was hired to perform specific statistical analyses. Additionally, qualitative data derived from narrative comments was tabulated and analyzed.

Intervention

This researcher developed and had planned to present the Child Neurology Curriculum for School Nurses to nurses in the Bay Coast Chapter of the California School Nurse Organization (CSNO). However, during Fall 2009, school nurses were consumed by preparing for and responding to H1N1 influenza. Future plans include teaching the school nurse curriculum to nurses in the local area and then expanding state-wide at the CSNO conference in Spring 2010. Lectures will be offered to school nurses on the curriculum content accompanied by the annotated PowerPoint® to encourage self study. Additionally, participants will receive a copy of the Child Neurology Telephone Encounter Guide as part of the educational package. A post- intervention survey will given to all participants with questions regarding comfort and confidence with the subject matter in general AND concerns that were specific to each content area. Additionally, subjective information will be queried including assessing acquired knowledge, increased comfort with topic, change in behavior, e.g. “Do you know more now than you did before about this topic?” The annotated PowerPoint® presentations vary in length but include approximately 40-60 slides each.

Results

Thirty-one school nurses responded to the needs assessment survey. The average participant had been a nurse for over twenty-five years and a school nurse for 11 years. Sixty-two percent of participants held a BSN, with 44% having a Master’s degree in nursing. No participants were doctorally prepared. Most respondents had school nurse assignments in elementary schools (n=18), others in middle or high schools, and some through the County Office of Education. When queried about the most commonly seen neurology related diagnoses in their school setting, seizures (80.6%), ADD/ADHD (80.6%) and autism (45.2%) were

identified. Nurses who responded to the survey identified that students contacting them regarding *symptoms* as a common occurrence. It was reported that many concerned with a child's symptoms turned to the school nurse for a first contact. Medication questions and administrative issues in general (documentation, clarification of orders) were also identified as frequent reasons for contact.

The school nurses identified the MD as the child neurology provider with whom they have the most contact (51.6%); RN's and mental health providers came next. School nurses rarely interfaced with nurse practitioners (6.5%), and 6.5% of respondents stated that they do not interface with any child neurology provider. School nurses were neutral when responding to a question regarding ease or difficulty in obtaining information from the child neurology provider. School nurses identified the following as being useful to their practice: Improving their knowledge base (72.2%), becoming more knowledgeable/comfortable when talking to parents (70%), increase student and parent satisfaction with care at school (70%), increasing comfort level with child neurology diagnoses (55%), and improving general assessment skills (56.3%). School nurses identified in-person lectures/slide presentations as the best way to acquire educational content, although the other options offered were also identified as being useful (online study or learning modules, written information in handbook form including case studies, and formal educational conferences). (See Appendix B)

Discussion/Evaluation

Quantitative survey results indicated that seizures, ADD/ADHD, and autism are the most commonly seen neurology related diagnoses, with developmental delay/intellectual disability and headaches also fairly common. When considering the frequency with which concussions and head injuries occur, particularly related to school sports, the low incidence identified by the

respondents was surprising. This may be explained by the demographics of respondents, most of whom work in the elementary setting rather than middle or high school. Additionally, some nurses were employed by the County Office of Education. It is less likely that this population participates in concussion-causing contact sports than a general secondary school population.

School nurses are frequently contacted by other school personnel (attendance clerks, truancy officers, etc.) regarding a student's attendance. Teachers contact school nurses about behavior and school performance, and parents commonly contact the school nurse about medication administration issues. Interestingly, nearly 90% of survey respondents identified that students came to them with questions about *symptoms* of their condition. A surprising finding is that 50% of nurses who responded stated that they interface with the MD provider most, rather than a nurse practitioner. Several respondents identified RN's and mental health providers as frequent contacts, and 6.5% stated that they do not communicate with any child neurology provider. It is unclear whether this is due to lack of availability or lack of need. Correspondingly, 43% of respondents identified "neutral" as the response to ease or difficulty in obtaining information from a child neurology provider. But another 36.6% identified it as being "difficult" or "very difficult" to obtain information.

Respondents to this survey are eager for further information in this clinical area. Many stated interest in: improving their knowledge base, increasing knowledge when talking with parents, increasing satisfaction with school nurse services, improving their general assessment skills, and increasing their comfort with child neurology diagnoses. When respondents started in their school nurse role, most (74%) acquired knowledge about child neurology diagnoses by reviewing the literature, receiving on the job training, and attending continuing education conferences. The nurses also identified that a collection of educational material focusing on

assessment, evaluation, and management of common child neurology conditions would be helpful for their current role. This is in addition to an overwhelming need they expressed for inservice sessions on pertinent topics by experts, and care and case management training. Professional organization (CSNO, NASN) practice guidelines were also identified as being somewhat valuable.

These findings complement the goals of the Healthy Learner Model for Student Chronic Condition Management. The HLM is an integrated, coordinated effort to optimize the health status and support the academic success of children with chronic conditions. The professional school nurse uses evidence based practice as is provided in the Curriculum, and in conjunction with the healthcare provider and family works to create high quality care and positive outcomes for students with chronic conditions (Erickson C. D., Splett, Mullett, Jensen, & Belseth, 2006) . The three elements of the ChiNePOT model are: knowledge, skill, and judgment. A thorough knowledge base is required to understand and synthesize pathophysiologic and pharmacologic elements of care. Skill in data collection from the student or parent, and other health professionals, is also central in employing this model in this context. Clinical judgment is the final overriding principle of this model. Knowledge and skill are crucial but the practitioner must also appropriately interpret data to render safe, effective care. This combination of knowledge, skill and judgment ultimately enhances the child's potential as a healthy learner.

