Type 1

School Nursing Evidence-Based

Clinical Practice Guideline: Students with Type I Diabetes

National Association of School Nurses

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School Nursing Evidence-Based Clinical Practice Guideline: Students with Type I Diabetes

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Rationale

There are four general categories of diabetes: type 1 diabetes (T1D), formerly known as juvenile onset diabetes or insulin-dependent diabetes; type 2 diabetes (T2D), formerly known as adult-onset or noninsulin-dependent diabetes; gestational diabetes; and other specific but less common types of diabetes such as maturity-onset diabetes of the young and neonatal diabetes (American Diabetes Association [ADA], 2020). While there is some overlap in care and treatment modalities, the pathophysiology differs; therefore, this Clinical Practice Guideline (CPG) focuses only on students (prekindergarten to 12th grade) with T1D.

In T1D, the body's immune system attacks the beta cells where insulin is produced, usually leading to complete insulin deficiency. Individuals with T1D must begin exogenous insulin treatment as soon as insulin production is deemed insufficient. Insulin facilitates cellular glucose uptake and regulates carbohydrate, lipid, and protein metabolism which is needed to survive (Chan et al., 2021). Diabetes results in increased blood glucose levels which is a risk for microvascular and macrovascular complications. The specific causes of T1D are thought to be a combination of environmental and genetic factors.

T1D is a common chronic childhood disease and auto-immune disorder which destroys the insulin producing beta cells in the pancreas (Chan et al., 2021). Without sufficient insulin production by the pancreas, children with T1D are dependent on exogenous insulin their entire lives. T1D is diagnosed by an elevated fasting plasma glucose concentration, 2-hour plasma glucose during a glucose tolerance test, glycosylated hemoglobin (A1C) criteria, and/or the presence of two or more autoantibodies (ADA, 2020). Failure to treat and manage T1D can lead to serious adverse health outcomes, including death (American Association of Diabetes Educators [AADE], 2019). In 2019, diabetes (from all types) was the 7th leading cause of death in the U. S. (Centers for Disease Control and Prevention [CDC], 2021) and the direct cause of 1.5 million deaths globally (World Health Organization, 2021).

Approximately 1,110,100 children and adolescents 0-19 years are estimated to have T1D globally, with an estimated 128,900 new cases annually (International Diabetes Federation, 2019). Within the U.S., analysis of data from 2002 – 2015 shows that the overall incidence of T1D increased by 1.4%, with the greatest increased rates in white males, aged 10-14 years. Racial and ethnic minorities demonstrated larger rises in the incidence of T1D per year as compared to Whites (0.7%): Blacks (2.7%), Hispanics (4.0%), and Asians and Pacific Islanders (4.4%) (Divers et al., 2020).

Roughly a third of all new T1D diagnoses present with life-threatening diabetic ketoacidosis (DKA) (ADA, 2020). Additionally, several researchers have found DKA to be one of the most common reasons for emergency department (ED) visits, especially among youth with new onset T1D (Agency for Healthcare Research and Quality (AHRQ), 2016; Maahs et al., 2015; Park et al, 2012). The mean hospital cost of a pediatric DKA admission in U.S. youth is estimated at $7142 per admission, contributing to a pediatric DKA burden to society of approximately $90 million annually (Maahs et al., 2015).

Also alarming is the increased use of the ED by youth with T1D who are insured by Medicaid. Park et al. (2012) reported a statistically significant higher frequency of visits by youth insured by Medicaid compared with commercially insured children. The data do not explain the difference; however, charts of the Medicaid insured children were less likely to identify a primary care provider than the charts of commercially insured children.

Chronic diabetes-related disease complications — such as neurologic, ophthalmic, peripheral vascular, renal, and cardiac — are directly linked to 4% of all premature deaths and reduced quality of life (ADA, 2018; Wou et al., 2019). The cost burden of diabetes in the U.S. in children younger than 18 years is estimated to be approximately $7510 per person, and the overall cost of diabetes in the U.S. is estimated at $327 billion (ADA, 2018). Additionally, the costs associated with diabetes are predicted to grow due to changes in healthcare use, technology, and medical costs (Boyle et al., 2010; CDC, 2020; Wou et al., 2019).

It is critical that a safe and supportive environment exists in schools for students with T1D to self-manage their disease, achieve optimal glycemic stability, and proactively plan and implement risk reduction strategies to minimize actual or potential diabetes-related complications. The ADA and the Association of Diabetes Care & Education Specialists (ADCES), formerly known as the AADE, support the concepts of person-centered care of students with T1D by emphasizing student and family empowerment to optimize health outcomes and quality of life (AADE, 2019; ADA, 2020).

The literature demonstrates that children with T1D experience multiple challenges in school that may place them at an increased risk for diabetes-related complications. Examples of these challenges include lack of access to school nurses and trained school personnel, blood glucose monitoring and insulin administration, access to supplies and snacks, and full participation in all school activities (Agwu et al., 2020; Ellis et al., 2019; Eriksen et al., 2020; Fried et al., 2020; Wilt, 2020). Some children with T1D may experience stress, depression, increased absenteeism, decreased academic performance, and decreased quality of life when compared to their peers without T1D (Bleich et al., 2018; Leroy et al., 2017; Oakley et al., 2020). Youth with T1D may also experience diabetes distress, a measurable construct of depression-like symptoms that is specific to the burden of managing their diabetes (Hood et al., 2018). Diabetes distress can be mitigated through the promotion of resilience in students with T1D through both structured and informal interventions (Hood et al., 2018; Iturralde et al., 2019; Lord et al., 2015; Rohan et al., 2015). These challenges have the potential to contribute to increased healthcare costs as well as poor health and academic outcomes for the student with T1D.

Children with T1D spend 6-10 hours a day in school. Effective T1D management is integral to their short- and long-term health. The child with T1D requires multifaceted school nursing care and resources such as blood glucose monitoring, administration of insulin, treatment of hypoglycemia and hyperglycemia, coordination of care for school activities, training of back-up school personnel, psychosocial support, and self-care management monitoring (Agwu et al., 2020; Charleer et al., 2020; Knight & Perfect, 2019; Kobos et al., 2020; McCollum & O'Grady, 2020). In addition to direct care of the student with T1D, the school nurse has a critical role in collaborative care among the student, family, medical healthcare team, and school healthcare team. Diabetes resilience comes from strengths such as adaptive processes, behaviors, and attitudes that facilitate achievement of resilient outcomes when faced with disease-related challenges. For youth with T1D, these include supportive family communication, collaborative parent/caregiver involvement, diabetes self-efficacy, and adaptive problem-solving skills (Hilliard et al., 2017).

School nurses provide leadership in the school setting to support diabetes resilience and student self-management. CPGs support the school nurse in providing and coordinating standardized safe and effective care. This CPG will provide evidence-based practice (EBP) recommendations and resources for school nurses; contribute to improving and implementing diabetes-related school policies; and ensure that children with T1D have the same opportunities for academic success and full participation in school activities as their peers without T1D.

Purpose

The purpose of this CPG is to give the school nurse working with students in grades pre-K-12 who have T1D EBP recommendations for quality care. The focus of the Guideline is on keeping the student in the classroom and achieving glucose goals/targets and glycemic stability through risk-reduction measures. The student with T1D should participate fully in all academic, physical education, and extracurricular activities.

This Guideline includes practice recommendations and strategies to assist school nurses in their role of improving the health and safety of the school-age child with T1D. Student goals resulting from successfully implementing the guidelines include:

- improved management of T1D
- decreased time spent out of the classroom
- improved student academic success
- full participation in all school activities
- decreased hospitalizations
- improved quality of life
- improved mental well being

The care of students with T1D is multifaceted and is done in collaboration with the student, family, medical healthcare team members, and the school healthcare team. Specific treatment regimens established by the medical or school healthcare teams will not be discussed in detail within this Guideline. Therefore, recommendations are not given for monitoring of adherence, frequency of measurement, or assessment of impact. Rather, this Guideline is intended as an overview to guide school nurses in implementing provider-developed treatment regimens, as well as applying nursing judgment based on students' individual needs. Implications specific to complex treatment regimens are beyond the scope of this CPG. In addition, this Guideline outlines steps specific to T1D. Other activities carried out by the school nurse for students with chronic conditions should still be completed but are not included in this Guideline. For example, such activities may include assessing and addressing student developmental stage, cultural practices, social determinants of health, developing student/family goals, and providing student-specific education/empowerment (AADE, 2019; Alvar et al., 2018; Braveman et al., 2017; Cooper et al., 2016; Kise et al., 2017; Patrick & Wyckoff, 2018; Ratterman et al., 2021).

Methodology

The *School Nursing Evidence-Based Clinical Practice Guideline*: *Students with Type I Diabetes* was developed according to the NASN *Model for Developing School Nursing Evidence-Based Clinical Practice Guidelines* (Shannon & Maughan, 2020).

This Guideline is intended as a decision-making tool to guide school nurses in implementing the most recent, evidence-based practice recommendations as of the date of publication. The results of future studies may require revisions to this Guideline to reflect new scientific data. The advancement in knowledge may be faster than the guidelines can be updated.

This Guideline is not intended to create a rule or legal standard of care, nor should it be interpreted as encouraging, advocating, requiring, or discouraging any particular treatment. All decisions regarding care of students should be made by the healthcare team, family, and student in consideration of the student's particular health and circumstances, clinical presentation, and authorized policies. Clinical decisions involve the application of nursing judgment to the student's condition and available courses of action.

Neither NASN nor its officers, directors, members, employees, or agents will be liable for any loss, damage, or claim with respect to any liabilities — including direct, special, indirect, or consequential damages — incurred in connection with this Guideline or reliance on the information presented in it.

Definitions and Abbreviations of Terms

504 Plan: Plan developed under Section 504 of the Rehabilitation Act of 1973. This federal legislation guarantees certain rights to people with disabilities. This was one of the first federal rights laws offering protection for individuals with disabilities. It set precedents for the Americans with Disabilities Act of 1990. A 504 Plan is a plan developed to ensure that a child who has a disability identified under the law receives accommodations to ensure their academic success and access to the learning environment. A 504 Plan specifies the actions the school will take to keep the student with diabetes medically safe and ensure the student has the same access to education as other children and is treated fairly.

A1C: Also abbreviated as HbA1c, hemoglobin A1c, A1c, HgbA1c, Hb1c. Measures glycated hemoglobin, a form of hemoglobin that is chemically linked to a sugar. A1C is measured to determine the two- to three-month average BG level as an assessment of glycemic control in individuals with diabetes.

Appropriate Treatment or Care: According to evidence-based best practice and/or current standards of care.

Basal Insulin Rate: A continuous flow of background insulin delivered in units/hour via CSII to treat automatic glucose produced by the liver between meals. The basal rate delivered during the day can vary from the basal rate delivered during hours of sleep and is calculated and ordered by the HCP.

BG: Blood glucose. Blood sugar, or blood glucose, is the main sugar found in blood. Blood carries glucose to the body's cells as the main source of the body's energy. As many students use interstitial sensor glucose readings, the term blood glucose level may be replaced by glucose level in the DMMP.

Caregiver: Responsible adult who looks after a child under the direction of a parent or guardian.

CGM: Continuous glucose monitoring. A CGM system works through a sensor inserted under the skin, measuring interstitial glucose levels. The sensor sends information to a monitor or a mobile device that allows sharing of information with family members and the healthcare team. CGM devices typically provide glucose levels and high and low trending arrows at 5-minute intervals. Constant monitoring and the ability to predict hypo- and hyperglycemia before it occurs allows prompt prevention and treatment.

CHO: Carbohydrate. CHOs are found in foods and drinks. CHOs are broken down by the body into glucose. Glucose is the main source of energy for the body's cells. The meal portion of insulin dosing is based on counting grams of CHOs in foods.

CPG: Clinical Practice Guideline.

CSII: Continuous subcutaneous insulin infusion (insulin pump). An insulin pump is a computerized, wearable technology device. It delivers rapid-acting or short-acting insulin through a thin and short tube or cannula inserted under the skin. The premise is to mimic the body's release of insulin continuously (basal) and then provide for an extra bolus of insulin when eating. Insulin pump therapy is most commonly used in conjunction with CGM systems (e.g., hybrid and advanced hybrid systems) that can provide synergism through mechanisms such as autocorrected boluses and automatic or adjusting basal rates.

DIY: Do-it-yourself diabetes technology, often referred to as looping that uses outside resources and materials to create an artificial pancreas. The DIY movement is an outgrowth of diabetes community members frustrated with the lack of accessibility and high cost of FDA approved artificial pancreas systems. There are concerns about safety as the items are not commercially available; nor are they FDA-approved, which may cause increased liability concerns for schools.

DKA: Diabetic ketoacidosis. Serious complication of diabetes when the body has insufficient insulin. The body is unable to use the circulating blood sugar for metabolism and begins to break down fat. The breakdown process results in a build-up of ketones (acids) in the bloodstream. Left untreated, DKA develops. S/S vary but include thirst, frequent urination, elevated BG levels, and ketonuria. Later S/S include fatigue, dry and flushed skin, nausea, vomiting, or abdominal pain, shortness of breath, fruity breath odor and confusion or difficulty paying attention. Students with T1D are tested for ketones per HCP orders when glucose levels are very high, typically ≥ 250 mg/dL.

DMMP: Diabetes Medical Management Plan. Prepared by the student's medical diabetes healthcare team, the DMMP contains the medical orders tailored for each student. The format and contents of the DMMP vary by clinic. Every student with diabetes must have a DMMP in order for treatments to be performed at school.

EBP: Evidence-based practice. EBP utilizes the most current, scientific research available. Research demonstrates that EBP improves the triple aim of improving the delivery of health care, improving patient outcomes, and decreasing costs.

ECP: Emergency care plan. This plan comes from the nurse's care plan (IHP) and is developed by the school nurse using clear terminology that can be easily understood by school personnel and non-medical professionals. The ECP outlines the action steps involved in recognizing and responding to a health crisis.

EMS: Emergency medical services. A system of coordinated emergency medical response and care. Per the DMMP and ECP, emergency medical services (often 911) may be called for events such as severe hypoglycemia, seizures, or unconsciousness.

ED: Emergency department.

Flash Glucose Monitoring: Flash glucose monitoring (FGM), also referred to as intermittently scanned CGM, is a method of glucose testing. Patients have a sensor inserted on their upper arm and a separate touchscreen reader device. When the reader device is swiped close to the sensor, the sensor transmits an instantaneous glucose level, a trend arrow, and an eight-hour trend graph to the reader. Some, but not all, FGM systems have hypo- or hyperglycemia alarms.

HCP: Healthcare provider. Examples include endocrinologist, primary care provider, physician, physician assistant, or nurse practitioner responsible for medical diagnosis and treatment and writing the medical orders.

Hypoglycemia: BG level that is lower than normal and requires treatment to bring BG back into target range. This usually occurs when BG is < 70 mg/dL. S/S vary but include shakiness, nervousness or anxiety, sweating, chills and clamminess, irritability or impatience, confusion, lightheadedness or dizziness, hunger, nausea, pallor. S/S may not be present if the student has hypoglycemia unawareness.

Hyperglycemia: BG level that is higher than normal. The cutoff for hyperglycemia varies by clinic. In people with diabetes, this occurs from not enough insulin, insulin resistance, stress, and illness. S/S vary but include frequent urination, increased thirst, fruity odor to breath, weakness, confusion, and coma. Ketone testing should be performed per the DMMP parameters and referral to EMS for very high readings and altered level of consciousness.

IEP: Individualized Education Program. Developed under the Individuals with Disabilities Education Act (IDEA, 2004), an IEP is created for students with a disability that impacts learning and requires special education services. Students who are eligible have a plan developed in collaboration with the student, family, and educational facility that is a road map of services and supports to ensure academic success for all students in the least restrictive environment. The IEP specifies what the school is going to do to meet the child's individual educational needs.

IHP: Individualized Healthcare Plan, called a nursing care plan in other settings. School nurses develop individualized healthcare plans to meet the needs of students. The plan is developed in partnership with the student and family and incorporates synthesis of the nursing assessment and the HCP medical orders. The plan focuses on meeting a student's health and academic goals (NASN, 2020). It is from the IHP that an ECP and other documents are created.

Insulin Sensitivity Factor: Also called the correction factor. This estimates the amount that BG is lowered by injecting 1 unit of a rapid-acting insulin and can vary for each person. It is related to how sensitive a person is to insulin. This information can be used to create a correction scale or dose that gives information on how much insulin to take for various ranges of high BG levels.

Insulin to Carbohydrate Ratio: An estimate of how many grams of CHO is processed by 1 unit of insulin. This can be used along with CHO counting to estimate how much insulin should be injected for a meal based on the number of CHO contained.

Ketones: When cells don't get the glucose they need for energy, the body burns fats as a secondary source of fuel, producing ketones, which are acids. Ketones may be present with normal and even low glucose levels during illness. See DKA for S/S.

Least Restrictive Medication: A rescue medication that is administered via the least invasive route. For example, glucagon injection administration is invasive while the intranasal route of glucagon is noninvasive.

Medical Healthcare Team: The HCP, along with dieticians, social workers, Certified Diabetes Care and Education Specialist, and others who provide support for youth with T1D.

RCT: Randomized controlled trial. A type of scientific experiment that randomly allocates participants to different groups. The groups are then treated differently (one group receives the intervention, the other group does not [control group]).

School Healthcare Team: The school nurse, school psychologist, school dietician, teacher, and other school personnel who provide support for youth with T1D.

School Nurse: A registered nurse (RN) who works in a school setting.

Severe hypoglycemia: A hypoglycemic diabetes emergency event requiring assistance of another person to actively administer CHOs, glucagon, or other resuscitative actions (ADA, n.d.). This should not be confused with an event in which a younger child needs assistance to ingest CHO for mild hypoglycemia.

SMBG: Self-monitored blood glucose via fingerstick. This is an important tool for understanding fluctuations in BG levels and preventing hypo- or hyperglycemia. Glucose levels should be monitored before meals, with exercise, and with any physical S/S or complaints.

Special Education Services: Free and appropriate education for children with disabilities that is designed to meet their unique needs and is administered by means of an IEP (IDEA, 2004).

S/S: Signs and symptoms. A sign is a health issue that can be observed. A symptom is subjective – something the individual describes but that cannot be observed.

TIR: Time in range. Using CGM data, TIR is the amount of time spent in the prescribed BG target range. The typical target range for adults is 70 mg/dL – 180 mg/dL; this may vary in the pediatric population. The ADA states most people with T1D or T2D should aim for 70% TIR.

UAP: Unlicensed assistive personnel. Other similar terms used include but are not limited to assistive personnel, nursing assistive personnel, trained school personnel, unlicensed personnel, and unlicensed school personnel. In a school setting, this includes but is not limited to teachers, coaches, bus drivers, cafeteria staff, paraprofessional aides, and administrative building personnel. School nurses may delegate diabetes care tasks that do not require nursing judgment to a UAP, in accordance with the principles of nursing delegation and state nurse practice acts. The school nurse facilitates the UAP training and provides ongoing supervision (NASN, 2019; National Council of State Boards of Nursing & American Nurses Association, 2019).

Search and Selection of Relevant Literature

The systematic literature search and selection was conducted according to the steps outlined in the *Model for Developing School Nursing Evidence-Based Clinical Practice Guidelines* (Shannon & Maughan, 2020). Once a body of literature was located, the Clinical Guideline Evidence Decision Tree (Appendix A) was applied to ensure inclusion of only strong, high-quality, relevant evidence. The first step of the decision tree is the application of Quick Filter Criteria: Reputable source? Relevant to population? Applicable to practice? Literature that met these criteria was further evaluated and graded.

The search inclusion criteria included English language, peer-reviewed, academic journals published between January 2015 – June 2021 (dates chosen to capture the current body of evidence). Descriptive studies focusing on the needs of school children with T1D were included for review for EBP. Studies focusing on children outside of the school environment, such as in camps or daycare, were retained as relevant information as management in non-acute settings in the community is applicable to the school environment. Systematic or scoping reviews were included and hand-searched for relevant references. Evidence-based internet sources were included. Gray literature sources such as dissertations, theses, and reports were searched. Additionally, the websites of the CDC, NASN, Joslin Diabetes, JDRF (formerly known as Juvenile Diabetes Research Foundation), ADA, National Diabetes Education Program, National Institute of Diabetes and Digestive and Kidney Diseases, American Association of Clinical Endocrinologists, Association of Diabetes Care & Education Specialists (formerly American Association of Diabetes Educators), and American Academy of Pediatrics were searched to locate toolkits, guidelines, EBP resources, training resources, and expert panel recommendations specific to the care and management of students with T1D. The following criteria were used to determine the appropriateness of inclusion into the literature review: high quality EBP evidence; relevant to school nursing coordination of care of students with T1D; school-based and community interventions for students with T1D; international studies of the pediatric and adolescent population with T1D that have relevance to U.S. school nursing; studies on adolescents and the emerging young adult populations to capture transition of care research and recommendations; studies including students, parents, guardians, or caregivers to represent their view; and systematic reviews that included the adult and pediatric populations. Studies that did not include school-age children, were not relevant to school nursing, involved only the T2D population, or the quality of evidence was poor were excluded.

Using multiple electronic databases (i.e., CINAHL, PubMed, Educational Resources Information Center [ERIC], Nursing and Allied Health Database, APA PsychInfo, Web of Science, Academic Search Premier, OVID, Medline), a search strategy combined the following key word terminologies in multiple combinations using: T1D, or type 1 diabetes, or diabetes mellitus or juvenile diabetes or insulin-dependent diabetes or pediatric diabetes or pediatric T1D, children NOT adults, school health services, school health nursing, school health promotion programs, school nurse, school, CPGs, diabetes guidelines. The search process was aided by the Seton Hall University librarian, who assisted in compiling the total results found and removing duplicate articles. Quick Filter Criteria were applied to the articles and EBP resources. An additional literature search and selection was conducted in June 2021 to capture updated and current scientific literature and EBP resources. See Figure 1 for the PRISMA flow diagram that reports out the results of the literature review (Moher et al., 2009).

Critical Appraisal of Evidence

Two reviewers with expertise in school nursing conducted the initial and subsequent appraisals of the evidence. Sources were appraised and evaluated by both reviewers according to the level, quality, and strength of practice recommendations (see Appendix B for appraisal rating tools). Only sources meeting the specified criteria were included in the final appraisal. Each reviewer added domains of care to each source, which were then compared for accuracy and agreement. Differences of opinion between the reviewers regarding select references were resolved with discussion and a more critical appraisal of the relevant sources until consensus was achieved. The final body of evidence was critically appraised to establish level, quality, and subsequent strength of practice recommendations (Appendix C). A group of experts in diabetes, including practicing school nurses and physicians, reviewed and contributed to the evidence appraisal and practice recommendations. An additional panel, who are experts in clinical guidelines, used the AGREE II Instrument to assess the quality of the Guideline and recommendations for use. Panelist and reviewers provided a declaration of their conflict of interest. The reviews were conducted double-blinded. Selected modifications based on expert panel critical appraisal were incorporated into the Guideline and practice recommendations. NASN also completed an independent review. Reduction of bias and increase in validity were achieved through the aforementioned multiple rounds of reviews conducted by stakeholders with expertise in T1D and CPGs.

Translation into Practice Recommendations

The following practice recommendations are based on the most recent, high-quality evidence to inform professional school nursing care of students with T1D. According to the procedures in the *Model for Developing School Nursing Evidence-Based Clinical Practice Guidelines* (Shannon & Maughan, 2020), recommendations are organized by the following domains of care: academic performance, care coordination, care planning, CPG, education/training, leadership/advocacy, mental health, rescue medication, and technology. Recommendations are specific to T1D and so do not outline cultural, developmental stage, and other contextual factors that must be addressed in each step of the nursing process. Nursing diagnoses examples, both actual and potential, relate to the focus of care identified by the school nurse after critical synthesis of the nursing assessment data and related HCP medical orders. This list is not meant to be all-inclusive; nursing diagnoses should be individualized to meet student and family specific healthcare needs and goals.

Although there is strong evidence surrounding the treatment and management of T1D, research specific to the school setting is limited. The evidence and reviewers indicate students will benefit from the support and safety outlined in these guidelines. It is therefore recommended that the *School Nursing Evidence-Based Clinical Practice Guideline: Students with Type I Diabetes* be adopted into practice. School nurse experience, workload, and resources vary and may influence how quickly these guidelines may be fully implemented and adopted. NASN will facilitate the implementation and adoption of the *School Nursing Evidence-Based Clinical Practice Guideline: Students with Type I Diabetes* to professional school nursing practice through education and ongoing support. Further research that tracks the implementation and outcomes for using guidelines should also be conducted. The Guideline will be available on the NASN Learning Center website free and accessible to all and will be disseminated via NASN education programs and communications. An implementation toolkit will support the integration of these guidelines into practice.

School Nursing Evidence-Based Clinical Practice Guideline: Students with Type I Diabetes Translation into Practice Recommendations

<table>
<tr><th>School Nursing Evidence-Based Practice Guidelines</th><th>Domains of Care</th><th>References by Strength* (A, B, C) (See Appendix B)</th></tr>
<tr><td rowspan="13">ASSESSMENT
In addition to the ongoing nursing assessment conducted by the school nurse for any student with a chronic health condition, the school nurse will also assess for the unique physical, mental, and social information relative to a student with T1D including the
presence of DMMP at least annually;
student health history including frequency of hospitalizations and ED visits;
student access to a medical home and specialized care, including physical access to care and medical coverage annually;
family/caregiver knowledge, engagement, coping, and involvement in caring for the student with T1D;
mechanism or plan for communication with family/caregiver and HCP;
student's level of T1D self-management capabilities (e.g., T1D self-efficacy, resilience, independence, skill mastery);
student target BG target range;
student's target A1C;
student's usual ranges for hypoglycemia and hyperglycemia;
student's pattern of hypo- and hyperglycemia events - including presenting s/s, frequency, and severity;
access/availability of rescue medication (glucagon) for school (including route, dose, expiration date);
physical and social environment that allows students to perform T1D care at their comfort level (e.g., private space, space in classroom, peer education);
risks to student health and safety (e.g., medical co-morbidities, degree of social/family engagement, psychosocial issues, mental health concerns);
impact on educational success (e.g., participation in physical education, attendance, missed class time due to T1D management);
extracurricular activities (e.g., school sports, before and after school programs);
diabetes technology used– student understanding of use, and school nurse self-assessment of understanding the technology; and
school and district policies, protocols, and procedures related to
internet and Wi-Fi capabilities for CSII and CGM real-time data and data downloads,
use of encrypted devices for communicating BG levels to parents/caregivers and HCPs,
the use of diabetes care technologies (e.g., CGM/FGM, CSII),</td><td rowspan="2">Academic Performance</td><td>A: 7, 62</td></tr>
<tr><td>B: 3, 17, 35, 53, 68, 69, 71, 90</td></tr>
<tr><td rowspan="3">Care Coordination</td><td>A: 8, 21, 23, 32, 34, 37, 39, 40, 42, 48, 62, 70, 75, 77, 80, 83-88</td></tr>
<tr><td>B: 2, 12, 14-16, 18, 19, 22, 25, 27, 44, 45, 47, 53, 58, 64-66, 68, 69, 71, 73, 74, 76, 79, 81</td></tr>
<tr><td>C: 63</td></tr>
<tr><td rowspan="3">Care Planning</td><td>A: 8, 21, 28, 29, 32, 34, 42, 52, 62, 70, 75, 77, 80, 85-87</td></tr>
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<tr><td rowspan="2">CPG</td><td>A: 32, 42, 80, 89</td></tr>
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<tr><td rowspan="3">Education/Training</td><td>A: 8, 21, 23, 28, 31-33, 36, 42, 43, 48, 52, 57, 60, 67, 70, 72, 75, 77, 80, 83-87, 89</td></tr>
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<tr><td>C: 11, 63</td></tr>
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<tr><td rowspan="12">

non-FDA approved DIY systems,
diabetes education and training for school staff,
BG monitoring and insulin administration, including access to supplies and appropriate storage,
self-carry of diabetes supplies (e.g., insulin, glucometer, snacks, water),
medication administration,
nursing delegation of diabetes care tasks if permitted by state/local regulations,
plan for diabetes care, including medication administration, in absence of school nurse, and
medical emergency preparedness and response.

</td><td rowspan="2">Leadership/ Advocacy</td><td>A: 20, 21, 32-34, 36, 37, 43, 48, 75</td></tr>
<tr><td>B: 12, 14, 22, 30, 45, 66, 69, 90</td></tr>
<tr><td rowspan="2">Mental Health</td><td>A: 5,6, 21, 26, 32, 62, 80</td></tr>
<tr><td>B: 13, 18, 19, 22, 24, 27, 41, 55, 64, 73, 76, 79</td></tr>
<tr><td rowspan="2">Rescue Medication</td><td>A: 10, 38, 51, 54, 56, 57, 59, 60, 67, 72, 80, 85, 87</td></tr>
<tr><td>B: 50</td></tr>
<tr><td rowspan="3">Technology</td><td>A: 20, 31, 37, 39, 43, 52, 77, 80, 83, 84, 86, 87</td></tr>
<tr><td>B: 9, 15, 16, 35, 46, 49, 58</td></tr>
<tr><td>C: 11</td></tr>
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<tr><td rowspan="10">
NURSING DIAGNOSES
The school nurse will use the DMMP, other healthcare team members' assessments, and the nursing assessment to identify appropriate nursing diagnoses to guide student-centered care. Examples of areas to focus care include:

impaired diabetes resilience for diabetes self-management management
effective T1D self-management
readiness to improve T1D self-management
knowledge gaps and strengths for T1D self-management
family and/or student coping and/or stress with ongoing T1D management
unstable blood glucose
social engagement with peers and/or family
general health promotion and well-being

</td><td rowspan="2">Academic Performance</td><td>A: 62</td></tr>
<tr><td>B: 3, 17, 35, 53, 68, 69, 71, 90</td></tr>
<tr><td rowspan="2">Care Coordination</td><td>A: 5, 8, 21, 23, 26, 32, 34, 37, 39, 42, 48, 61, 62, 70, 75, 77, 80, 83-88</td></tr>
<tr><td>B: 2, 12, 14-16, 18, 19, 22, 25, 27, 44, 45, 47, 53, 58, 64-66, 68, 69, 71, 73, 74, 76, 79, 81</td></tr>
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<tr><td rowspan="2">CPG</td><td>A: 32, 42, 89</td></tr>
<tr><td>B: 12, 16, 53, 68, 69, 74, 90</td></tr>
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<tr><td rowspan="12"></td><td rowspan="3">Education/Training</td><td>A: 8, 21, 23, 28, 31–33, 36, 42, 43, 48, 52, 57, 60, 67, 70, 72, 75, 77, 80, 83–87, 89</td></tr>
<tr><td>B: 1, 4, 9, 12, 14, 16, 17, 22, 30, 35, 45, 46, 49, 65, 66, 74</td></tr>
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<tr><td rowspan="2">Leadership/ Advocacy</td><td>A: 5, 7, 8, 20, 21, 32, 34, 36, 37, 43, 48, 75</td></tr>
<tr><td>B: 12, 14, 22, 30, 45, 66, 69, 90</td></tr>
<tr><td rowspan="2">Mental Health</td><td>A: 5, 6, 21, 26, 32, 62, 78, 80</td></tr>
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<tr><td rowspan="3">Technology</td><td>A: 20, 31, 37, 39, 43, 52, 77, 80, 83, 84, 86, 87</td></tr>
<tr><td>B: 9, 15, 16, 35, 46, 49, 58</td></tr>
<tr><td>C: 11</td></tr>
<tr><td rowspan="5">OUTCOMES IDENTIFICATION
The school nurse in conjunction with students, families, and other healthcare team members will identify goals and desired outcomes for the student such as:
• Receive healthcare team and educational support for effective T1D management.
• Receive appropriate care for T1D medical emergencies.
• Receive appropriate treatment and monitoring for hypoglycemia and hyperglycemia in the school setting.
• Remain free from injury resulting from unstable blood glucose (e.g., severe hypoglycemia, DKA).
• Experience reduced risk for suboptimal social engagement in the school setting.
• Receive support in facilitating conversations with trusted peers.
• Remain free from impaired skin integrity (e.g., infection, urticaria, irritation) resulting from fingerstick BG monitoring and invasive diabetes technologies in the school setting.</td><td rowspan="2">Academic Performance</td><td>A: 7, 62, 82</td></tr>
<tr><td>B: 1, 3, 17, 35, 53, 68, 69, 71, 90</td></tr>
<tr><td rowspan="3">Care Coordination</td><td>A: 5, 8, 21, 23, 26, 32, 34, 37, 39, 40, 42, 48, 61, 62, 70, 75, 77, 80, 82–88</td></tr>
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School Nursing Evidence-Based Clinical Practice Guideline: Students with Type I Diabetes Translation into Practice Recommendations

• Receive collaborative support, encouragement, and guidance for the transition of diabetes care from adolescence to adulthood. • Effective self-management of T1D, as developmentally appropriate and with minimal school/classroom interruptions. • Receive appropriate support to fully participate in all school-based academic and school-sponsored activities. • Achieve academic success (e.g., attendance, classroom seat time, passing grades, graduation).	Care Planning	A: 5, 7, 8, 21, 26, 28, 32, 34, 42, 52, 62, 70, 75, 77, 78, 82, 85-87
		B: 1, 2, 4, 9, 12, 15, 16, 22, 25, 29, 35, 44-46, 53, 55, 65, 66, 68, 69, 74, 80, 81, 90
		C: 63
	CPG	A: 32, 42, 80, 82, 87, 89
		B: 12, 16, 53, 68, 69, 74, 90
	Education/Training	A: 8, 21, 23, 28, 31-33, 36, 42, 43, 48, 52, 57, 60, 67, 70, 72, 75, 77, 80, 82-87, 89
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		C: 11, 63
	Leadership/ Advocacy	A: 5, 7, 8, 20, 21, 32, 34, 36, 37, 43, 48, 75, 82
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	Mental Health	A: 5, 6, 21, 26, 32, 62, 78, 80, 82
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	Rescue Medication	A: 10, 38, 51, 54, 56, 57, 59, 60, 67, 72, 80, 82, 85, 87
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		C: 11

School Nursing Evidence-Based Clinical Practice Guideline: Students with Type I Diabetes Translation into Practice Recommendations

PLANNING

Using the DMMP, nursing assessment synthesis (i.e., nursing diagnoses), and identified outcomes, the school nurse will develop a modifiable, customizable IHP and ECP to address, as appropriate

- monitoring glucose levels (target range, where and when to monitor, interventions to address results);
- monitoring ketone levels (where and when to monitor, interventions to address results);
- treatment of non-emergency hypoglycemia and hyperglycemia;
- treatment of emergency hypoglycemia and hyperglycemia;
- advocating for and assist family in accessing the ***least restrictive evidence-based rescue medication*** choice (nasal rather than injection), when appropriate;
- accommodations for daily management of T1D for example,
    - access to water and snacks (including glucose tabs)
    - bathroom privileges
    - self-carry of T1D management supplies
    - use of cell phone
    - access to a "buddy"
    - access to trained UAP or aide
    - access to the elevator;
- accommodations for academic success, for example,
    - 504 plan or IEP
    - preferential classroom seating
    - extended time on classroom and standardized testing and assessments
    - glucose within target range prior to testing and assessments
    - full participation in school-sponsored activities (e.g., field trips);
- equipment and supplies needed for a comprehensive school emergency response (e.g., natural disasters, school lock-downs);
- insulin administration instructions (if permitted by state/local regulations);
- parameters for full and safe participation in physical education and sports (e.g., SMBG frequency, reduced insulin dosing, fluids and snacks, BG threshold for restriction of activity);
- action steps for technology malfunction (e.g., CSII, CGM/FGM,);
- communication and documentation plans among the student, family, school nurse, and HCP;
- development and enhancement of self-management skills;
- development and strengthening of social and emotional support skills;
- school-site specific considerations and accommodations (e.g., where to treat glucose fluctuations);