Although this survey and project add to the knowledge base of school nurses, limitations are present in this study. These include a small sample size and a sample from one geographic area in one state which limits the ability to generalize the information obtained to school nurses in other areas of the state or country. Another limitation occurred due to H1N1 influenza affecting this researcher's ability to implement the curriculum to school nurses. At this writing,

school nurses are consumed with an influenza epidemic that is postponing other responsibilities and opportunities for education. Preliminary informal feedback has been favorable; however data regarding the usefulness of the curriculum has not been obtained.

Conclusions

In summary, the needs assessment survey confirmed that providing educational offerings to school nurses are needed and welcomed. . The purpose of this project was to develop a child neurology curriculum for school nurses. Prior to development and distribution of the survey, this researcher had identified four areas of need for further education and training of school personnel. These areas had been identified from the researcher's 10+ years as a nurse practitioner in pediatric neurology as the conditions which most frequently elicited questions from parents and school nurses. Seizures/epilepsy, headaches/migraines, tics, and post concussion management were areas of concentration for this project. [Although autism and Asperger's Syndrome were also strongly identified as being areas of high educational need, the researcher chose not to include those topics for curriculum development due to ongoing controversy regarding current methods of diagnosis and treatment.]

General themes arising from this survey and curriculum development include the ongoing need of school nurses for useful evidence-based research to guide their practice. This research enhances nurses' leadership skills which ultimately leads to healthier learners. Factors to consider when implementing this curriculum include three elements. Feasibility or "buy-in" by health service managers in local and statewide school districts. Evaluation of this element includes: Who is the student population that will benefit? Who are the school nurses that will benefit from this information? How is the information best presented? Also, questions of cost must be addressed. Who will be financially responsible for purchasing the PowerPoint

curriculum and accompanying Child Neurology Telephone Encounter Guide? How will content be reviewed and revised in order to maintain the current evidence-based integrity of the curriculum and Telephone Encounter Guide's? Last, the juxtaposition of both elements above – how is cost effectiveness of these interventions best determined? Future plans include implementation of the Curriculum locally and then expanding state-wide beginning at the CSNO conference in Spring 2010. School nurses will attend lectures on the content along with the annotated PowerPoint® slides for self-study. Additionally, participants will receive a copy of the Child Neurology Telephone Encounter Guide as part of the educational package. A post-intervention survey will be given to all participants with questions regarding comfort and confidence with the subject matter in general AND questions that were specific to each content area. Subjective information will be queried including assessing knowledge, increased comfort with topic, change in behavior, e.g. Do you know more now than you did before about this topic? Determination of actual cost effectiveness, an often elusive pursuit, will be addressed.

Recommendations for future expansion of this project include broadening the content areas. Areas to consider may include autism, Asperger's Syndrome and developmental delay. Children in schools are continuing to need expert, sophisticated care from highly skilled professional nurses. Demands on schools and school nurses continue to increase with increased technology and complex medical treatments. The purpose of this project was to assess the need for -- and then to develop -- a child neurology curriculum for school nurses that will aid in offering optimal care to students with child neurology diagnoses while they are at school.

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Figure 1 Healthy Learner Model

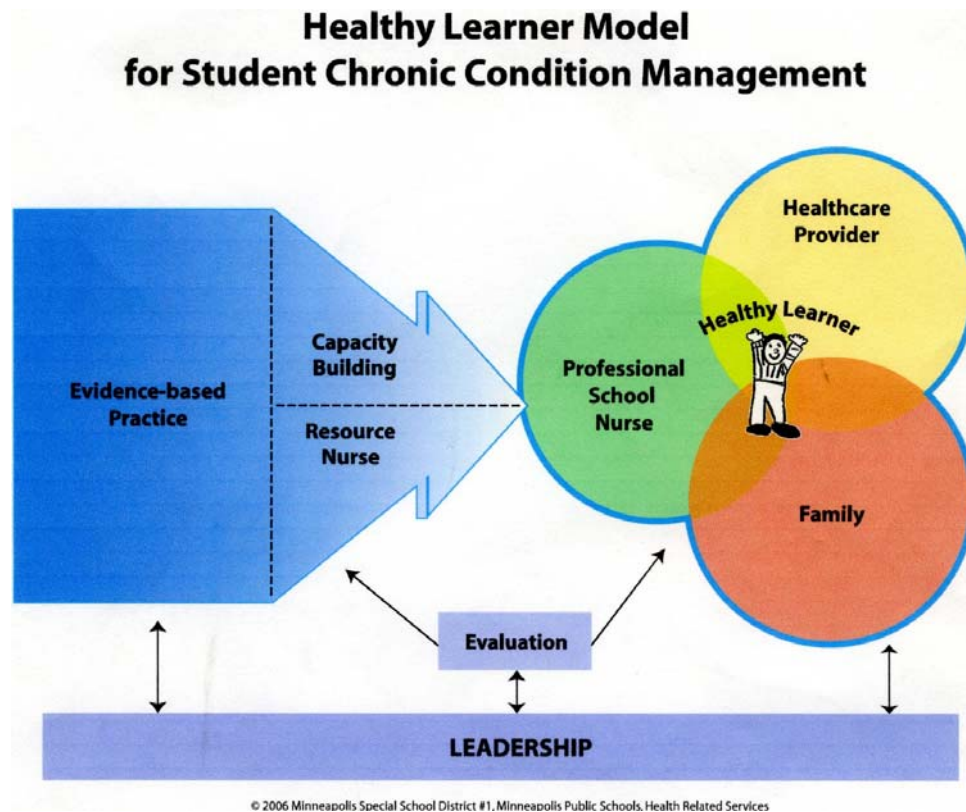


Figure 1. The Healthy Learner Model for student chronic condition management. The aim of this model is to enable students with chronic conditions to be healthy, in school, and ready to learn. Copyright 2006 Special School District #1, Minneapolis Public Schools Health Related Services (Used with permission).

Figure 2 ChiNePOT

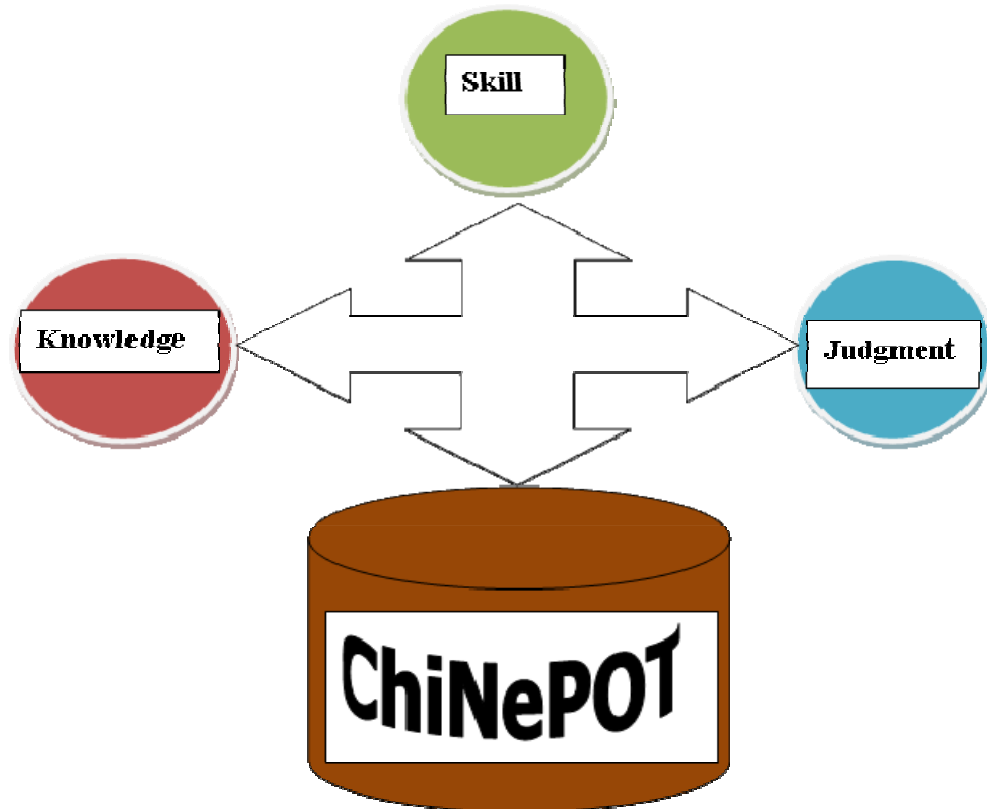
**Rosenblum & Sprague-McRae 2009**

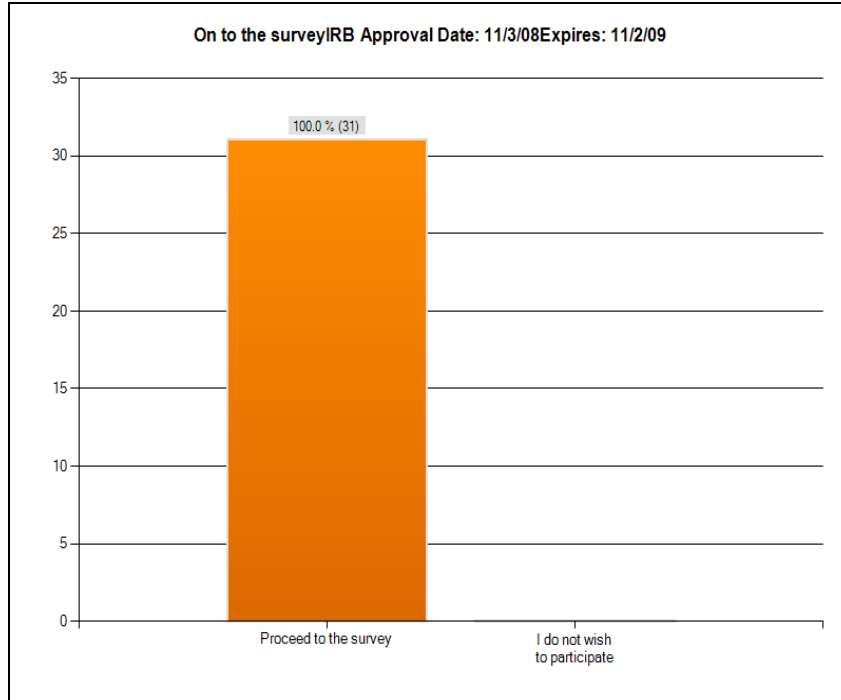
Figure 2. The Child Neurology Process Oriented Triage Model combines a thorough knowledge base, skill at data collection, and clinical judgment to appropriately interpret data and render safe and effective care. Copyright 2009 Rosenblum and Sprague-McRae. Used with permission.

Appendix A (see attached)

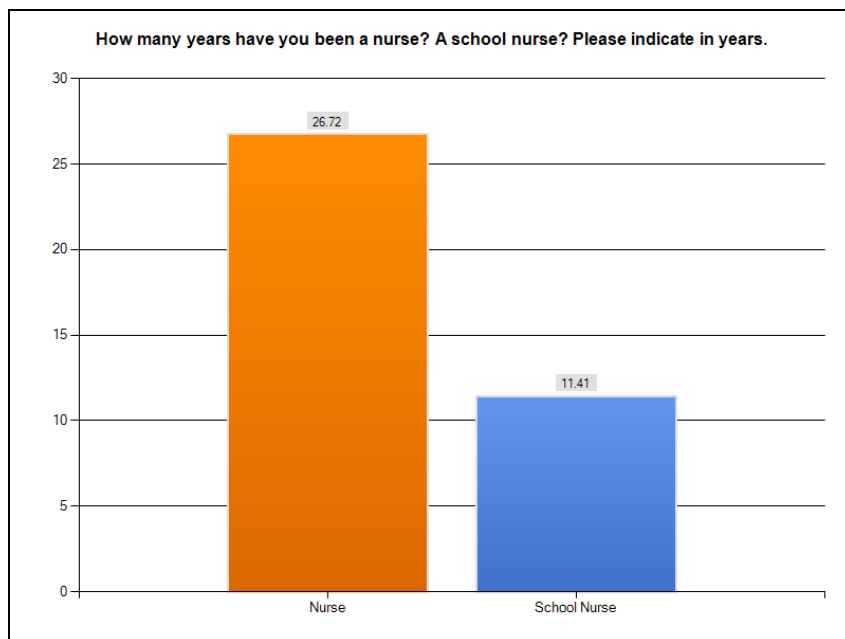
Needs Assessment of Child Neurology Topics for the School Nurse