Academic Performance	A: 7, 62, 82
	B: 3, 17, 35, 53, 68, 69, 71, 90
Care Coordination	A: 5, 8, 21, 23, 26, 32, 34, 37, 40, 42, 48, 61, 62, 70, 75, 77, 80, 82, 83-88
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	C: 63
Care Planning	A: 5, 7, 8, 21, 26, 28, 29, 32, 34, 42, 52, 62, 70, 75, 77, 78, 80, 82, 85-87
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CPG	A: 32, 42, 80, 82, 87, 89
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Education/Training	A: 8, 21, 23, 28, 31-33, 36, 42, 43, 48, 52, 57, 60, 67, 70, 72, 75, 77, 80, 82-87, 89
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Mental Health	A: 5, 6, 21, 26, 32, 62, 78, 80, 82
	B: 13, 18, 19, 22, 24, 27, 41, 55, 64, 73, 76, 79

• other student-specific interventions to address identified goals and outcomes; • community resources needed by the student and family to best meet the identified goals and outcomes; • nursing care tasks that can be delegated (as allowed by state law); • tiered training of school personnel; • training out-of-school time personnel, if appropriate; • skills for transitioning from pediatric to adult diabetes care (for the high school student); and • addressing diabetes distress or other mental health concerns associated with T1D.	Rescue Medication	A: 10, 38, 51, 54, 56, 57, 59, 60, 67, 72, 80, 82, 85, 87
		B: 50
	Technology	A: 20, 31, 37, 43, 52, 77, 80, 82, 83, 84, 86, 87
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		C: 11

IMPLEMENTATION
The school nurse implements the student-centered plan(s) of care (e.g., IHP, ECP, 504 plan, IEP) communicating with the student, family/caregivers, school health and education team, and HCP (or student's personal healthcare team) to improve and revise as needed. Implementation also includes:
• Developing policies, protocols, and/or procedures related to
    o nursing delegation of diabetes care tasks,
    o the use of internet and Wi-Fi for real-time data and data downloads,
    o the use of diabetes care technologies (e.g., CGM/FGM, CSII, DIY systems),
    o the use of encrypted devices, if appropriate, to communicate BG levels to parents/caregivers and HCPs,
    o provision of T1D training,
    o medication administration to allow for delegation of routine and rescue medication administration and insulin administration (if permitted by state/local regulations) or plan for medication administration in absence of school nurse,
    o ketone monitoring and treatment,
    o resources and support (e.g., Certified Diabetes Care and Education Specialist [CDCES] and/or nutritionist) to ensure engagement with the nutrition plan,
    o safe and full participation in physical education and sports,
    o medical emergency preparedness and response plan specific to T1D,
    o documentation of care provided and outcomes, and
    o professional development for the school nurse and school staff on T1D (e.g., new resources, technology and treatment updates).
• Conducting tiered training of school personnel in collaboration with families/caregivers, school administrators, and HCP and in accordance with district policies, competency training and criteria, and state nurse practice act regulations.
    o Training may be conducted in person or virtually.
    o The school nurse may access educational support through professional nursing and diabetes organizations, local and regional diabetes centers, CDCES, and school district educator when available.
	Academic Performance	A: 7, 62, 82

		B: 1, 3, 17, 35, 53, 68, 69, 71, 90
	Care Coordination	A: 5, 8, 21, 23, 26, 32, 34, 37, 39, 40, 42, 48, 61, 62, 70, 75, 77, 80, 82-88
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		B: 1, 4, 9, 12, 14, 16, 17, 22, 30, 35, 45, 46, 49, 65, 66, 74
		C: 11, 63

• Collaborating with parents/caregivers and HCP to plan for day and overnight field trips and school emergencies (e.g., school lock downs, natural disasters).
• Following the communication plan to communicate consistently with family/caregiver and HCP. Topics to include:
  ○ T1D monitoring results outside established parameters,
  ○ areas of noted concern (e.g., level of engagement, mental health issues, changes from baseline),
  ○ occurrences of hypoglycemia,
  ○ administration of rescue medication, and
  ○ additional needed supports identified.
• Documenting according to school policy, protocols, and procedures. For example:
  ○ student/school nurse visits and disposition,
  ○ treatments and student response,
  ○ medications (time, dose, route, student response), and
  ○ tier leveled training to school personnel.
• When delegation of nursing tasks is allowed by local and state regulations and when tasks in the student's IHP have been determined to be appropriate to delegate for the student, follow the remaining critical components of nursing delegation, including providing for the training and ongoing supervision of the UAP.
• Providing oversight, assessment, and coaching of T1D self-management skills.
	Leadership/ Advocacy	A: 5, 7, 8, 21, 32-34, 36, 37, 48, 75, 82

		B: 12, 14, 20, 22, 30, 43, 45, 66, 69, 90
	Mental Health	A: 5, 6, 21, 26, 32, 62, 78, 80, 82
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	Rescue Medication	A: 10, 38, 51, 54, 56, 57, 59, 60, 67, 72, 80, 82, 85, 87
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	Technology	A: 20, 31, 37, 39, 43, 52, 77, 80, 82-84, 86, 87
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EVALUATION *In addition to regular evaluation for individual student's care plans (e.g., IHP, ECP, 504 plan, IEP) and goals to evaluate progress to adjust the plans as needed to meet goals, the school nurse will collect the following information to track progress and evaluate efforts*: • number of students diagnosed with T1D; • number of students using multiple daily injections, CSII, FGM, and CGMs; • number of students within target range (TIR) per their DMMP; • number of students who have a DMMP (completed by HCP); • number of students who have an IHP, ECP, 504 Plan, and/or IEP to address T1D- related needs in the school setting; • number of students receiving care from UAP; • number of health office visits of students with T1D; • number of students who experience a mild or severe hypoglycemic episode in the school setting; • number of students with ketonuria/ketonemia; • number of students who have access to T1D rescue medication (glucagon);	Academic Performance	A: 7, 62, 82
		B: 1, 3, 17, 35, 53, 68, 69, 71, 90
	Care Coordination	A: 5, 8, 21, 23, 26, 32, 34, 37, 39, 40, 42, 48, 61, 62, 70, 75, 77, 80, 82-88
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		C: 63

• number of students who receive T1D rescue medication in the school setting for a severe hypoglycemic episode (or per parameters delineated in ECP);
• the disposition and outcome of students who experience severe hypoglycemia or ketonuria/ ketonemia in school: EMS and ED (e.g., discharged from ED or admitted to inpatient unit), home, return to class;
• psychosocial outcomes of students with T1D (e.g., anxiety, depression, disordered eating, diabetes distress, resilience, treatment and social engagement, self-efficacy);
• frequency of school personnel T1D training (Level/Tier 1, 2, 3);
• emergency response of school staff in the event of a hypoglycemia occurrence in the absence of school nurse, subsequent outcome and disposition;
• emergency response of school staff in the event of a lockdown or natural disaster;
• academic outcomes of students T1D;
    ○ time spent in class
    ○ absenteeism
    ○ track academic trends (maintained or observable decline in grades)
    ○ other outcomes, as specific to student;
• student with T1D and family/caregiver satisfaction with care coordination efforts by the school nurse (qualitative and anecdotal evidence);
• successes and barriers in developing/implementing school health policies, protocols, and procedures relevant to the effective and appropriate management of students with T1D; and
• number of IHPs where goals were met for the year.
	CPG	A: 32, 42, 80, 82, 87, 89

		B: 12, 16, 53, 68, 69, 74, 90
	Education/Training	A: 8, 21, 23, 31-33, 36, 52, 57, 60, 67, 70, 72, 75, 77, 80, 82-87, 89
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References

Abbott. (n.d.). *What is continuous glucose monitoring?* https://www.freestyle.abbott/us-en/what-is-cgm.html

Agency for Healthcare Quality and Research. Healthcare Cost and Utilization Project. (2016). *Emergency department visits for children and young adults with diabetes, 2012. Statistical Brief #203*. https://www.hcup-us.ahrq.gov/reports/statbriefs/sb203-Emergency-Department-Children-Diabetes.jsp

Agwu, J. C., Idkowiak, J., Papanikolaou, T., & Tharmaratnam, R. (2020). Support for children and young people with diabetes mellitus during school hours. *Postgraduate Medical Journal, 96*(1135), 241-242. http://dx.doi.org/10.1136/postgradmedj-2019-137312

Alkhatatbeh, M. J., Abdalqader, N. A., & Alqudah, M. A. Y. (2019). Impaired awareness of hypoglycemia in children and adolescents with type 1 diabetes mellitus in north of Jordan. *BMC Endocrine Disorders, 19*(107). https://doi.org/10.1186/s12902-019-0441-9

Alvar, C. M., Coddington, J. A., Foli, K. J., & Ahmed, A. H. (2018). Depression in the school-aged child with type 1 diabetes: Implications for pediatric primary care providers. *Journal of Pediatric Health Care, 32*(1), 43-52. https://doi.org/10.1016/j.pedhc.2017.07.002

American Academy of Pediatrics Council on School Health. (2016). Role of the school nurse in providing school health services. *Pediatrics, 137*(6), Article e20160852. https://doi.org/10.1542/peds.2016-0852

American Association of Diabetes Educators. (2019). Management of children with diabetes in the school setting. *The Diabetes Educator, 45*(1), 54–59. https://doi.org/10.1177/0145721718820943

American Diabetes Association. (n.d.). *DKA (ketacidosis) and ketones.* https://www.diabetes.org/diabetes/complications/dka-ketoacidosis-ketones

American Diabetes Association. (n.d.). *Hypoglycemia (low blood sugar).* https://www.diabetes.org/healthy-living/medication-treatments/blood-glucose-testing-and-control/hypoglycemia

American Diabetes Association. (n.d.). *Understanding A1C.* https://www.diabetes.org/a1c

American Diabetes Association. (n.d.). *What is time in range?* https://www.diabetes.org/healthy-living/devices-technology/cgm-time-in-range

American Diabetes Association. (2018). Economic costs of diabetes in the U.S. in 2017. *Diabetes Care, 41*(5), 917-928. https://doi.org/10.2337/dci18-0007

American Diabetes Association. (2020). Classification and diagnosis of diabetes: Standards of medical care in diabetes-2020. *Diabetes Care, 43*, S14-S31. https://doi.org/10.2337/dc20-S002

American Diabetes Association. (2021). Children and adolescents: Standards of medical care in diabetes—2021. *Diabetes Care, 44*(Supplement 1), S180-199. https://doi.org/10.2337/dc21-S013

Association of Diabetes Care & Education Specialists. (n.d.). *Becoming a certified diabetes care and education specialist.* https://www.diabeteseducator.org/education/certification/cdces

Barnard-Brak, L., Stevens, T., & Carpenter, J. (2017). Care coordination with schools: The role of family-centered care for children with special health care needs. *Maternal and Child Health Journal, 21*(5), 1073–1078. https://doi.org/10.1007/s10995-016-2203-x

Begum, M., Chittleborough, C., Pilkington, R., Mittinty, M., Lynch, J., Penno, M., & Smithers, L. (2020). Educational outcomes among children with type 1 diabetes: Whole-of-population linked-data study. *Pediatric Diabetes, 21*(7), 1353-1361. https://doi.org/10.1111/pedi.13107

Birkebaek, N., Drivvoll, A., Aakeson, K., Bjarnason, R., Johansen, A., Samuelsson, U., Skrivarhaug, T., Thorsson, A., & Svensson, J. (2017). Incidence of severe hypoglycemia in children with type 1 diabetes in the Nordic countries in the period 2008–2012: Association with hemoglobin A1C and treatment modality. *BMJ Open Diabetes Research & Care, 5*(1), Article e000377. https://doi.org/10.1136/bmjdrc-2016-000377

Bixo Ottosson, A., Åkesson, K., Ilvered, R., Forsander, G., & Särnblad, S. (2017). Self-care management of type 1 diabetes has improved in Swedish schools according to children and adolescents. *Acta Paediatrica, 106*(12), 1987–1993. https://doi.org/10.1111/apa.13949

Bleich, S. N., Vercammen, K. A., Zatz, L. Y., Frelier, J. M., Ebbeling, C. B., & Peeters, A. (2018). Review: Interventions to prevent global childhood overweight and obesity: A systematic review. *The Lancet Diabetes & Endocrinology, 6,* 332-346. https://doi.org/10.1016/S2213-8587(17)30358-3

Boyle, J. P., Thompson, T. J., Gregg, E. W., Barker, L. E., & Williamson, D. F. (2010, October 22). Projection of the year 2050 burden of diabetes in the US adult population: Dynamic modeling of incidence, mortality, and prediabetes prevalence. *Population Health Metrics, 8,* Article 29(2010). https://doi.org/10.1186/1478-7954-8-29

Braveman, P., Arkin, E., Orleans, T., Proctor, D., & Plough, A. (2017, May 1). *What is health equity? And what difference does a definition make?* https://www.rwjf.org/en/library/research/2017/05/what-is-health-equity-.html

Brazeau, A.-S., Nakhla, M., Wright, M., Henderson, M., Panagiotopoulos, C., Pacaud, D., Kearns, P., Rahme, E., Da Costa, D., & Dasgupta, K. (2018). Stigma and its association with glycemic control and hypoglycemia in adolescents and young adults with type 1 diabetes: Cross-sectional study. *Journal of Medical Internet Research, 20*(4), Article151. https://doi.org/10.2196/jmir.9432

Buschur, E. O., Glick, B., & Kamboj, M. K. (2017). Transition of care for patients with type 1 diabetes mellitus from pediatric to adult health care systems. *Translational Pediatrics, 6*(4), 373–382. https://doi.org/10.21037/tp.2017.09.06

Centers for Disease Control and Prevention. (2020). *National diabetes statistics report, 2020.* https://www.cdc.gov/diabetes/pdfs/data/statistics/national-diabetes-statistics-report.pdf

Centers for Disease Control and Prevention. (2021, March 1). *Leading causes of death.* https://www.cdc.gov/nchs/fastats/leading-causes-of-death.htm

Chan, J. C. N., Lim, L.-L., Wareham, N. J., Shaw, J. E., Orchard, T. J., Zhang, P., Lau, E. S. H., Eliasson, B., Kong, A. P. S., Ezzati, M., Aguilar-Salinas, C. A., McGill, M., Levitt, N. S., Ning, G., So, W.-Y., Adams, J., Bracco, P., Forouhi, N. G., Gregory, G. A., Guo, J., Hua, X., Klatman, E. L., Magliano, D. J., Ng, B.-P., Ogilvie, D., Panter, J., Pavkov, M., Shao, H., Unwin, N., White, M., Wou, C., Ma, R. C. W., Schmidt, M. I., Ramachandran, A., Seino, Y., Bennett, P. H., Oldenburg, B., Gagliardino, J. J., Luk, A. O. Y., Clarke, P. M., Ogle, G. D., Davies, M. J., Holman, R. R., & Gregg, E. W. (2021). The Lancet Commission on diabetes: Using data to transform diabetes care and patient lives. *Lancet 396*(10267), 2019-2082. https://doi.org/10.1016/S0140-6736(20)32374-6

Charleer, S., Gillard, P., Vandoorne, E., Cammaerts, K., Mathieu, C., & Casteels, K. (2020). Intermittently scanned continuous glucose monitoring is associated with high satisfaction but increased HbA1C and weight in well-controlled youth with type 1 diabetes. *Pediatric Diabetes, 21*(8), 1465-1474. https://doi.org/10.1111/pedi.13128

Chiang, J. L., Maahs, D. M., Garvey, K. C., Hood, K. K., Laffel, L. M., Weinzimer, S. A., Wolfsdorf, J. I., & Schatz, D. (2018). Type 1 diabetes in children and adolescents: A position statement by the American Diabetes Association. *Diabetes Care, 41*(9), 2026–2044. https://doi.org/10.2337/dci18-0023

Cooper, M. N., McNamara, K. A., de Klerk, N. H., Davis, E. A., & Jones, T. W. (2016). School performance in children with type 1 diabetes: A contemporary population-based study. *Pediatric Diabetes, 17*(2), 101-111. https://doi.org/10.1111/pedi.12243

de Cássia Sparapani, V., Liberatore, R. D. R., Damião, E. B. C., de Oliveira Dantas, I. R., de Camargo, R. A. A., & Nascimento, L. C. (2017). Children with type 1 diabetes mellitus: Self-management experiences in school. *Journal of School Health, 87*(8), 623–629. https://doi.org/10.1111/josh.12529

Deeb, A., Yousef, H., Al Qahtani, N., Artan, I., Suliman, S., Tomy, M., Abdulrahman, L., Al Suwaidi, H., Attia, S., & Nagelkerke, N. (2019). Novel ambulatory glucose-sensing technology improves hypoglycemia detection and patient monitoring adherence in children and adolescents with type 1 diabetes. *Journal of Diabetes & Metabolic Disorders, 18*(1), 1–6. https://doi.org/10.1007/s40200-018-0351-9

Deeb, L. C., Dulude, H., Guzman, C. B., Zhang, S., Reiner, B. J., Piché, C. A., Pradhan, S., & Zhang, X. M. (2018). A phase 3 multicenter, open-label, prospective study designed to evaluate the effectiveness and ease of use of nasal glucagon in the treatment of moderate and severe hypoglycemia in children and adolescents with type 1 diabetes in the home or school setting. *Pediatric Diabetes, 19*(5), 1007–1013. https://doi.org/10.1111/pedi.12668

Demir, G., Özen, S., Çetin, H., Darcan, Ş., & Gökşen, D. (2019). Effect of education on impaired hypoglycemia awareness and glycemic variability in children and adolescents with type 1 diabetes mellitus. *Journal of Clinical Research in Pediatric Endocrinology, 11*(2), 189–195. https://doi.org/10.4274/jcrpe.galenos.2019.2019.0009

DiaTribe. (n.d.). *Flash glucose monitoring.* https://diatribe.org/flash-glucose-monitoring

Dickinson, J. K., Guzman, S. J., Maryniuk, M. D., O'Brian, C. A., Kadohiro, J. K., Jackson, R. A., D'Hondt, N., Montgomery, B., Close, K. L., & Funnell, M. M. (2017). The use of language in diabetes care and education. *The Diabetes Educator, 43*(6), 551-564. https://doi.org/10.1177/0145721717735535

Divers, J., Mayer-Davis, E. J., Lawrence, J. M., Isom, S., Dabelea, D., Dolan, L., Imperatore, G., Marcovina, S., Pettitt, D. J., Pihoker, C., Hamman, R. F., Saydah, S., & Wagenknecht, L. E. (2020). Trends in incidence of type 1 and type 2 diabetes among youths - Selected counties and Indian reservations, United States, 2002-2015. *MMWR: Morbidity & Mortality Weekly Report, 69*(6), 161-165. https://doi.org/10.15585/mmwr.mm6906a3

Driscoll, K. A., Volkening, L. K., Haro, H., Ocean, G., Wang, Y., Jackson, C. C., Clougherty, M., Hale, D. E., Klingensmith, G. J., Laffel, L., Deeb, L. C., & Siminerio, L. M. (2015). Are children with type 1 diabetes safe at school? Examining parent perceptions. *Pediatric Diabetes, 16*(8), 613-620. https://doi.org/10.1111/pedi.12204

Edraki, M., Zarei, A., Soltanian, M., & Moravej, H. (2020). The effect of peer education on self-care behaviors and the mean of glycosylated hemoglobin in adolescents with type 1 diabetes: A randomized controlled clinical trial. *International Journal of Community Based Nursing & Midwifery, 8*(3), 209-219. https://doi.org/10.30476/ijcbnm.2020.82296.1051

Ellis, D. A., Carcone, A. I., Rajkumar, D., Naar-King, S., Palmisano, G., & Moltz, K. (2019). Adaptation of an evidence-based diabetes management intervention for delivery in community settings: Findings from a pilot randomized effectiveness trial. *Journal of Pediatric Psychology, 44*(1), 110-125. https://doi.org/10.1093/jpepsy/jsx144

Erie, C., Van Name, M. A., Weyman, K., Weinzimer, S. A., Finnegan, J., Sikes, K., Tamborlane, W. V., & Sherr, J. L. (2018). Schooling diabetes: Use of continuous glucose monitoring and remote monitors in the home and school settings. *Pediatric Diabetes, 19*(1), 92–97. https://doi.org/10.1111/pedi.12518

Eriksen, T. M., Gaulke, A., Thingholm, P. R., Svensson, J., & Skipper, N. (2020). Association of type 1 diabetes and school wellbeing: A population-based cohort study of 436,439 Danish schoolchildren. *Diabetologia, 63*(11), 2339-2348. https://doi.org/10.1007/s00125-020-05251-z

Evans-Atkinson, T., Fung, A., Antunes Silvestre, A., Crozier, T., & Hursh, B. (2021). Evaluation of a province-wide type 1 diabetes care plan for children in the school setting. *Canadian Journal of Diabetes, 45*(1), 15–21. https://doi.org/10.1016/j.jcjd.2020.04.004

Fleming, M., Fitton, C. A., Steiner, M. F. C., McLay, J. S., Clark, D., King, A., Lindsay, R. S., Mackay, D. F., & Pell, J. P. (2019). Educational and health outcomes of children treated for type 1 diabetes: Scotland-wide record linkage study of 766,047 children. *Diabetes Care, 42*(9), 1700–1707. https://doi.org/10.2337/dc18-2423

Fortin, K., Kwon, S., & Pierce, M. C. (2016). Characteristics of children reported to child protective services for medical neglect. *Hospital Pediatrics, 6*(4), 204–210. https://doi.org/10.1542/hpeds.2015-0151

Fortin, K., Pries, E., & Kwon, S. (2016). Missed medical appointments and disease control in children with type 1 diabetes. *Journal of Pediatric Health Care, 30*(4), 381–389. https://doi.org/10.1016/j.pedhc.2015.09.012

Foster, N. C., Beck, R. W., Miller, K. M., Clements, M. A., Rickels, M. R., DiMeglio, L. A., Maahs, D. M., Tamborlane, W. V., Bergenstal, R., Smith, E., Olson, B. A., Garg, S. K., & the T1D Exchange Clinic Network. (2019). State of type 1 diabetes management and outcomes from the T1D Exchange in 2016–2018. *Diabetes Technology & Therapeutics, 21*(2), 66–72. https://doi.org/10.1089/dia.2018.0384

Fox, L. A., Pfeffer, E., Stockman, J., Shapiro, S., & Dully, K. (2020). Medical neglect in children and adolescents with diabetes mellitus. *Journal of Child & Adolescent Trauma, 13*(3), 259–269. https://doi.org/10.1007/s40653-018-0215-y

Fried, L., Cross, D., Pearce, N., Lin, A., Vithiatharan, R., Monks, H., Jones, C., & Davis, E. (2020). Lessons from schools with high levels of support for students with type 1 diabetes: A qualitative study. *Issues in Educational Research, 30*(2), 512-531. http://www.iier.org.au/iier30/fried.pdf

Fried, L., Vithiatharan, R., Davis, E., Jones, T., Payne, D., Hancock, K., Runions, K., Cross, D., Jones, C., Wright, A., Pieterse, D., Knowles, J., Clarke, J., & Lin, A. (2018). The school experiences of children and adolescents with type 1 diabetes in Western Australia. *Issues in Educational Research, 28*(3), 578-595. http://www.iier.org.au/iier28/fried.pdf

Goss, P. W., Middlehurst, A., Acerini, C. L., Anderson, B. J., Bratina, N., Brink, S., Calliari, L., Forsander, G., Goss, J. L., Maahs, D., Milosevic, R., Pacaud, D., Paterson, M. A., Pitman, L., Rowley, E., & Wolfsdorf, J. (2018). ISPAD position statement on type 1 diabetes in schools. *Pediatric Diabetes, 19*(7), 1338–1341. https://doi.org/10.1111/pedi.12781

Gurkan, K., Bahar, Z., & Bober, E. (2019). Effects of a home-based nursing intervention program among adolescents with type 1 diabetes. *Journal of Clinical Nursing, 28*, 4513-4524. https://doi.org/10.1111/jocn.15040

Hamburger, E. R., Goethals, E. R., Choudhary, A., & Jaser, S. S. (2020). Sleep and depressive symptoms in adolescents with type 1 diabetes not meeting glycemic targets. *Diabetes Research and Clinical Practice, 169*. https://doi.org/10.1016/j.diabres.2020.108442

Hayes, B., Lopez, L., & Price, A. (2017). Resilience, stress and perceptions of school-based support for young people managing diabetes in school. *Journal of Diabetes Nursing, 21*(6), 212–216.

Herbert, L. J., Clary, L., Owen, V., Monaghan, M., Alarez, V., & Streisand, R. (2015). Relations among school/daycare functioning, fear of hypoglycaemia and quality of life in parents of young children with type 1 diabetes. *Journal of Clinical Nursing, 24*(910), 1199-1209. https://doi.org/10.1111/jocn.12658

Hilliard, M. E., Iturralde, E., Weissberg-Benchell, J., & Hood, K. K. (2017). The Diabetes Strengths and Resilience Measure for Adolescents with type 1 diabetes (DSTAR-Teen): Validation of a new, brief self-report measure. *Journal of Pediatric Psychology, 42*(9), 995–1005. https://doi.org/10.1093/jpepsy/jsx086

Hood, K. K., Iturralde, E., Rausch, J., & Weissberg-Benchell, J. (2018). Preventing diabetes distress in adolescents with type 1 diabetes: Results 1 year after participation in the STePS program. *Diabetes Care, 41*(8), 1623–1630. https://doi.org/10.2337/dc17-2556

Hopkins, A. F., & Hughes, M. (2016). Individualized health care plans: Supporting children with chronic conditions in the classroom. *Young Exceptional Children, 19*(2), 33-44. https://doi.org/10.1177/1096250614566538

Individuals with Disabilities Act, 20 U.S.C. § 1400. (2004). https://sites.ed.gov/idea/final-regulations/

International Diabetes Federation. (2019). *IDF Diabetes Atlas 9th edition 2019.* https://diabetesatlas.org/upload/resources/material/20200302_133351_IDFATLAS9e-final-web.pdf

Iturralde, E., Rausch, J. R., Weissberg-Benchell, J., & Hood, K. K. (2019). Diabetes-related emotional distress over time. *Pediatrics, 143*(6), Article e20183011. https://doi.org/10.1542/peds.2018-3011

Jackson, C. C., Albanese-O'Neill, A., Butler, K. L., Chiang, J. L., Deeb, L. C., Hathaway, K., Kraus, E., Weissberg-Benchell, J., Yatvin, A. L., & Siminerio, L. M. (2015). Diabetes care in the school setting: A position statement of the American Diabetes Association. *Diabetes Care, 38*(10), 1958–1963. https://doi.org/10.2337/dc15-1418

Jennings, P., & Hussain, S. (2020). Do-it-yourself artificial pancreas systems: A review of the emerging evidence and insights for healthcare professionals. *Journal of Diabetes Science and Technology, 14*(5), 868–877. https://doi.org/10.1177/1932296819894296

Johansen, A., Kanijo, B., Fredheim, S., Olsen, B., Hertz, B., Lauridsen, M. H., Andersen, M. L. M., Mortensen, H. B., & Svensson, J. (2015). Prevalence and predictors of severe hypoglycemia in Danish children and adolescents with diabetes. *Pediatric Diabetes, 16*(5), 354–360. https://doi.org/10.1111/pedi.12171

Johns Hopkins Medicine. (n.d.). *Insulin sensitivity factor.* https://hopkinsdiabetesinfo.org/glossary/insulin-sensitivity-factor/

Johns Hopkins Medicine. (n.d.). *Insulin-to-carbohydrate-ratio.* https://hopkinsdiabetesinfo.org/glossary/insulin-to-carbohydrate-ratio/

Joiner, K. L., DeJonckheere, M., Whittemore, R., & Grey, M. (2020). Perceptions and experiences of living with type 1 diabetes among Latino adolescents and parents with limited English proficiency. *Research in Nursing & Health, 43*(3), 263–273. https://doi.org/10.1002/nur.22019

Jones, S. E., Brener, N. D., & Bergren, M. D. (2015). Association between school district policies that address chronic health conditions of students and professional development for school nurses on such policies. *The Journal of School Nursing, 31*(3), 163–166. https://doi.org/10.1177/1059840514547275

Karges, B., Schwandt, A., Heidtmann, B., Kordonouri, O., Binder, E., Schierloh, U., Boettcher, C., Kapellen, T., Rosenbauer, J., & Holl, R. W. (2017). Association of insulin pump therapy vs insulin injection therapy with severe hypoglycemia, ketoacidosis, and glycemic control among children, adolescents, and young adults with type 1 diabetes. *JAMA, 318*(14), 1 358-1366. https://doi.org/10.1001/jama.2017.13994

Kesavadev, J., Srinivasan, S., Saboo, B., Krishna B, M., & Krishnan, G. (2020). The do-it-yourself artificial pancreas: A comprehensive review. *Diabetes Therapy, 11*(6), 1217–1235. https://doi.org/10.1007/s13300-020-00823-z

Kise, S. S., Hopkins, A., & Burke, S. (2017). Improving school experiences for adolescents with type 1 diabetes. Journal of School Health, 87(5), 363-375. https://doi.org/10.1111/josh.12507

Klein, N. J., & Evans-Agnew, R. (2019). Flying by the seat of their pants: A grounded theory of school nurse case management. *Journal of Advanced Nursing, 75*(12), 3677–3688. https://doi.org/10.1111/jan.14204

Knauer, H., Baker, D. L., Hebbeler, K., & Davis-Alldritt, L. (2015). The mismatch between children's health needs and school resources. *The Journal of School Nursing, 31*(5), 326–333. https://doi.org/10.1177/1059840515579083

Knight, M. F., & Perfect, M. M. (2019). Glycemic control influences on academic performance in youth with type 1 diabetes. *School Psychology, 34*(6), 646-655. https://doi.org/10.1037/spq0000320

Kobos, E., Imiela, J., Kryczka, T., Szewczyk, A., & Knoff, B. (2020). Actual and perceived knowledge of type 1 diabetes mellitus among school nurses. *Nurse Education Today, 87*, Article 104304. https://doi.org/10.1016/j.nedt.2019.104304

Lai, C. W., Lipman, T. H., Willi, S. M., & Hawkes, C. P. (2021). Racial and ethnic disparities in rates of continuous glucose monitor initiation and continued use in children with type 1 diabetes. *Diabetes Care, 44*(1), 255–257. https://doi.org/10.2337/dc20-1663

Leinwand, B., Johnsrud, M., Nguyen, A., Meyer, J., & Johnson, K. (2020). A ready-to-use liquid glucagon for treatment of severe hypoglycemia demonstrates reduced healthcare payer costs in a budget impact model. *Journal of Medical Economics, 23*(7), 744–750. https://doi.org/10.1080/13696998.2020.1742131

Leroy, Z. C., Wallin, R., & Lee, S. (2017). The role of school health services in addressing the needs of students with chronic health conditions: A systematic review. *The Journal of School Nursing, 33*(1), 64-72. https://doi.org/10.1177/1059840516678909

Lipman, T. H., Smith, J. A., Patil, O., Willi, S. M., & Hawkes, C. P. (2021). Racial disparities in treatment and outcomes of children with type 1 diabetes. *Pediatric Diabetes, 22*(2), 241–248. https://doi.org/10.1111/pedi.13139

Lipman, T. H., Willi, S. M., Lai, C. W., Smith, J. A., Patil, O., & Hawkes, C. P. (2020). Insulin pump use in children with type 1 diabetes: Over a decade of disparities. *Journal of Pediatric Nursing, 55*, 110–115. https://doi.org/10.1016/j.pedn.2020.08.007

Lord, J. H., Rumburg, T. M., & Jaser, S. S. (2015). Staying positive: Positive affect as a predictor of resilience in adolescents with type 1 diabetes. *Journal of Pediatric Psychology, 40*(9), 968–977. https://doi.org/10.1093/jpepsy/jsv042

Maahs, D. M., Hermann, J. M., Holman, N., Foster, N. C., Kapellen, T. M., Allgrove, J., Schatz, D. A., Hofer, S. E., Campbell, F., Steigleder-Schweiger, C., Beck, R. W., Warner, J. T., & Holl, R. W. (2015, 10/01/). Rates of diabetic ketoacidosis: International comparison with 49,859 pediatric patients with type 1 diabetes from England, Wales, the U.S., Austria, and Germany. *Diabetes Care, 38*(10), 1876-1882. https://doi.org/10.2337/dc15-0780

MacMillan, F., Kirk, A., Mutrie, N., Moola, F., & Robertson, K. (2015). Supporting participation in physical education at school in youth with type 1 diabetes: Perceptions of teachers, youth with type 1 diabetes, parents and diabetes professionals. *European Physical Education Review, 21*(1), 3-30. https://doi.org/10.1177/1356336X14534367

March, C. A., Nanni, M., Kazmerski, T. M., Siminerio, L. M., Miller, E., & Libman, I. M. (2020). Modern diabetes devices in the school setting: Perspectives from school nurses. *Pediatric Diabetes, 21*(5), 832–840. https://doi.org/10.1111/pedi.13015

McCabe, E. M., Jameson, B. E., & Strauss, S. M. (2020, November 24). School nurses matter: Relationship between school nurse employment policies and chronic health condition policies in U.S. school districts. *The Journal of School Nursing.* Advance online publication. https://doi.org/10.1177/1059840520973413

McCollum, D. C., & O'Grady, M. J. (2020). Diminished school-based support for the management of type 1 diabetes in adolescents compared to younger children. *Diabetic Medicine, 37*(5), 779-784. https://doi.org/10.1111/dme.14160

Messaaoui, A., Tenoutasse, S., & Crenier, L. (2019). Flash glucose monitoring accepted in daily life of children and adolescents with type 1 diabetes and reduction of severe hypoglycemia in real-life use. *Diabetes Technology & Therapeutics, 21*(6), 329–335. https://doi.org/10.1089/dia.2018.0339

Miller, G. F., Coffield, E., Leroy, Z., & Wallin, R. (2016). Prevalence and costs of five chronic conditions in children. *The Journal of School Nursing, 32*(5), 357–364. https://doi.org/10.1177/1059840516641190

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D.G., The PRISMA Group. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *PLoS Medicine, 6*(7), Article e1000097. https://doi.org/10.1371/journal.pmed.1000097

National Association of School Nurses. (2016). *Diabetes management in the school setting* (Position Statement). https://www.nasn.org/nasn/advocacy/professional-practice-documents/position-statements/ps-diabetes

National Association of School Nurses. (2018). *Wearable medical technology in schools – The role of the school nurse* (Position Brief). https://www.nasn.org/nasn/advocacy/professional-practice-documents/positionbriefs/pb-wearable

National Association of School Nurses. (2019). *Nursing delegation in the school setting* (Position Statement). https://www.nasn.org/nasn/advocacy/professional-practice-documents/position-statements

National Association of School Nurses. (2020). *Use of individualized healthcare plans to support school health services* (Position Statement). https://www.nasn.org/nasn/advocacy/professional-practice-documents/position-statements/ps-ihps

National Council of State Boards of Nursing & American Nurses Association. (2019). *National guidelines for nursing delegation.* https://www.ncsbn.org/NGND-PosPaper_06.pdf

National Diabetes Education Program. (2016). *Helping the student with diabetes succeed: A guide for school personnel.* https://www.diabetes.org/sites/default/files/2020-02/NDEP-School-Guide-Full-508.pdf

Nieto-Eugenio, I., Ventura-Puertos, P. E., & Rich-Ruiz, M. (2020). S.O.S! My child is at school: A hermeneutic of the experience of living a chronic disease in the school environment. *Journal of Pediatric Nursing, 53*, e171-e178. https://doi.org/10.1016/j.pedn.2020.03.016

Oakley, N. J., Kneale, D., Mann, M., Hilliar, M., Tan, J., Dayan, C., Gregory, J. W., & French, R. (2020). Association between type 1 diabetes mellitus and educational attainment in childhood: A systematic review protocol. *BMJ Open, 10*, Article e021893. https://doi.org/10.1136/bmjopen-2019-033215

Park, J.-H. G., Linakis, J. G., Skipper, B. J., & Scott, S. M. (2012). Factors that predict frequency of emergency department utilization in children with diabetes-related complaints. *Pediatric emergency care, 28*(7), 614-619. https://doi.org/10.1097/PEC.0b013e31825cf7a2

Patrick, K. A., & Wyckoff, L. (2018). Providing standards for diabetes care in the school setting: A review of the Colorado model. *NASN School Nurse 33*(1), 52-56. https://doi.org/10.1177/1942602X17725886