Appendix B

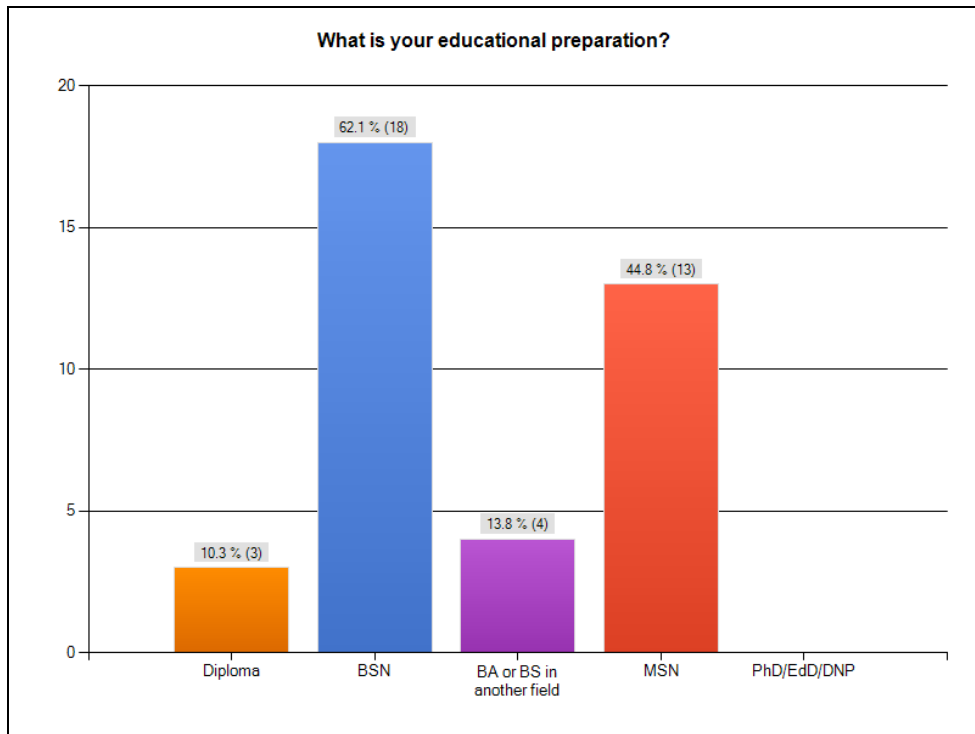
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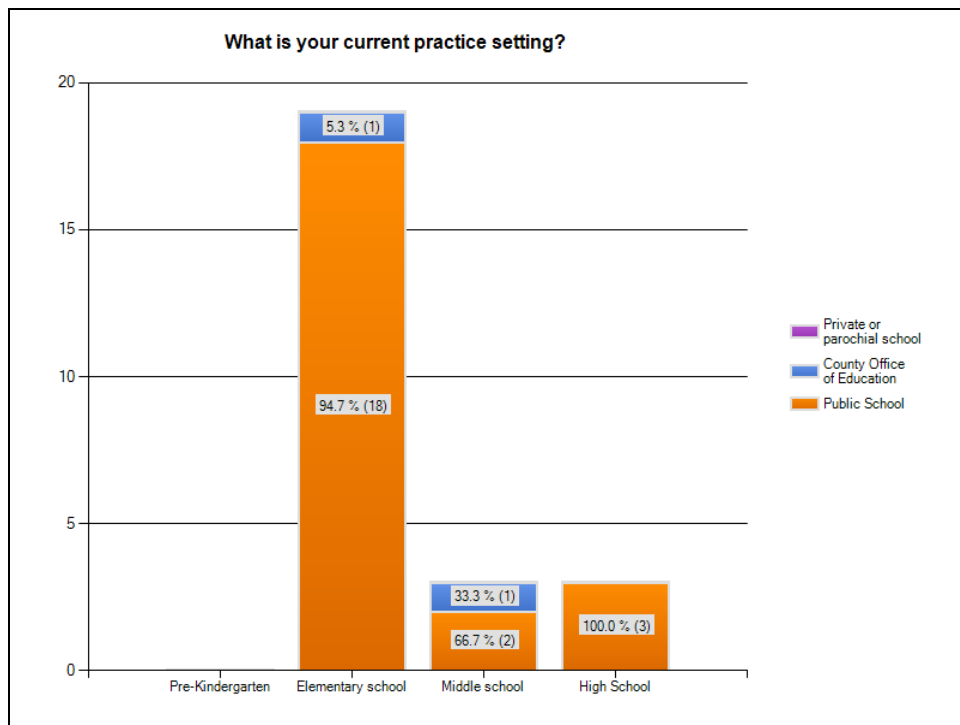
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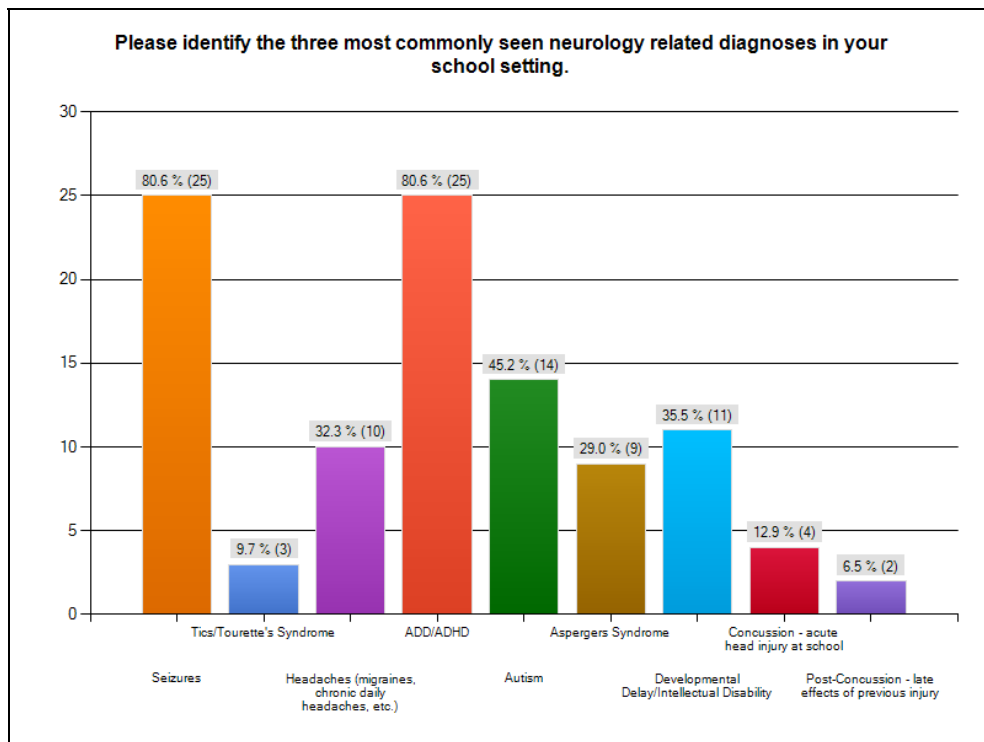