Peters, A., Laffel, L., & the American Diabetes Association Transitions Working Group. (2011). Diabetes care for emerging adults: Recommendations for transition from pediatric to adult diabetes care systems. A position statement of the American Diabetes Association, with representation by the American College of Osteopathic Family Physicians, the American Academy of Pediatrics, the American Association of Clinical Endocrinologists, the American Osteopathic Association, the Centers for Disease Control and Prevention, Children with Diabetes, The Endocrine Society, the International Society for Pediatric and Adolescent Diabetes, Juvenile Diabetes Research Foundation International, the National Diabetes Education Program, and the Pediatric Endocrine Society (formerly Lawson Wilkins Pediatric Endocrine Society). *Diabetes Care, 34*(11), 2477–2485. https://doi.org/10.2337/dc11-1723

Petruzelkova, L., Jiranova, P., Soupal, J., Kozak, M., Plachy, L., Neuman, V., Pruhova, S., Obermannova, B., Kolouskova, S., & Sumnik, Z. (2021). Pre-school and school-aged children benefit from the switch from a sensor-augmented pump to an ANDROIDAPS hybrid closed loop: A retrospective analysis. *Pediatric Diabetes, 22*(4), 594-604. https://doi.org/10.1111/pedi.13190

Pöhlmann, J., Mitchell, B. D., Bajpai, S., Osumili, B., & Valentine, W. J. (2019). Nasal glucagon versus injectable glucagon for severe hypoglycemia: A cost-offset and budget impact analysis. *Journal of Diabetes Science and Technology, 13*(5), 910–918. https://doi.org/10.1177/1932296819826577

Pontiroli, A. E., & Tagliabue, E. (2020). Intranasal versus injectable glucagon for hypoglycemia in type 1 diabetes: Systematic review and meta-analysis. *Acta Diabetologica, 57*(6), 743–749. https://doi.org/10.1007/s00592-020-01483-y

Rachmiel, M., Landau, Z., Boaz, M., Mazor Aronovitch, K., Loewenthal, N., Ben-Ami, M., Levy-Shraga, Y., Modan-Moses, D., Haim, A., Abiri, S., & Pinhas-Hamiel, O. (2015). The use of continuous glucose monitoring systems in a pediatric population with type 1 diabetes mellitus in real-life settings: The AWeSoMe Study Group experience. *Acta Diabetologica, 52*(2), 323–329. https://doi.org/10.1007/s00592-014-0643-6

Rance, G., Chisari, D., Edvall, N., & Cameron, F. (2016). Functional hearing deficits in children with type 1 diabetes. *Diabetic Medicine, 33*(9), 1268-1274. https://doi.org/10.1111/dme.13086

Rattermann, M. J., Angelov, A., Reddicks, T., & Monk, J. (2021). Advancing health equity by addressing social determinants of health: Using health data to improve educational outcomes. *PLOS ONE, 16*(3), Article e0247909. https://doi.org/10.1371/journal.pone.0247909

Rehabilitation Act of 1973, 29 U.S.C § 504 (1973). https://www.dol.gov/agencies/oasam/centers-offices/civil-rights-center/statutes/section-504-rehabilitation-act-of-1973

Rickels, M. R., Ruedy, K. J., Foster, N. C., Piché, C. A., Dulude, H., Sherr, J. L., Tamborlane, W. V., Bethin, K. E., DiMeglio, L. A., Wadwa, R. P., Ahmann, A. J., Haller, M. J., Nathan, B. M., Marcovina, S. M., Rampakakis, E., Meng, L., Beck, R. W., & the T1D Exchange Intranasal Glucagon Investigators. (2015). Intranasal glucagon for treatment of insulin-induced hypoglycemia in adults with type 1 diabetes: A randomized crossover noninferiority study. *Diabetes Care, 39*,264-270. https://doi.org/10.2337/dc15-1498

Rohan, J. M., Huang, B., Pendley, J. S., Delamater, A., Dolan, L., Reeves, G., & Drotar, D. (2015). Predicting health resilience in pediatric type 1 diabetes: A test of the resilience model framework. *Journal of Pediatric Psychology, 40*(9), 956–967. https://doi.org/10.1093/jpepsy/jsv061

Seaquist, E. R., Dulude, H., Zhang, X. M., Rabasa-Lhoret, R., Tsoukas, G. M., Conway, J. R., Weisnagel, S. J., Gerety, G., Woo, V. C., Zhang, S., Carballo, D., Pradhan, S., Piché, C. A., & Guzman, C. B. (2018). Prospective study evaluating the use of nasal glucagon for the treatment of moderate to severe hypoglycaemia in adults with type 1 diabetes in a real-world setting. *Diabetes, Obesity and Metabolism, 20*(5), 1316–1320. https://doi.org/10.1111/dom.13278

Settles, J. A., Gerety, G. F., Spaepen, E., Suico, J. G., & Child, C. J. (2020). Nasal glucagon delivery is more successful than injectable delivery: A simulated severe hypoglycemia rescue. *Endocrine Practice, 26*(4), 407–415. https://doi.org/10.4158/EP-2019-0502

Shannon, R. A., & Maughan, E. D. (2020). A model for developing evidence-based clinical practice guidelines for school nursing. *The Journal of School Nursing, 36*(6), 415-422. https://doi.org/10.1177/1059840519880938

Sherr, J. L., Hermann, J. M., Campbell, F., Foster, N. C., Hofer, S. E., Allgrove, J., Maahs, D. M., Kapellen, T. M., Holman, N., Tamborlane, W. V., Holl, R. W., Beck, R. W., & Warner, J. T. (2016). Use of insulin pump therapy in children and adolescents with type 1 diabetes and its impact on metabolic control: Comparison of results from three large, transatlantic paediatric registries. *Diabetologia, 59*(1), 87–91. https://doi.org/10.1007/s00125-015-3790-6

Sherr, J. L., Ruedy, K. J., Foster, N. C., Piché, C. A., Dulude, H., Rickels, M. R., Tamborlane, W. V., Bethin, K. E., DiMeglio, L. A., Fox, L. A., Wadwa, R. P., Schatz, D. A., Nathan, B. M., Marcovina, S. M., Rampakakis, E., Meng, L., & Beck, R. W. (2016). Glucagon nasal powder: A promising alternative to intramuscular glucagon in youth with type 1 diabetes. *Diabetes Care, 39*(4), 555–562. https://doi.org/10.2337/dc15-1606

Singh-Franco, D., Moreau, C., Levin, A. D., Rosa, D. D. L., & Johnson, M. (2020). Efficacy and usability of intranasal glucagon for the management of hypoglycemia in patients with diabetes: A systematic review. *Clinical Therapeutics, 42*(9), e177–e208. https://doi.org/10.1016/j.clinthera.2020.06.024

Stankute, I., Dobrovolskiene, R., Danyte, E., Razanskaite-Virbickiene, D., Jasinskiene, E., Mockeviciene, G., Marciulionyte, D., Schwitzgebel, V. M., & Verkauskiene, R. (2019). Factors affecting cardiovascular risk in children, adolescents, and young adults with type 1 diabetes. *Journal of Diabetes Research, 2019*, 1-12. https://doi.org/10.1155/2019/9134280

Stenberg, U., Haaland-Øverby, M., Koricho, A. T., Trollvik, A., Kristoffersen, L. G. R., Dybvig, S., & Vågan, A. (2019). How can we support children, adolescents and young adults in managing chronic health challenges? A scoping review on the effects of patient education interventions. *Health Expectations, 22*(5), 849-862. https://doi.org/10.1111/hex.12906

Stough, L. M., Ducy, E. M., Kang, D., & Lee, S. (2020, 05/01/May 2020). Disasters, schools, and children: Disability at the intersection. *International Journal of Disaster Risk Reduction, 45*. https://doi.org/10.1016/j.ijdrr.2019.101447

Sullivan-Bolyai, S., Bova, C., & Johnson, K. (2020). Development and psychometric testing of the Peer-Mentor Support Scale for parents of children with type 1 diabetes and for youths with type 1 diabetes. *Diabetes Educator, 46*(2), 191-196. https://doi.org/10.1177/0145721720907055

Teuten, P., Holt, S., Edate, S., & Siba, P. P. (2016). Recognition and nursing management of diabetes in children. *Emergency Nurse, 24*(8), 26-32. https://doi.org/10.7748/en.2016.e1610

Thorstensson, S., Fröden, M., Vikström, V., & Andersson, S. (2016). Swedish school nurses' experiences in supporting students with type 1 diabetes in their school environment. *Nordic Journal of Nursing Research, 36*(3), 142–147. https://doi.org/10.1177/0107408315615020

Tiu, G. F., Leroy, Z. C., Lee, S. M., Maughan, E. D., & Brener, N. D. (2019, November 3). Characteristics associated with school health services for the management of chronic health conditions. *The Journal of School Nursing*. Advance online publication. https://doi.org/10.1177/1059840519884626

Tournilhac, C., Dolladille, C., Armouche, S., Vial, S., & Brouard, J. (2020). Evaluation of a new training program to reassure primary school teachers about glucagon injection in children with type 1 diabetes during the 2017–2018 school year. *Archives de Pédiatrie, 27*(4), 212–218. https://doi.org/10.1016/j.arcped.2020.02.002

Wadams, H., Cherñavvsky, D. R., Lteif, A., Basu, A., Kovatchev, B. P., Kudva, Y. C., & DeBoer, M. D. (2015). Closed-loop control for pediatric type 1 diabetes mellitus. *Diabetes Management, 5*(1), 25–35. https://www.openaccessjournals.com/articles/closedloop-control-for-pediatric-type-1-diabetes-mellitus.pdf

Wang, S. Y., Andrews, C. A., Herman, W. H., Gardner, T. W., & Stein, J. D. (2017). Incidence and risk factors for developing diabetic retinopathy among youths with type 1 or type 2 diabetes throughout the United States. *Ophthalmology, 124*(4), 424-430. https://doi.org/10.1016/j.ophtha.2016.10.031

Wang, S. Y., Andrews, C. A., Stein, J. D., Gardner, T. W., Wood, M., & Singer, K. (2017). Ophthalmic screening patterns among youths with diabetes enrolled in a large US managed care network. *JAMA Ophthalmology, 135*(5), 432-438. https://doi.org/10.1001/jamaophthalmol.2017.0089

Wasserman, R. M., Anderson, B. J., & Schwartz, D. D. (2016). Screening of neurocognitive and executive functioning in children, adolescents, and young adults with type 1 diabetes. *Diabetes Spectrum, 29*(4), 202-210. https://doi.org/10.2337/ds16-0037

Willgerodt, M., Johnson, K. H., & Helmer, C. (2020). Enhancing care coordination for students with type 1 diabetes. *Journal of School Health, 90*(8), 651–657. https://doi.org/10.1111/josh.12912

Wilt, L. (2020, April 15). The role of school nurse presence in parent and student perceptions of helpfulness, safety, and satisfaction with type 1 diabetes care. *The Journal of School Nursing.* Advance online publication. https://doi.org/10.1177/1059840520918310

Winnick, J. B., Berg, C. A., Wiebe, D. J., Schaefer, B. A., Lei, P.-W., & Butner, J. E. (2017). Metabolic control and academic achievement over time among adolescents with type 1 diabetes. *School Psychology Quarterly, 32*(1), 105-117. https://doi.org/10.1037/spq0000190

World Health Organization (2021, April 13). *Diabetes.* https://www.who.int/news-room/fact-sheets/detail/diabetes

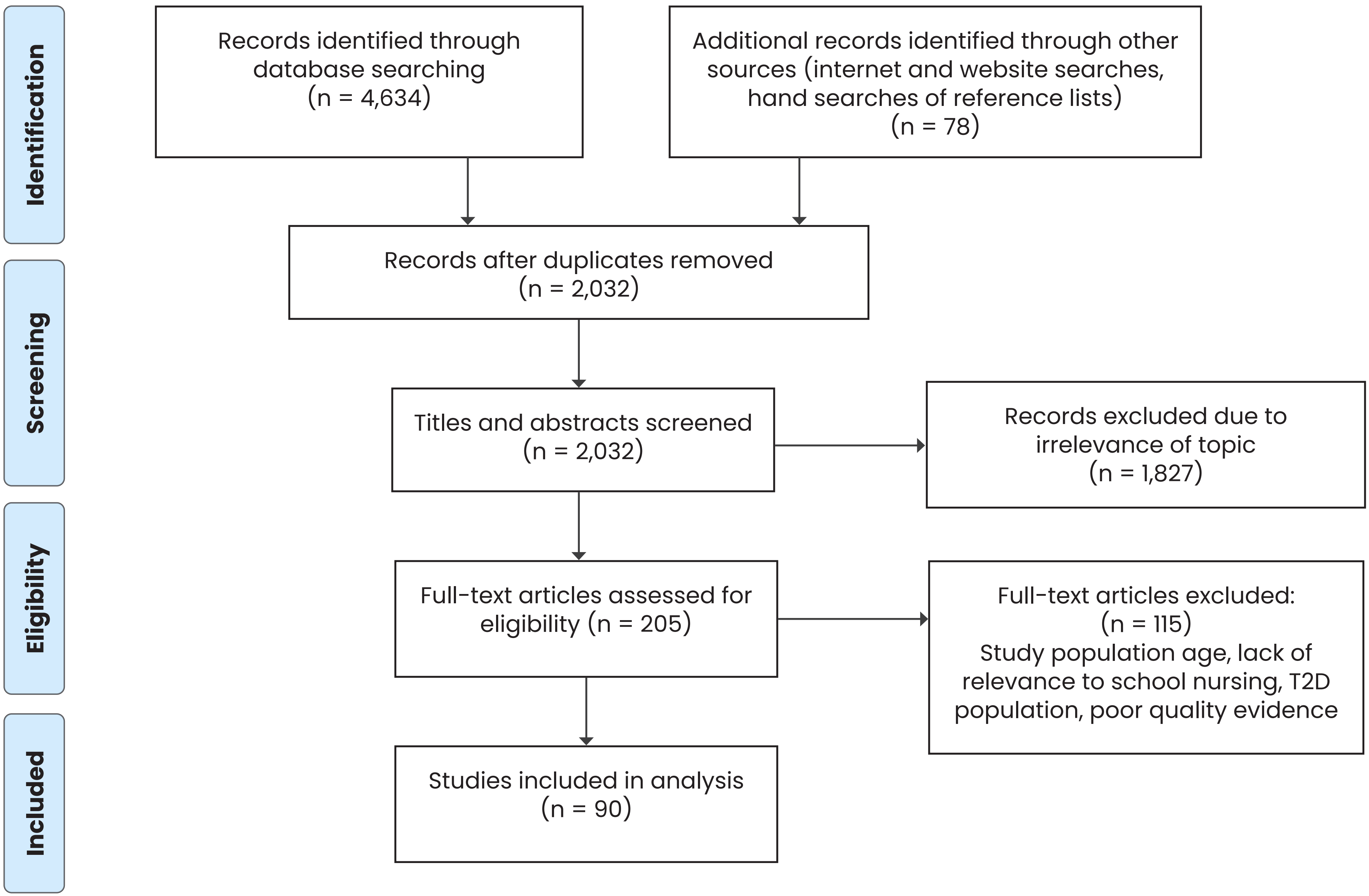
Wou, C., Unwin, N., Huang, Y., & Roglic, G. (2019). Implications of the growing burden of diabetes for premature cardiovascular disease mortality and the attainment of the Sustainable Development Goal target 3.4. *Cardiovascular Diagnosis and Therapy, 9*(2), 140-149. https://doi.org/10.21037/cdt.2018.09.04

Yale, J.-F., Dulude, H., Egeth, M., Piché, C. A., Lafontaine, M., Carballo, D., Margolies, R., Dissinger, E., Shames, A. R., Kaplowitz, N., Zhang, M. X., Zhang, S., & Guzman, C. B. (2017). Faster use and fewer failures with needle-free nasal glucagon versus injectable glucagon in severe hypoglycemia rescue: A simulation study. *Diabetes Technology & Therapeutics, 19*(7), 423–432. https://doi.org/10.1089/dia.2016.0460

Yi-Frazier, J. P., Yaptangco, M., Semana, S., Buscaino, E., Thompson, V., Cochrane, K., Tabile, M., Alving, E., & Rosenberg, A. R. (2015). The association of personal resilience with stress, coping, and diabetes outcomes in adolescents with type 1 diabetes: Variable- and person-focused approaches. *Journal of Health Psychology, 20*(9), 1196–1206. https://doi.org/10.1177/1359105313509846