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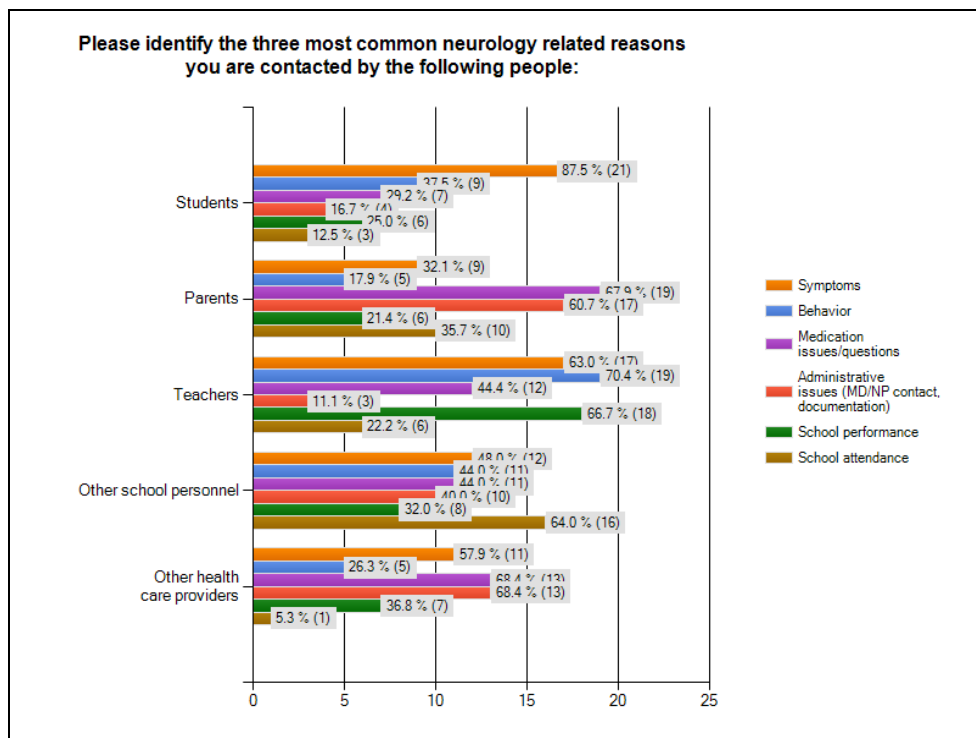
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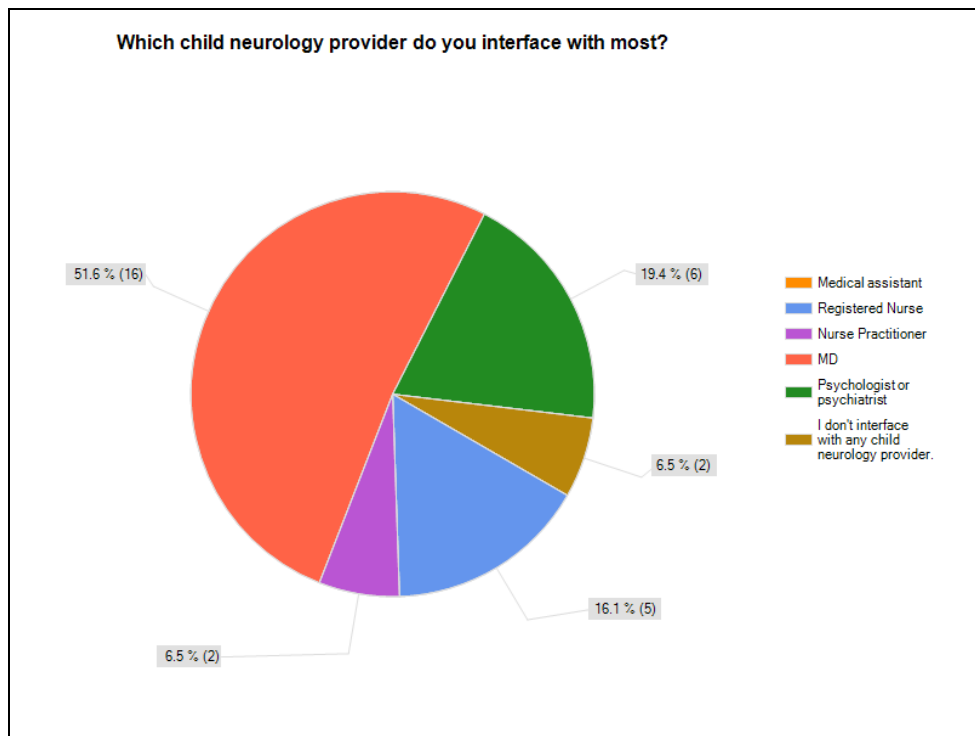
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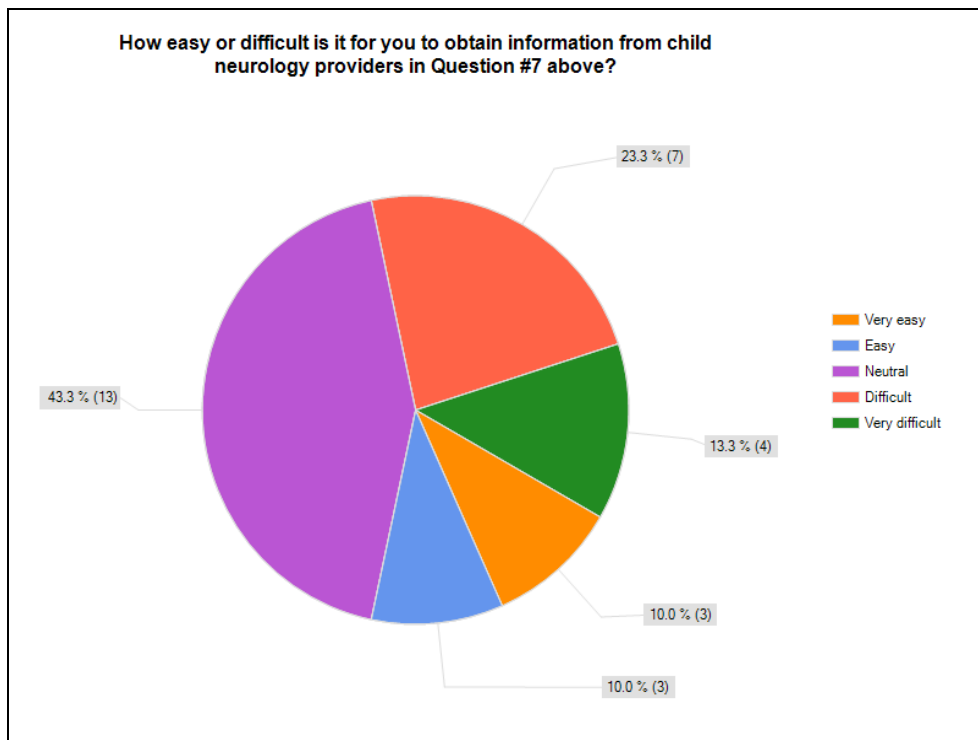