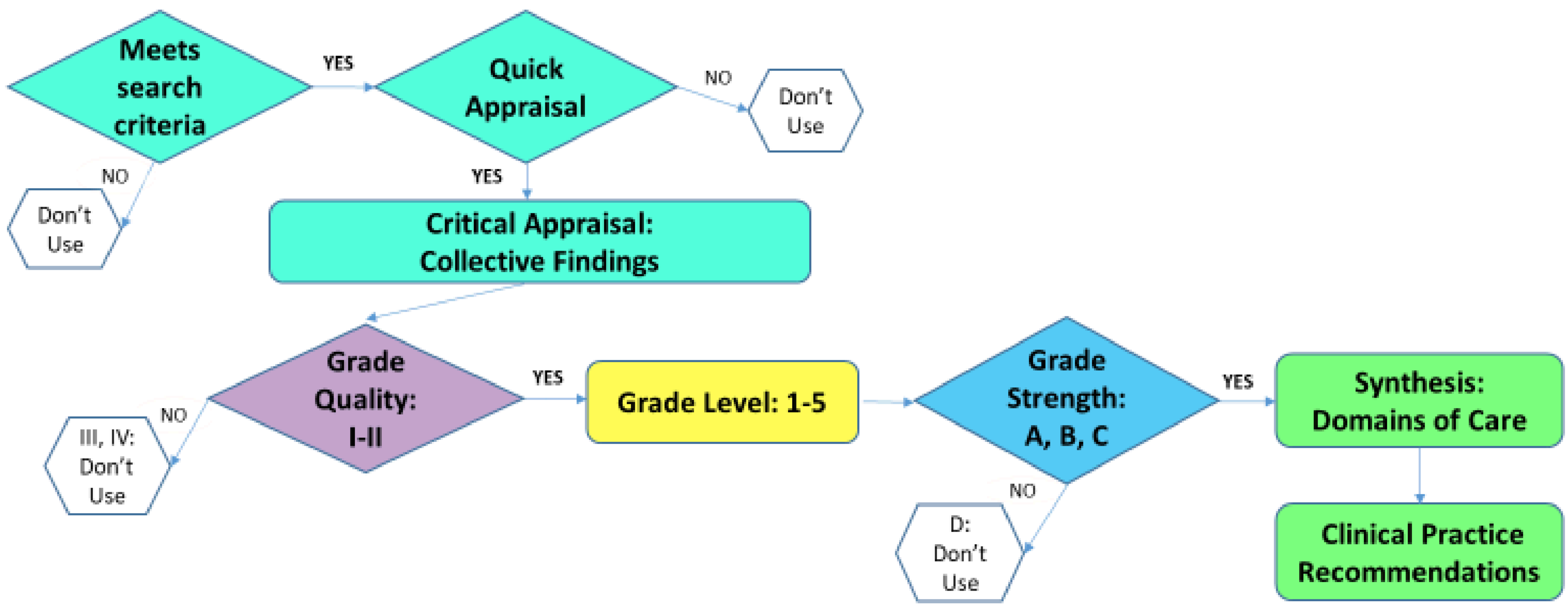
FIGURE 1

PRISMA Flowchart of Studies Included in the Literature Review



APPENDIX A

Clinical Practice Guideline Evidence Decision Tree



APPENDIX B

Grading the QUALITY of Evidence for School Nursing EBP Clinical Guidelines	
Quality	*Descriptor*
I	Acceptable quality: No concerns
II	Limitations in quality: Minor flaws and inconsistencies in the evidence
III*	Major limitations in quality: Many flaws in the evidence
IV*	Not acceptable: Major flaws in the evidence
**Do not include sources of quality levels III and IV in the synthesis.*	

Grading the LEVEL of Evidence for School Nursing EBP Clinical Guidelines	
Level	*Descriptor*
1	Evidence from systematic reviews, meta-analysis, evidence guidelines, and evidence summaries (expert panel recommendations)
2	Evidence obtained from well-designed RCTs
3	Evidence from well-designed case-control and cohort studies and systematic reviews of descriptive and qualitative studies
4	Evidence from clinical research critiques, integrative literature reviews, practice guidelines, clinical reference texts, legal mandates
5	Evidence from expert opinion, case reports, professional policy, or position paper

STRENGTH of Recommendations for School Nursing EBP Clinical Guidelines		
	Strength	*Descriptor*
A	Strong Evidence	Based on consistent and good quality evidence; has relevance and applicability to school nursing practice
B	Moderate Evidence	Based on evidence of moderate rigor or with minor inconsistencies in quality; has relevance and applicability to school nursing practice
C	Limited Evidence	Based on evidence that is limited, low level, or has major inconsistencies in quality; has relevance and applicability to school nursing practice
D*	Insufficient Evidence	Insufficient or no evidence upon which to make a recommendation; based on traditional practice alone
**Do not include sources of Strength D in CPG Recommendations.*		

APPENDIX C

Collective Findings Tables 1 and 2: Critical Appraisal of Evidence

Table 1: RESEARCH ARTICLES								
Reference (Author, Year, Title)	Purpose/ Research Question	Study Design, Sample Size, and Characteristics	Major Strengths (S) and Limitations (L)	Summary of Findings and Recommendations	Domains of Care	Quality/Level/ Strength of Evidence (See Appendix B)		
1. Alkhatatbeh et al. (2019). Impaired awareness of hypoglycemia in children and adolescents with type 1 diabetes mellitus in north of Jordan	Assess impaired awareness of hypoglycemia (IAH), frequency of hypoglycemia, severe hypoglycemia, and intensity of hypoglycemia symptoms among children and adolescents with T1D in North of Jordan	Cross-sectional 5-16 years (Children defined as < 10 years, adolescents defined as ≥ 10 years) N = 94 Jordan	(S): Well validated instrumentation (L): Single center; self-report bias (patients may underreport hypoglycemia); although sample size adequate for study, larger sample may have shown more associations between IAH and A1C or severe hypoglycemia; may not be representative of youth with T1D in US.	• Recurrent hypoglycemia reported by 66% of sample • 18.1% had at least 1 episode severe hypoglycemia requiring assistance during previous year. • Prevalence IAH 16.1% and associated with frequency of hypoglycemia in the previous 6 months • Recommendations: School nurses should monitor students with frequent hypoglycemia events for IAH.	Academic performance Care planning Education/ Training	II	3	B
2. Barnard-Brak et al. (2017). Care coordination with schools: The role of family-centered care for children with special health care needs	Examine relationship of family centered care (FCC) with care coordination with schools and school absences	Cross sectional National Survey of Children with Special Health Care Needs 2009-2010 (N = 40,242) US	S): Large sample size (L): Cross sectional design; role of schools in referrals for children with special healthcare needs not examined; current study examines wide range of healthcare needs; future research should examine specific disabilities to make more applicable.	• FCC construct consists of 5 items: Spend time with patients, listen carefully, be sensitive to family values/customs, provide specific information, help patients/families feel like partners (FCC scale scored 1-4). • Higher degree FCC associated with fewer absences and improved care coordination with schools	Care coordination Care planning	I	3	B

				• Controlled for • functional difficulties, poverty level, number of conditions • Recommendations: Incorporate FCC construct items into care planning.				
3. Begum et al. (2020). Educational outcomes among children with type 1 diabetes: Whole-of-population linked-data study	To estimate the effects of T1D on children's educational outcomes, and compare time since T1D diagnosis (recent diagnosis [≤ 2 years] and 3 to 10 years long exposure) on educational outcomes	Whole of population data from South Australian Early Childhood Data Project 2001-2014 T1D (n = 162) No T1D (n = 61,283) South Australia	(S): Use of augmented inverse probability weighting statistical methods; use of pediatric public hospital with endocrine unit (L): No data on A1C or use of technologies; younger ages (9-10 years) may have better glycemic control thereby underestimating impact of T1D on outcomes; included only children attending public hospitals and public schools, small sample size of children with T1D; may not be representative of youth with T1D in US	• 5 educational domains assessed (reading, writing, spelling, grammar, numeracy) • No significant difference between those with and those without T1D on educational outcomes • No significant difference between recently diagnosed (≤ 2 years) and those with longer exposure (3-10 years) • Recommendations: School nurses should monitor students with T1D for academic performance changes.	Academic performance	II	3	B
4. Birkebaek et al. (2017). Incidence of severe hypoglycemia in children with type 1 diabetes in the Nordic countries in the period 2008–2012: Association with hemoglobin A1C and treatment modality	Compare the incidence of severe hypoglycemia events in Denmark, Norway, Iceland, Sweden and to assess influence of A1C and treatment modalities on the frequency of severe hypoglycemia;	National childhood diabetes databases in Nordic countries. 89 centers; age < 15 years N = 8806 Denmark, Iceland, Norway, Sweden	S): Large sample size; 5-year study period; data completeness 95%; all countries had comparable healthcare systems and free access to health care and technologies. (L): Severe hypoglycemia events relied on parent report; Swedish sample size	• Severe hypoglycemia defined as event associated with severe neuroglycopenia resulting in coma or seizure and requiring parenteral therapy • Severe hypoglycemia incidence lowest in group with lowest A1C ≤ 6.7%	Care planning Education/ Training	II	3	B

	To explore if A1C target ≤ 6.7% is feasible		much larger than other countries and may have had higher impact on results; may not be representative of youth with T1D in US.	• Patients on pen therapy had higher risk severe hypoglycemia compared with CSII therapy. • Lower insulin requirement had lower risk severe hypoglycemia.				
5. Bixo Ottosson et al. (2017). Self-care management of type 1 diabetes has improved in Swedish schools according to children and adolescents	To investigate the perceived quality of support children and adolescents received in 2015 and 2008	Cross-sectional comparison of survey results on Health-Related Quality of Life (HRQoL) of children and parents (separate questionnaires) aged 6-15 in Sweden regarding support for T1D in schools 2008 N = 317 children/ adolescents 2015 N = 570 children/ adolescents and 568 parents 2015 control group N = 1881 children	(S): Universal healthcare with required care provided at designated pediatric diabetes units enables ability to survey T1D population in the country; control group for 2015 data. (L): Self report perspective with self-selection for participation; not longitudinal so did not capture changes in individual perspectives; unclear if improvements were related to new regulations in schools related to support; may not be representative of youth with T1D in US	• Significantly improved difference in perceived level of support from 2008 to 2015. A1C levels significant lower. • Increased reports of hypoglycemia episodes in 2015; however there was not a corresponding increase in hypoglycemia support • Girls reported significantly less satisfaction than boys. • Changes in policies suggest improvement in HRQoL. • Gender differences need more exploration in further studies as girls<boys perceived support. • Increased hypoglycemia support recommended in schools	Care coordination Care planning Leadership/ Advocacy Mental health	I	3	A
6. Brazeau et al. (2018). Stigma and its association with glycemic control and hypoglycemia in adolescents and young adults with type 1 diabetes: Cross-sectional study	Estimate stigma prevalence in youth aged 14-24 with T1D and its association with glycemic control	Cross-sectional N = 380 participants from 10 Canadian provinces with T1D (Clinicaltrials.gov NCT02796248) Canada	(S): Pilot study of 30 participants; large sample size; recruitment only through diabetes-specific organizational social media platforms (L): Not enough participants identifying gender identity or sexual	• Measures included stigma, self-efficacy for T1D management, well-being, glycemic control, demographic information. • Stigma prevalence 65.5%, higher among females and young adults aged 19-24 years than in males and 14-18 years	Mental health	I	3	A

			orientation to study; just 312 submitted capillary BG samples; may not be representative of youth with T1D in US	• Youth reporting stigma were 2.3 times more likely to have poor glycemic control (A1C > 9% and/or a severe hypoglycemia episode in the previous year). • Stigma associated with lower sense of well-being and lower self-efficacy for diabetes management • Recommendations: School nurses should monitor students with T1D for behavioral and mental health changes, especially those with poor glycemic control.				
7. Cooper et al. (2016). School performance in children with type 1 diabetes: A contemporary population-based study	Examine the school performance of children with type 1 diabetes in comparison to their peers, exploring changes over time, and the impact of clinical factors on school performance	Population based, secondary analysis, longitudinal N = 666 children with T1D matched with peers without T1D aged 7-14 Matched clinical data with national educational assessment data in Western Australia to the children with T1D Period of 2008- 2011 Examined five domains of school assessment scores, school attendance, A1C, history of severe hypoglycemia, DKA, age of onset	(S): Matched records with comparison to peers during same period (L): Used assumption method for missing data in the data sets; some struggling students may not be represented in the data; not able to understand other school supports available (e.g., . school nurse, aides) or longer-term outcomes post-secondary school graduation: may not be representative of youth with T1D in US	• No change in school assessment test scores longitudinally, with no decline over time, and no decline post-diagnosis as compared to peer group • T1D was significantly associated with 3% fewer days per year when compared to peers. • Higher A1C significantly associated with decreased attendance, and lower test scores. • Study suggests that diagnosis of T1D does not automatically infer poorer educational outcomes. • Attention to A1C and hypoglycemia and DKA episodes is needed to address findings of lower education assessment scores.	Academic performance Care planning Leadership/ Advocacy	II	3	A

8. de Cássia Sparapani et al. (2017). Children with type 1 diabetes mellitus: Self-management experiences in school	Analyze experience of children with T1D in self-management.	Qualitative; 40-minute interviews using puppets with children with T1D aged 7-12 years N=19 Brazil	(S): Relatively large sample for qualitative methodology (L): Data collected from outpatient clinic, which may be different in school setting where direct observation of tasks and support could be done; school system setup may be different from US as there is limited mention of school nurses.	• Lack of information about T1D; information given to principal by parents but not disseminated to teachers; restrictive rules impacting safety • Self-care at school – limited choices in cafeteria, snacking restricted • Support received by children limited by lack of school nurse presence, some took insulin only at home. • Recommendations: Students must be provided with access to supplies, testing, food. School nurses must educate and train school personnel in care of students with T1D.	Care coordination Care planning Education/ Training Leadership/ Advocacy	II	3	A
9. Deeb et al. (2019). Novel ambulatory glucose-sensing technology improves hypoglycemia detection and patient monitoring adherence in children and adolescents with type 1 diabetes.	Study impact of FGM in detecting hypoglycemia and enhancing adherence in children and adolescents with T1D.	Prospective 3 visits (wear FGM for 2-4 weeks) N = 75 aged 2-19 years UAE	(L): Single center; short study duration; nonrandomized; longer duration could enable comparisons between A1C levels before and after study period and could show reductions in hypoglycemia events; randomization or cross-over design would enhance robustness; may not be representative of youth with T1D in US	• Diurnal and nocturnal hypoglycemia detected more often with FGM than glucometer • Monitoring frequency 2.87/day with glucometer vs 11.6/day with FGM • Recommendations: School nurses should support the use of advanced diabetes technologies that improve health outcomes for students.	Care planning Education/ Training Technology	II	3	B

10. Deeb et al. (2018). A phase 3 multicenter, open-label, prospective study designed to evaluate the effectiveness and ease of use of nasal glucagon in the treatment of moderate and severe hypoglycemia in children and adolescents with type 1 diabetes in the home or school setting **Included in Singh-Franco et al. (2020) systematic review	Evaluate real-world effectiveness and ease of use of nasal glucagon (NG) in treating moderate or severe hypoglycemia events in children and adolescents with T1D.	Prospective N = 14 aged 4 to 17 years with 33 moderate hypoglycemia episodes (Clinicaltrials.gov NCT02402933) Caregivers administered 3 mg NG to children with symptomatic moderate-severe hypoglycemia events. BG measured before/ immediately after treatment and at 15, 30, 45-minute intervals. Questionnaire about ease of use completed right after treatment. Nasal score questionnaire completed within 2 hours after complete recovery. Moderate hypoglycemia defined as s/s neuroglycopenia (such as dizziness, poor concentration) and BG ≤70 mg/dL based on sample taken close to treatment Severe hypoglycemia event defined as event	(S): Evaluated real-world effectiveness of NG during hypoglycemia episodes in home or school (L): Lack of randomization and control; self-report bias/ inconsistencies; no severe hypoglycemia events reported so results limited to moderate hypoglycemia treatment	• 54.5% hypoglycemia events resolved with 10 minutes of administration. 100% patients returned to normal status within 30 min of NG administration in all events. • 9 patients had 17 clinically significant hypoglycemia episodes defined as BG < 54 mg/ dL. BG range 42-53 mg/ dL at time of NG admin. 100% achieved BG > 70 mg/dL within 15 min of dosing • Adverse events – nasal discomfort, watery eyes, HA, runny nose, nasal congestion, sneezing, redness of eyes – 3 withdrew from study after 3 months due to severe nasal discomfort. 60% side effects resolved within 1 hour. • Mean BG increased from 55.5 to 113.7 mg/dL within 15 minutes. • Caregivers reported administration as easy/ very easy (93.9%) – could administer within 30 seconds in 60.6% events. No serious adverse effects • Recommendations: Nasal glucagon is an effective and well tolerated option to treat moderate symptomatic hypoglycemia. School nurses must educate	Rescue medication	I	3	A

		associated with severe neuroglycopenia usually resulting in coma or seizure and requiring parenteral therapy US		and train school personnel in the use of NG as state laws allow.				
11. Demir et al. (2019). Effect of education on impaired hypoglycemia awareness and glycemic variability in children and adolescents with type 1 diabetes mellitus	Determine prevalence of impaired hypoglycemia unawareness (IHA) in children and adolescents with T1D using a professional CGM system. Show the effect of structured education on glycemic variability in children and adolescents with IHA.	Prospective N = 37 with diabetes duration > 5 years CGM conducted on all patients x 6 days; Performed ≥ 4 fingerstick BG levels/day and record; hypoglycemia was defined as BG < 70 mg/dL. Those with IHA underwent structured training program. CGM reapplied in 3 months. Turkey	(L): Short follow-up period; small sample size; may not be representative of youth with T1D in US	• Patients diagnosed with IHA by CGM received structured training program on insulin, hypoglycemia training, exercise, BG levels. Seen weekly x3 months and SMBG done 4-6x/day • Those with IHA were hypoglycemia for longer (11.44 +/- 5.12 hours) than those without IHA (1.93 +/- 2.23 hours). • After education, those with IHA were hypoglycemic for 4.44 +/- 3.78 hours. • Recommendations: School nurses should support the use of advanced diabetes technologies that can improve hypoglycemia detection earlier. School nurses should educate and train school personnel on diabetes technologies consistent with state laws.	Education/ Training Technology	II	3	C

12. Driscoll et al. (2015) Are children with type 1 diabetes safe at school? Examining parent perceptions	To describe parent perceptions of children's diabetes care at school including availability of licensed health professionals; staff training; logistics of provision of care; and occurrence and treatment of hypo- and hyper-glycemia; and to examine parents' perceptions of their children's safety and satisfaction in the school environment	A survey of parents of children with TID from permissive states (trained, non-medical school personnel permitted to provide diabetes care; N=237, Texas and Colorado) and non-permissive (only licensed healthcare professionals permitted to provide diabetes care; N=198, Pennsylvania and Massachusetts) states	(S): Analysis of differences between 4 states with differing legal regulations regarding provision of medical care in schools (L): No reporting of school type information such as size, location, employment of school nurse; socioeconomic data not included	• Most parents reported that schools had nurses available for the school day. • Teachers and coaches should be trained. • School nurses, children, and parents frequently provided diabetes care. • Hypo- and hyperglycemia occurred often. • Parents in permissive states perceived children to be as safe and were as satisfied with care as parents in non-permissive states. • Recommendations: Training non-medical staff will maximize safety of children with diabetes when a school nurse is not available.	Care coordination Care planning CPG Education/ Training Leadership/ Advocacy	II	3	B
13. Edraki et al. (2020). The effect of peer education on self-care behaviors and the mean of glycosylated hemoglobin in adolescents with type 1 diabetes: A randomized controlled clinical trial	Investigate the effect of peer education on self-care behaviors and glycosylated hemoglobin among adolescents with T1D	RCT N = 84. (en.irct.ir/IRCT20180904040944N1) At a diabetes clinic in Iran, intervention consisted of 4 training sessions on self-care behaviors by peers with T1D. Control group received routine diabetes education training. Iran	(S): Study design; thorough Methods description including instrumentation and peer training (L): Limited training sessions; single study site; follow-up only to 3 months; may not be representative of youth with T1D in US	• Intervention group reported significantly higher levels of self-care behaviors and lower A1C levels than control group after 3 months. • Control group did not demonstrate an increase in self-care behaviors after 3 months and had an increased A1C after 3 months. • Recommendations: Have utility in school setting through a buddy system when structured programs are not feasible. School nurses should facilitate these relationships.	Mental health	I	2	B