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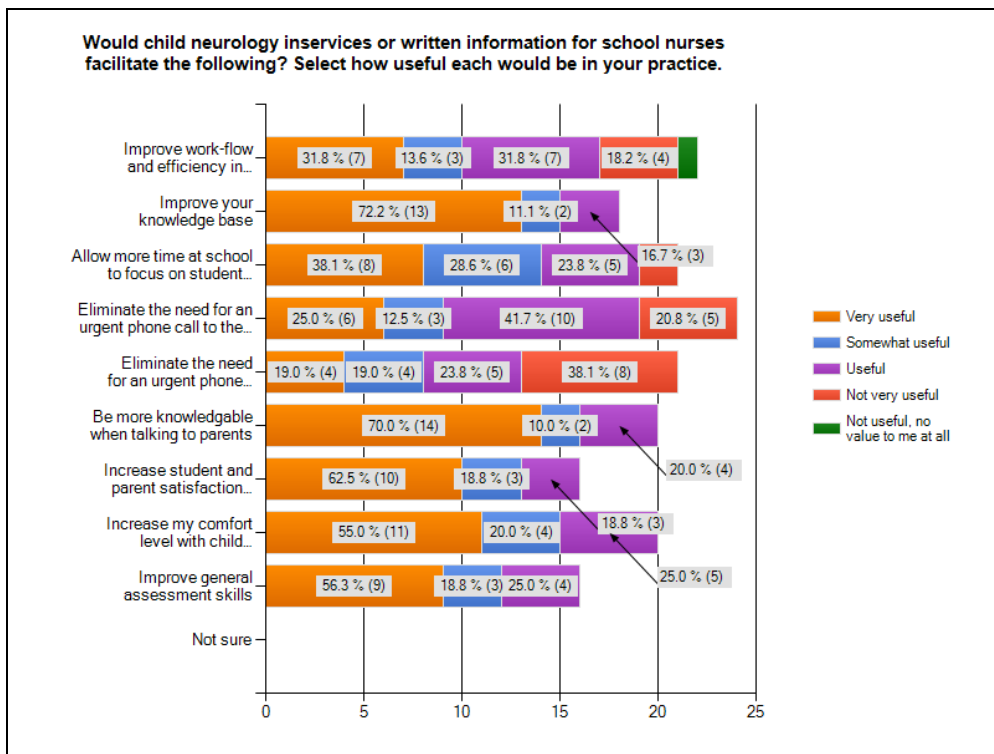
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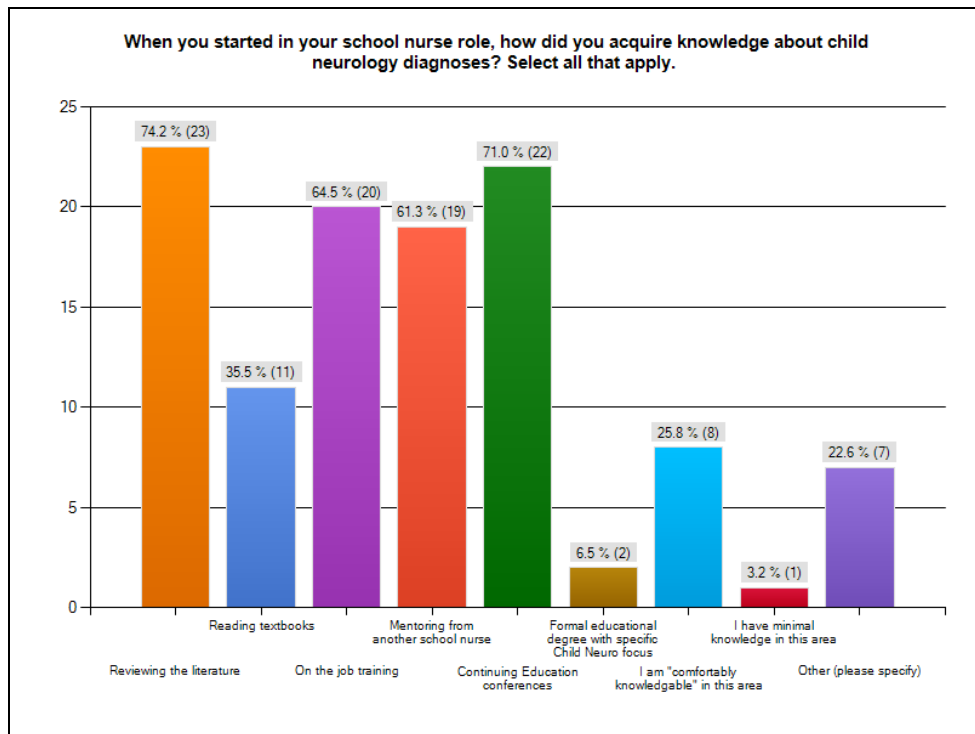
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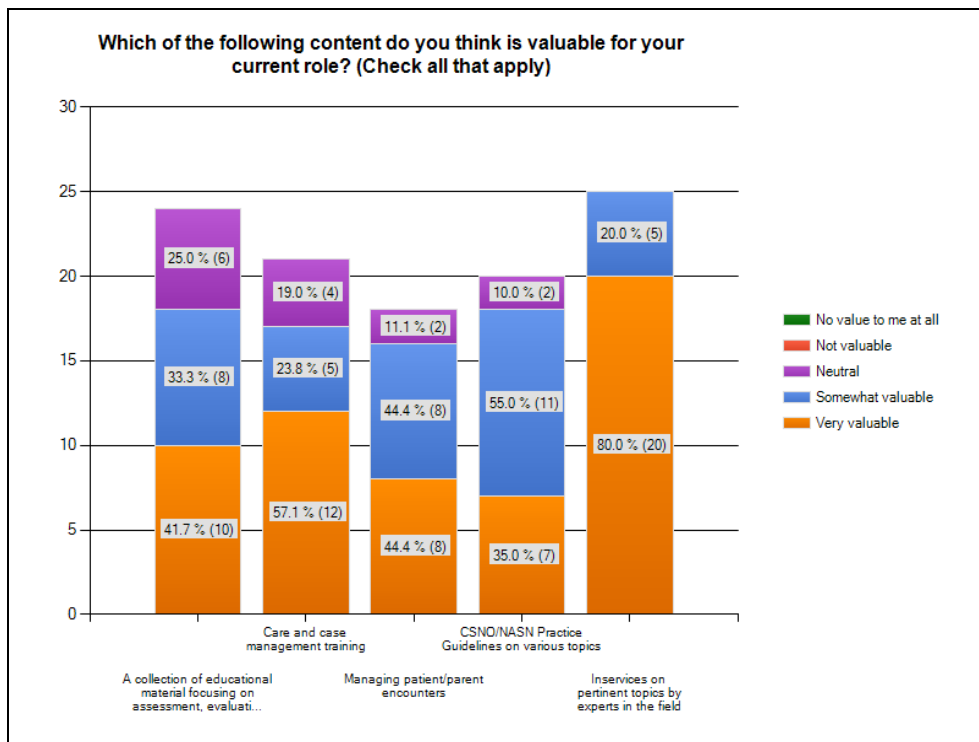