14. Ellis et al. (2019) Adaptation of an evidence-based diabetes management intervention for delivery in community settings: Findings from a pilot randomized effectiveness trial	To adapt an evidence-based intervention with pilot testing using community health workers (CHWs) targeting TID management in poorly controlled TID adolescents who live in high-risk, low-income settings, for use in community settings; addressing multiple treatment systems: child, family, school and health care.	Mixed methods. Used effectiveness – implementation hybrid design to evaluate new intervention, REACH for Control (RFC) (Clinicaltrials.gov NCT02243072) Used two randomized family groups where one group received the intervention (RFC) (n=26), the other, standard care (n=24) Participants were between 10-18 years with mean A1C ≥9%. Families participated in intervention in 3 Phases over 6 months. Examples of modules/ sessions included Problem-solving barriers to diabetes management and developing a school diabetes plan.	(S): Pilot showed statistically significant changes in physical and socio-emotional aspects for participant and family who received RFC; research methodology. (L): Small sample size, conducted at one agency in one location; treatment fidelity and drop-outs	• Primary dependent variables: glycemic control, regimen adherence, quality of life • Participants had statistically significant improvements in A1C and quality of life from baseline. • Satisfaction with the program was measured qualitatively in exit interviews. • Overall program well received and improved family interactions • Treatment dose was mixed, with 59% reporting twice weekly sessions were acceptable, but families were frequently unavailable for the second weekly session. • Changes from the RFC impacted positively both A1C and quality of life. • Research demonstrates the RFC increasing caregiver involvement in care and reducing youth diabetes-related stress contribute to improved health and socio-emotional outcomes. • Recommendations: Additional studies with larger sample sizes expand to ESL participants, use differing agency characteristics	Care coordination Education/ Training Leadership/ Advocacy	II	2	B

15. Erie et al. (2018). Schooling diabetes: Use of continuous glucose monitoring and remote monitors in the home and school settings	To explore real-time and remote CGM practices in homes and schools, including caregiver expectations	Mixed methods; survey Parents (n = 33) of children aged 2-17 years and daytime caregivers (n = 17); caregiver defined as school nurse, daycare teacher, nanny, etc.) Yale Children's T1D Clinic US	(S): Broad range of participants (L): Small sample size may have impacted ability to detect relationship between remote CGM use and age of child; low response rate could be biased toward those with favorable experiences with CGM; most used CGM daily so that results may not be generalizable to those utilizing CGM less frequently; A1C not collected to encourage uninhibited responses; correlation with CGM use could not be assessed; numbers of school nurses not described	• Parents and daytime caregivers typically responded to high and low glucose alerts with SMBG testing before treating. o 39% parents and 35% caregivers indicated they treated lows without SMBG. o > 1/3 daytime caregivers contacted parent for low and high glucose alerts. o Real-time data primarily utilized • 85% parents expected caregiver to respond to alerts and 61% felt caregiver should use CGM data to make decisions. • 65% parents wanted contact from caregiver when responding to alerts. • 89% caregivers felt parental expectations on how they should use CGM data were reasonable. • Qualitative data from parents – less worry and stress, allowed child to more fully participate in activities and develop more independence • Qualitative data from caregivers – use CGM to alert school nurse to highs and lows to help stabilize student before BG too high or low; helps plan day	Care coordination Care planning Technology	II	3	B

				• Newer Dexcom G5 sensor does not require confirmatory SMBG. • Recommendations: School nurses should use CGM to anticipate high and low BG levels through analysis of trend data. CGM use and communication parameters should be included in school management plans (e.g., DMMP, 504 Plan, IHP, ECP).				
16. Evans-Atkinson et al. (2021). Evaluation of a province-wide type 1 diabetes care plan for children in the school setting	Identify perceptions of safety and effectiveness of a provincial (Canada) T1D school care plan. To inform future improvements in school care to accommodate the shifting needs of families, best clinical practices and new medical technologies	Cross sectional survey N = 160 (sent to 537 families with children in British Columbia who were identified as receiving care from Nursing Support Services Coordinators via a care plan in school) A complementary satisfaction and feedback questionnaire was offered to all NSSCs working with children who have a care plan. Data collected Aug 2017 to Feb 2018	(S): Little research on parents' perspectives on school safety for students with T1D (L): Low participation of families in survey; may not be representative of youth with T1D in US	• The majority of parents and coordinators reported the care plan is meeting both safety and diabetes management needs. • Families rated safety higher in schools 6.0/7.0 than coordinators 5.7/7.0. • Diabetes management was rated 5.6/7 by families, and 5.4/7 by coordinators. • Families and coordinators expressed the need for individualization of care, suggested modifications to how information is presented • Recommendations were to support future integration of CGM devices into the school setting.	Care planning Care coordination CPG Education/ Training Technology	II	3	B

17. Fleming et al. (2019). Educational and health outcomes of children treated for type 1 diabetes: Scotland-wide record linkage study of 766,047 children	To determine the association between childhood T1D and educational and health outcomes	Retrospective N = 766,047 (3330 with T1D) from 9 Scotland-wide databases who attended Scottish schools between 2009 and 2013; compared the health and educational outcomes of school children receiving insulin with peers Scotland	(S): Large sample size that investigated broad range of outcomes; nonselective nature of using school-based data versus hospital admissions means that inclusion not restricted to most severe cases (L): No definition for school exclusion; absence and exclusion data available only for 2009, 2010, 2012, only public-school data available (< 5% attend private school); may not be representative of youth with T1D in US	• Children with T1D more likely to be admitted to the hospital, die, be absent from school, and have learning difficulties • Higher A1C associated with greater absenteeism, increased school exclusion, poorer attainment, higher risk unemployment • Recommendations: School nurses should monitor attendance patterns of students with T1D and reinforce the importance of good glycemic control to students and parents.	Academic performance Education/ Training	II	3	B
18. Fortin et al. (2016). Characteristics of children reported to Child Protective Services for medical neglect	To describe group of children reported to Child Protective Services (CPS) for medical neglect; to define the population; to identify prevention and intervention strategies	Retrospective descriptive All patients at pediatric hospital in Chicago reported to CPS for medical neglect over 6-year period (N = 154) US	(S): Builds upon knowledge that children with specific chronic disease face increased risk of neglect (L): Retrospective design; missing data on parental age; patients were from single hospital; only children reported to CPS were included. Study dates not specified	• 140/154 reported to CPS had chronic conditions; T1D most prevalent chronic condition (n = 15, 9.7%) • Majority Black or Hispanic (83%) and publicly insured (90%) • 54% had > 1 CPS report during study period. • Risk factors, stressors, and barriers were transportation, finances, lack of child care. • Recommendations: School nurses should be alert to s/s of medical neglect in students with T1D. They should engage the family and HCP in a collaborative discussion and follow school and state reporting protocols.	Care coordination Mental health	II	3	B

19. Fortin et al. (2016). Missed medical appointments and disease control in children with type 1 diabetes	To describe the frequency of missed appointments in a sample of children with T1D and evaluate the relationship between missed appointments and poor disease control	Retrospective medical record review of patients < 18 years receiving outpatient care for T1D in Chicago from 2007-2011 (N = 1002) US	(S): Large sample size (L): Retrospective design prevents collecting data on family composition, stressors, barriers; study conducted at single institution which can underestimate DKA incidence; cannot establish causation between missed appointments and DKA and high A1C	• Those who missed appointments more likely to be racial minority, publicly insured, treated with premixed insulin • Those with missed appointments had higher incidence DKA and higher A1C. • Increased number of missed appointments associated with higher DKA incidence and higher A1C • Recommendations: School nurses should maintain collaborative communication with students, parents, and HCPs to promote optimal glycemic control.	Care coordination Mental health	II	3	B
20. Foster et al. (2019). State of type 1 diabetes management and outcomes from the T1D Exchange in 2016–2018	To provide snapshot of profile of adults and youth with T1D in US and assess longitudinal changes in T1D and clinical outcomes in T1D registry	Quantitative Multivariate linear regression 2016-2018 (N = 22,697, aged 1-93 years) compared with 2010-2012 (N = 25,529) Severe hypoglycemia defined as loss of consciousness or seizure; DKA event defined as requiring overnight hospitalization US	(S): Large sample size (L): Not population based; all participants treated at endocrine centers focusing on care of T1D; individuals not being seen by endocrine are not represented; uninsured and underinsured likely underrepresented; reporting of devices may be overestimates and those meeting ADA targets likely overestimated	• Increases noted in use of CSII from 57% to 63% and in CGM use from 7% to 30%, rising fastest < 12 years old • A1C lower in CSII and CGM users than nonusers • Severe hypoglycemia most frequent in those ≥ 50 years • CSII associated with lower frequency severe hypoglycemia and even lower with use of concomitant CGM • DKA most common in adolescents and young adults; fewer DKA events with CSII and CGM	Leadership/ Advocacy Technology	I	3	A

				• Racial disparities exist with CSII and CGM in all groups. • A1C higher in African Americans than Non-Hispanic Whites and Hispanics • Recommendations: School nurses should support the use of advanced diabetes technologies that improve health outcomes for students.				
21. Fried et al. (2020). Lessons from schools with high levels of support for students with type 1 diabetes: A qualitative study	To investigate how schools provide support for the psychosocial well-being and disease management of students with T1D in Western Australia	Qualitative, semi-structured interviews averaging 32 minutes N = 35 participants from 10 different schools: 6 students, 3 parents, 2 school nurses, 7 teachers, 6 principals, 11 other school admin/supports; no dates for data collection reported; participant demographics not reported	(S): Development of conceptual model to inform supporting students at school with T1D; variety of schools (L): Only interviewed schools with high level of supports; may not be representative of youth with T1D in US	• Three themes of the various ways schools provided support: (a) school characteristics – knowledgeable staff, flexible, inclusive; (b) interpersonal support – disease management, academic support, emotional support, independence, autonomy, peer support; and (c) organizational support – roles, planning and supporting, transitions. • Developed a conceptual model of support from findings	Care coordination Care planning Education/ Training Leadership/ Advocacy Mental health	I	3	A
22. Fried et al. (2018). The school experiences of children and adolescents with type 1 diabetes in Western Australia	To describe the mental health and the school experiences of children and adolescents with T1D attending mainstream schools in Western Australia	Parents of children aged 6-18 years with T1D and currently attending a mainstream school in Western Australia N = 92 parents/ guardians participated out of	(S): Added to research on parents' perceptions of school experiences with T1D children (L): Low response rate; self-report survey; perceptions of child not included; may not be representative of youth with T1D in US	• School support for T1D self-management is variable and often dependent on the caring nature of individual teachers. • Some concern expressed by parents of poor teacher knowledge of T1D, the impact of the transition	Care coordination Care planning Education/ Training Leadership/ Advocacy	II	3	B

		848 potential. Data collected March through August 2016		to secondary school on their children's T1D self-management and emotional well-being, and the lack of communication between school and home • Communication between students with T1D and teachers must also improve so that student medical and psychosocial needs can be attended to.	Mental health			
23. Gurkan et al. (2019). Effects of a home-based nursing intervention program among adolescents with type 1 diabetes	To investigate the effects of a home-based nursing intervention program based on the Health Promotion Model on the outcomes of adolescents with T1D	Quasi-experimental pretest/posttest control group; RCT (Non-Invasive Clinical Studies Evaluation Commission, Decree No: 2015/14-12; Date: 8.05.2015 and 2123-GOA protocol number) N = 71 adolescents aged 13-17 years old from pediatric endocrinology outpatient clinics of 2 hospitals Data collection at baseline, 3 months, 6 months after 5-week intervention program; home based intervention consisted of 5 weekly visits covering topics from training	(S): Large sample size; training booklet underwent content analysis and expert review. (L): Standard care not described; limited intervention time; lack of psychologist or social worker on team; Health Promotion Model does not have separate subscales for nutrition, exercise, treatment; self-selection bias; may not be representative of youth with T1D in US	• Training booklet contents: Insulin therapy, diabetes complications, nutrition therapy, diabetes management at school, self-monitoring, supporting group and family • Intervention group showed significantly lower A1C scores, higher self-efficacy scores, higher responsibility and management scores than control group. • Intervention group had lower hospital admissions and lower costs associated with T1D than control group. • Recommendations: School nurses should maintain collaborative communication with students, parents, and HCPs to promote optimal glycemic control. School nurses	Care coordination Education/ Training	I	2	A

		booklet, text reminders Turkey		can reinforce previously learned knowledge of students and parents.				
24. Hamburger et al. (2020). Sleep and depressive symptoms in adolescents with type 1 diabetes not meeting glycemic targets	To assess depressive symptoms and sleep in relation to diabetes indicators in adolescents with T1D	Cross-sectional secondary analysis of data collected for RCT. (Clinicaltrials.gov NCT02746627) N = 120 adolescents aged 13-17 years with poor glycemic control (A1C 8%-12%)	(S): Sample size; focused on children with poor glycemic control (L): Self-report bias; cross-sectional design; poor glycemic control may put adolescents at higher risk from depressive s/s	• 40% had mild depressive symptoms. • 26% reported clinically significant sleep disturbances (comparable to other studies on adolescents with T1D). • Those with sleep disturbances more likely to report mild s/s of depression • Depressive symptoms and sleep quality associated with poorer diabetes management • Sleep and depression screening measures important for adolescents with T1D • Recommendations: School nurses should screen students at risk for sleep disorders and depression.	Mental health	I	3	B
25. Herbert et al. (2015). Relations among school/daycare functioning, fear of hypoglycemia and quality of life in parents of young children with type 1 diabetes	To investigate the T1D related school/daycare experiences of parents of young children; to examine the relationship among child school/daycare functioning, parent fear of hypoglycemia and parent T1D-related quality of life	Descriptive correlation; cross-sectional survey design N=134 parents recruited from 3 tertiary care endocrinology clinics Majority of participant parents were 90% female and 78% White. Average age of the	(S): Adds to research understanding needs of parents of very young children with T1D in schools and daycare (L): Homogeneous population (White, married, middle to upper-class mothers); self-reported data; cross-sectional design.	• Parents of younger children, children on a more intensive medical regimen and children who had experienced T1D related unconsciousness or seizures had more school/daycare concerns. • Parents who perceived their children had higher school/daycare functioning had less fear about hypoglycemia and	Care coordination Care planning	II	3	B

		child was 5.33 years of age. US		reported better T1D related quality of life. • School/daycare functioning and fear of hypoglycemia were significantly associated with parent T1D-related quality of life.				
26. Hood et al. (2018). Preventing diabetes distress in adolescents with type 1 diabetes: Results 1 year after participation in the STePS program	To report 1-year outcomes of the STePS program for adolescents with T1D	RCT N = 264 adolescents (60% female; 65% White) aged 14-18 years in 2 US locations comparing Penn Resilience Program for type 1 diabetes (PRP T1D) to advance diabetes education intervention (EI). (Clinicaltrials.gov NCT01490619) Interventions spanned 4.5 months. Assessments completed at baseline, and at 4.5, 8, 12, and 16 months	(S): Diverse sample; high retention rate over time (92%); large sample increases representativeness and generalizability to youths with T1D, although age was restricted to 14-18. (L): Study limited to English-speaking participants; those with depressive symptoms excluded, a group which could benefit from this intervention	• PRP T1D teaches cognitive-behavioral, and social problem-solving skills in group format and led by Masters-level clinicians. • EI led by CDCES (formerly known as CDEs); focuses on nutrition, exercise, insulin review, diabetes technologies • Both programs consisted of 9 biweekly sessions of 90-120 minutes. • Outcomes measure diabetes distress (DD), depressive symptoms, resilience, diabetes self-management, glycemic control. • DD positively correlated with depressive symptoms and A1C and negatively correlated with diabetes management, resilience. • DD decreased over time in both groups with greater improvement in PRP T1D group. • Diabetes management declined over time in both groups.	Care coordination Care planning Mental health	I	2	A

27. Iturralde et al. (2019). Diabetes-related emotional distress over time	To characterize adolescents' trajectories of diabetes-related distress (DRD) over time; to examine associations between trajectory group membership and demographic and clinical characteristics of youth; to identify baseline predictors of chronic DRD	Secondary analysis of data from the STePS depression prevention clinical trial in US (Hood et al., 2018) N = 264 adolescents (14-18 years old) with T1D randomly assigned to resilience (n = 133) or education intervention (n =131); 9 group sessions every 2 weeks over 16 months	(S): Provides longitudinal data on DRD; most studies are cross-sectional; large sample size; randomization (L): It is possible that some DRD improvement is due to STePS study intervention, especially the resilience intervention; categorization of 4 trajectory classes based on clinical judgment rather than best statistical fit; most severe DRD trajectory had only 19 members, limiting generalizability of the group's attributes; no nonintervention group so unable to assess how DRD would progress without intervention	• Measures: Problem Areas in Diabetes-Teen version (higher values indicate higher levels diabetes distress); demographics and diabetes related characteristics; Children's Depression Inventory; State-Trait Anxiety Inventory; A1C, Self-Care Inventory • Categorized into 4 DRD trajectory groups (low, improving, stable moderate, stable high) • Stable high and stable moderate had highest A1Cs, lowest self-care skills, highest levels of depressive and anxious symptoms, lowest levels problem-solving ability. • Low DRD group 59.8% boys, had lowest baseline A1C, lowest levels depressive and anxious symptoms, highest level self-care behaviors, coping efficacy, problem-solving ability. • Predictors of chronic DRD: girls (3x higher odds than boys; higher A1C; higher scores on depression scale. • 2/3 youth improved over time.	Care coordination Care planning Mental health	I	3	B