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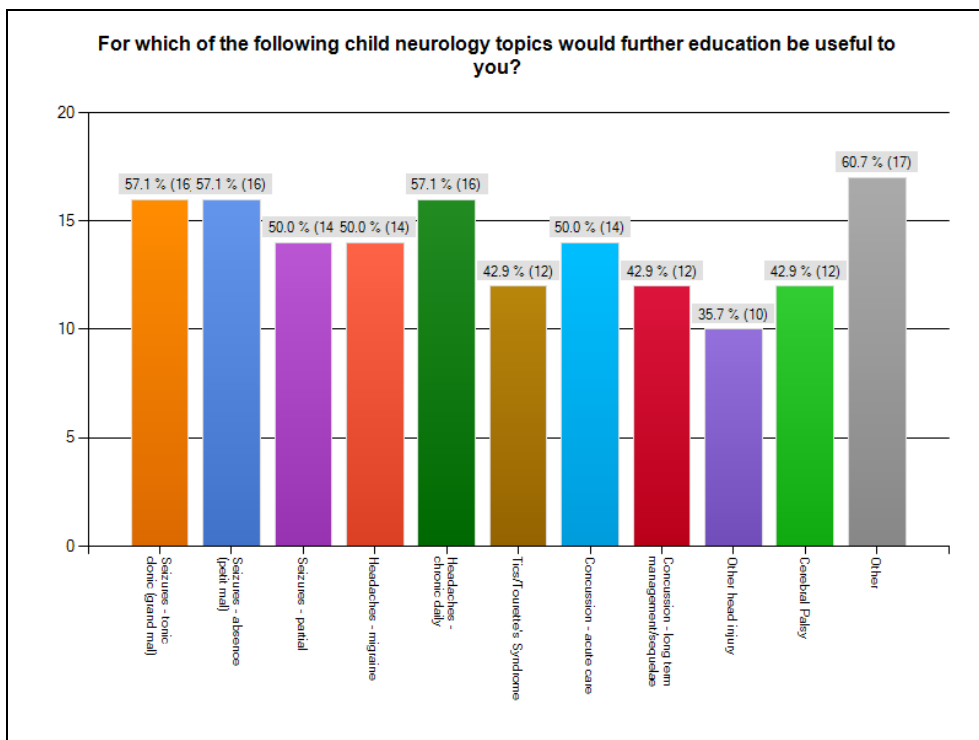
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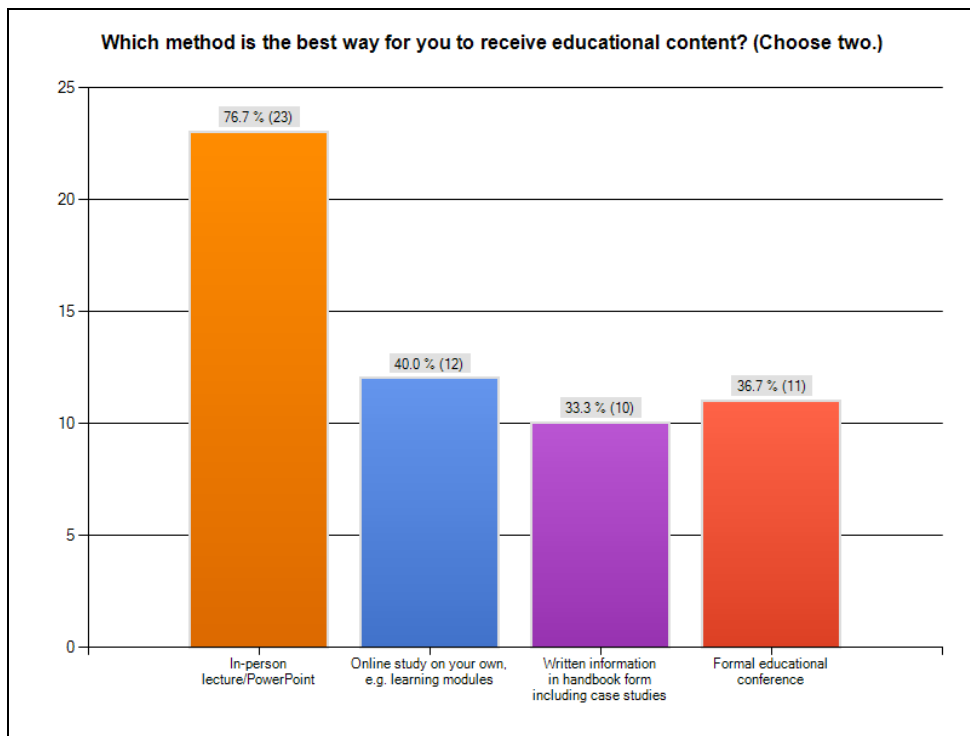
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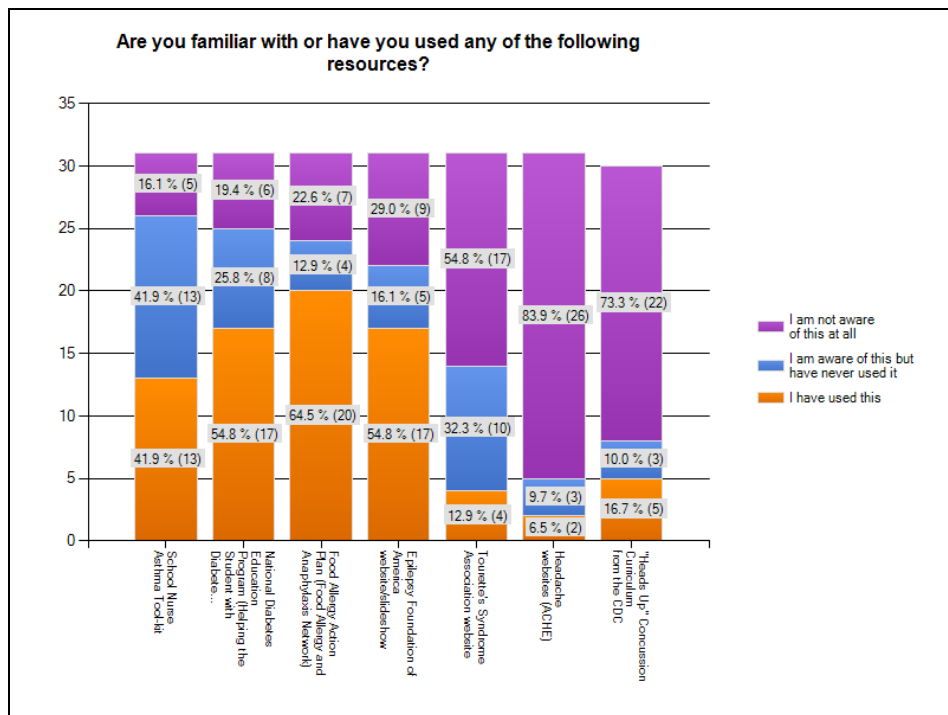
Question 12



Question 13



Question 14



Appendix C

(See Epilepsy, Headache , Post-concussion, and Tic documents)

Power Point References

Healthy Learner Model

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