28. Johansen et al. (2015). Prevalence and predictors of severe hypoglycemia in Danish children and adolescents with diabetes	To evaluate prevalence and predictors of severe hypoglycemia in Danish children and adolescents with T1D on modern treatment modalities over last decade	DanDiabKids population- based registry of 18 diabetes centers; study period 1998-2009 N = 3320 (0-18 years) Denmark	(S): Large sample; all receive same medical care, but some areas have access to 24h hotline. So there may be minor differences. (L): No data on parental education, insurance, family structure, income which can affect number of hypoglycemia events; may not be representative of youth with T1D in US	• Severe hypoglycemia events less frequent with CSII than insulin pen. • Severe hypoglycemia events fewer with ≥ 5 multiple daily injections • Severe hypoglycemia more common with longer diabetes duration • No association between A1C and severe hypoglycemia risk • Youngest and older had highest incidence severe hypoglycemia • Recommendations: School nurses should include severe hypoglycemia history, treatment, and response in IHP and ECP. School nurses must educate and train school personnel in care of students with T1D.	Care planning Education/ Training	I	3	A
29. Joiner et al. (2020). Perceptions and experiences of living with type 1 diabetes among Latino adolescents and parents with limited English proficiency	To explore perceptions and experiences of Latinos with T1D and parents with limited English proficiency (LEP)	Qualitative – Semi-structured interviews conducted in English or Spanish or both Latino adolescents aged 12-19 years with T1D and their parents (N=24) US	(S): Builds on limited body literature on cultural aspects of T1D (L): Recruitment from single setting; setting has Spanish speaking clinicians conducting monthly clinics so that parents may have more resources than is typical; Latino culture heterogeneous so this may not be reflective of all Latinos; interviews were conducted with parent-adolescent pair together, which may have limited some of responses.	• Themes: Understanding and adapting to T1D; coming to terms with social and environmental influences on T1D self-management; integrating T1D self-management expectations with Latino culture (family first, food, spirituality and religion, parental views of health care in US) ○ Parents but not adolescents were concerned about fitting in cultural foods.	Care planning	I	3	A

				○ Religion important to parents and adolescents ○ Difficult in US to find resources in Spanish • Recommendations: School nurses need to incorporate cultural aspects into T1D plan of care when appropriate.				
30. Jones et al. (2015). Association between school district policies that address chronic health conditions of students and professional development for school nurses on such policies	To determine whether districts with policies requiring schools to provide health services to students with chronic health conditions were significantly more likely to provide funding for professional development (PD) than districts without such policies	Cross-sectional 2012 SHPPS data N = 660 US	(L): Lack of data on quality or district policies and practices and potential for under or overreporting of required policies or PD offerings; SHPPS data limit identification of mediating variables.	• Number of districts providing funding or offering of PD on topics related to chronic health conditions significantly higher among districts requiring schools to provide those services • Above was true even when required service was not directly related to PD topic. • Establishing district policies related to health services for students with chronic health conditions may be first step toward securing PD funding.	Education/ Training Leadership/ Advocacy	II	3	B
31. Karges et al. (2017). Association of insulin pump therapy vs insulin injection therapy with severe hypoglycemia, ketoacidosis, and glycemic control among children, adolescents, and young adults with type 1 diabetes	To determine whether rates of severe hypoglycemia and DKA are lower with CSII therapy compared with insulin injection therapy in children, adolescents, and young adults with T1D Severe hypoglycemia	Prospective population-based matched cohort study of 446 diabetes centers in Germany, Austria, Luxembourg. N = 30,579 Germany, Austria, Luxembourg	(S): Large nationwide sample; capture rate of 80%; matched pair study design (L): Nonrandomized, observational design; factors relevant to severe hypoglycemia and DKA risk not addressed (education, motivation, family support, mental health); length of CSII use not analyzed; newer users	• CSII associated with lower rates of severe hypoglycemia, hypoglycemic coma and DKA than multiple daily injections (MDI). • CSII associated with lower A1C than MDI. • CSII associated with lower total daily insulin dose than MDI. • CSII associated with higher BGM frequency than MDI.	Education/ Training Technology	I	3	A

	defined as requiring third party assistance		may have higher rates of short-term complications. CGM has been shown to reduce hypoglycemia events but not analyzed in this study. May not be representative of youth with T1D in US	• Lower risk DKA with CSII related to higher BGM frequency • Recommendations: CSII is an effective means of optimizing glycemic control and preventing severe hypoglycemia and DKA. School nurses should support the use of advanced diabetes technologies that improve health outcomes for students.				

32. Kise et al. (2017). Improving school experiences for adolescents with type 1 diabetes	Identify ways in which schools can create positive environments and improve experiences and outcomes for adolescents with T1D.	Integrative literature review
		
		N = 27
			(S): Methods well described; review specific to T1D rather than chronic conditions in general
			
			(L): None noted by author
				• Concerns from students/parents: lack of full-time school nurse, lack of teacher knowledge about T1D, lack of access to diabetes supplies, lack of freedom to perform diabetes self-management, lack of nutritional info in cafeteria, lack of communication between parents and school personnel, missing school
				• School nurses only moderately confident in T1D care
				• Recommendations:
				  ◦ Full-time school nurse presence
				  ◦ Education/training for school personnel
				  ◦ Continuing education for school nurses (conferences, webinars, in-services, current materials)
					Care coordination
					
					Care planning
					
					CPG
					
					Education/ Training
					
					Leadership/ Advocacy
					
					Mental health
						I	4	A

				○ School nurses should create policies and plans of care that ensure students will have full access to supplies and storage, access to testing and treatment of hypoglycemia. ○ School nurses should work with cafeteria to provide better nutritional information. ○ School nurses should collaborate and communicate with parents, students, and HCPs.				
33. Klein & Evans-Agnew (2019). Flying by the seat of their pants: A grounded theory of school nurse case management	To develop a theory describing the processes and actions involved with school nurse case management for school-age children with chronic conditions in the K-12 system	Grounded theory Semi-structured interviews in person and via conference N = 12 school nurses US	(S): Methods clearly described (L): Web conferencing interview process may have intimidated some; geographical constraints limit generalizability.	• Navigating poor system supports included barriers in and out of the organization (internal processes, communication, caseload, time) • Balancing multiple roles (direct care, liaison, training others) was difficult. • Lack of guidance and training (case management manual, lack of resources, need for guidance, mastering the plan) problematic • Imperfect functioning (reliance on coworkers, using to-do lists, case management knowledge) was a barrier to case management.	Education/ Training Leadership/ Advocacy	I	3	A

				• Recommendations: School nurses should advance standards of practice to improve case management training, engage in leadership and advocacy efforts to reduce caseload and increase numbers of school nurses, participate in informatics quality improvement to improve functioning, and engage in advocacy for public health actions to advance health promotion roles of school nurses.				
34. Knauer et al. (2015). The mismatch between children's health needs and school resources	To gain policymakers and school health leaders perspectives to identify ways in which schools are successful in supporting needs of children with special healthcare needs (CSHCN); delineate challenges schools face in supporting CSHCN; and inform strategies to improve ability of schools to meet responsibilities of ensuring safety and access to educational services of CSHCN	Qualitative interviews N = 17 key informants (state-level directors of education and health departments and legislators [n = 6]; school district superintendents/ administrators for special education and health services [n = 4]; county-level health and human services administrators [n = 2]; pediatricians [n = 2]; other [n = 3]) and a 14-member school nurse advisory council US	(L): Purposive sampling; some aspects of school health may not have been captured. Response bias; limited generalizability	• Those without IEP may not have health needs identified. • Insufficient numbers of school health personnel due to allocation of public funds • Necessary communication may be inadequate due to lack of school health personnel. Lack of coordination between HCP, specialists, schools, school nurses, families • Requirements for data collection and monitoring health outcomes limited and funding decisions made without full information	Care coordination Care planning Leadership/ Advocacy	I	3	A

				• California has weak requirements governing school health, earmarks very little funding for school health staffing/ services, and provides little guidance related to chronic condition management. • Recommendations: School nurses should engage in data collection and use of information technology, create a standardized process for referrals between schools and outside agencies, create partnerships between schools and county mental health services, and standardize reporting. School nurses should advocate for funding and resources to put these actions in place.				
35. Knight & Perfect (2019). Glycemic control influences on academic performance in youth with type 1 diabetes	To examine the impact of glucose fluctuations measured by CGM across a specified time period on academic tasks *Hypothesis 1:* Individuals with hyperglycemia during standardized testing will perform significantly worse than individuals with glucose levels in target range.	Quantitative correlational Hypothesis 1: N = 67 Hypothesis 2: N = 83 US	(S): Fills gap in research literature; data support the importance of real-time assessment of glucose levels to ascertain the potential immediate impacts on student performance; blinded CGM and blinded researchers; 58% Hispanic/Latino/ Mexican (L): CGM stopped working in some. Because researchers were blinded, unable to determine functionality	• Test areas included reading and writing fluency, math calculations, spelling. • Students outside the target range (70-140 mg/dL) performed lower than students who evidenced good glycemic control during testing on reading and writing fluency tasks. • Prolonged hypoglycemia preceding testing had noticeable influences in multiple academic domains.	Academic performance Care planning Education/ Training Technology	II	3	B

	Hypothesis 2: The frequency and duration of hyperglycemic and hypoglycemia episodes during the 12 hours preceding standardized testing will significantly correlate with lower test scores.		of CGM; some were no longer wearing CGM during evaluation. Study did not document glycemic history prior to study period. Limited generalizability to other ethnicities and geographical locations	• Recommendations: Care planning should recommend students check BG before assessments. 504 Plan accommodations such as use of a spell checker, extra test time, decreased amount of written work for mastery for students who frequently experience severe hyperglycemic episodes or prolonged hypoglycemic episodes can be beneficial. Postponing assessments until BG is in target range should be considered.				
36. Kobos et al. (2020). Actual and perceived knowledge of type 1 diabetes mellitus among school nurses	To assess actual and perceived diabetes knowledge among school nurses	Cross-sectional 17 primary care facilities employing 230 school nurses (N = 202 completed materials) Poland	(S): Good reliability of instrumentation (DKQ = 0.81; SADK = 0.93); validated in pilot study previously (L): Small sample size (per author); use of new instrumentation; may not be representative of youth with T1D in US	• Assess actual diabetes knowledge (Diabetes Knowledge Questionnaire = DKQ) and perceived diabetes knowledge (Self-Assessed Diabetes Knowledge = SADK). • Instruments assessed 7 domains: general diabetes knowledge; insulin and glucagon; CSII; diabetes complications; nutrition, physical activity; and glycemia measurements. • DKQ correct responses = 46.7% and was correlated with SADK. • In 6/7 domains, school nurses perceived their diabetes knowledge better compared with actual knowledge.	Education/ Training Leadership/ Advocacy	I	3	A

				• Increased diabetes knowledge associated with higher education and participation in diabetes training but not with increased experience with children with T1D • Recommendations: School nurses need to advocate for resources to improve diabetes knowledge.				
37. Lai et al. (2021). Racial and ethnic disparities in rates of continuous glucose monitor initiation and continued use in children with type 1 diabetes	Compare CGM initiation rates and continued use among non-Hispanic White (NHW), non-Hispanic Black (NHB), and Hispanic children.	Retrospective review including children with T1D between January 1, 2015 and December 31, 2018 N = 1509 eligible children with T1D < 17 years old living in PA (all children with T1D living in PA have access to CGM); 73% NHW (n = 1105), 18% NHB (n = 279), 8% Hispanic (n = 125) US	(S): Large diverse population; standardized data collection of CGM use; similar insurance access through Medicaid coverage of children with PA. (L): Single center data may not be generalizable. Inability to analyze whether CGM technology advances may have influenced rates of sustained use; retrospective design	• Data extracted at baseline, 6 months. and 1 year • 726 (48%) started CGM (600 NHW [54%], 85 NHB [31%], 41 Hispanic [33%]). • NHW children twice as likely than NHB and Hispanic children to start CGM regardless of insurance type • In children starting CGM > 1 year after diagnosis. NHB children had higher median A1Cs than NHW children at start of CGM. • Of those starting CGM < age 17 years, 83% still using CGM 1 year later • Fewer NHB children (61%) continued CGM at 1 year compared to NHW (86%) and Hispanic children (85%). • Of those starting CGM, NHW children were 4.1 times more likely than NHB children to be using CGM at 1 year.	Care coordination Leadership/ Advocacy Technology	I	3	A

38. Leinwand et al. (2020). A ready-to-use liquid glucagon for treatment of severe hypoglycemia demonstrates reduced healthcare payer costs in a budget impact model.	To model the annual value of a novel ready-to-use, room temperature stable liquid glucagon rescue pen (GRP) and prefilled syringe (G-PFS) for treatment of severe hypoglycemia events versus lyophilized powder glucagon emergency kits (GEK)	Cost analysis comparison between GRP/G-PFS and GEK and no kit	(S): Contributes to small body of knowledge on cost comparisons
			
			(L): Reliance on assumptions based on expert opinion for key variables (ambulance calls, ambulance transport to ED, non-ambulance transport to ED); Medicare fee schedule used to standardize costs due to variability in commercial plan reimbursement may underestimate cost savings as commercial reimbursement rates are higher; lacks real-world evidence for usability
				• One year budget impact model from US healthcare plan perspective on 1 million covered lives
				• Cost-offsets from successful administration included EMS, ED, inpatient (IP), and outpatient (OP) utilization.
				• Costs derived from 2018 Medicare fee schedule and adjusted to represent commercial payer costs
				• GRP and G-PFS led to fewer EMS, ED, IP, OP costs compared to GEK and no kit. Total severe hypoglycemia costs:
				  o $2564 (GRP and G-PFS)
				  o $3606 (GEK)
				  o $3849 (no kit)
				• Cost savings arise from ease of use and successful administration.
				• Recommendations: Ready-to-use liquid glucagon was FDA approved late 2019 and shows promise as a treatment for severe hypoglycemia.
					Rescue medication	I	3	A

39. Lipman et al. (2020). Insulin pump use in children with type 1 diabetes: Over a decade of disparities	To determine if the gap in CSII use among Black (NHB) and White (NHW) youth with T1D has widened or narrowed over the past decade	Retrospective chart review of CSII usage by race (NHW/NHB) in 2005 and race/ethnicity (NHW/NHB/Hispanic) in 2011-2019
		
		Children with T1D ≤ 18 years, attending outpatient clinic appointment in select years; N = 1040 (2011) – 1519 (2019)
		
		US
			(S): Large sample size; ability to compare data over 10 years
			
			(L): Retrospective design; single center urban setting may limit generalizability; study did not examine potential causes of disparity. Cultural factors may contribute whereas NHW favor a child-centered approach and NHB favor a family-centered approach.
				• Data extracted every 2nd year 2011-2020
				• 2011-2019
				  o NHW population: 78.3%-83.5%
				  o NHB population: 13.5%-14.7%
				  o Hispanic population: 5%-7.9%
				  o NHW had lower A1C and more likely to have commercial insurance than NHB/Hispanic
				• 2011-2019: NHW used CSII 2.6-3.2x more than NHB; Hispanic children used CSII at 1.3x rate of NHB.
				• In all years, significantly more NHB than NHW had government insurance, but not always compared to Hispanic population.
				• Regardless of SES, NHW significantly more likely to be treated with CSII
				• Even with government insurance, NHW were treated 2x as often with CSII than NHB with government insurance. Similar in children with commercial insurance
				• NHW with government insurance were 1.4-1.7x more likely than NHB with commercial insurance to be prescribed CSII 2011-2019.
					Care coordination
					
					Technology
						I	3	A

40. Lipman et al. (2021). Racial disparities in treatment and outcomes of children with type 1 diabetes	To quantify racial and ethnic disparities in large urban pediatric center by comparing treatment modalities, clinical outcomes, and appointment attendance in Non-Hispanic Black (NHB), Non-Hispanic White (NHW), and Hispanic children while examining contribution of insurance status (proxy for SES)	Retrospective electronic chart review over 14 months Children with T1D < 18 years old attending large tertiary care diabetes center in US N = 1331 (n = 1026 [77%] NHW; n = 198 [15%] NHB; n = 107 [8%] Hispanic)	(S): Large sample size; inclusion of all patients in clinic providing real-world data (L): Retrospective design; incomplete assessment of SES; inability to discern if CSII/GGM offered and refused or not offered; single center study may limit generalizability of results	• Outcome measures: healthcare utilization (appointments, ED visits, hospitalizations), technology (CSII, CGM), A1C • Government insurance: n = 358 (60% NHB; 53% Hispanic; 18% NHW) • NHB had higher A1C, more ED visits and hospitalizations, and were less likely to be treated with CSII or CGM than NHW children. • Hospitalization over study period: NHB (18%); Hispanic (10%); NHW (3%). Odds ratio NHB compared to NHW 7.7x higher; Hispanic children compared to NHW children 4x higher. Disparities most significant among commercially insured children • More NHB and Hispanic children attended diabetes education appointments than NHW but had 2x as many missed appointments as NHW. • Technology: NHW children treated with CSII > 2x as frequently as NHB and 1.3x that of Hispanic children. Children with government insurance less likely to use CSII; NHW with government insurance more likely than NHB with commercial insurance	Care coordination	I	3	A

				to use CSII and CGM; CGM more likely to be used by NHW than NHB or Hispanic children, regardless of insurance status • A1C: NHW 7.8%; Hispanic 8.6%; NHB 9.4%; pattern observed in both government and commercially insured patients				
41. Lord et al. (2015). Staying positive: Positive affect as a predictor of resilience in adolescents with type 1 diabetes	To describe positive affect (observational and self-report) as a protective process in adolescents with T1D; to examine associations between positive affect, glycemic control, quality of life, and psychological symptoms	Prospective, observational design with 15-minute taped video discussion of a stressful diabetes-related topic related to the child's T1D Measures at baseline and 6 months (T2) N = 93 adolescents aged 10-16 years and their mothers (12 lost to follow-up at 6 months)	(S): Observational and longitudinal design; sample had good glycemic control with 43% meeting recommended targets. (L): Homogeneous sample (90.2% non-Hispanic; high SES status; good glycemic control); sample size limited power to detect smaller effects; larger sample may reveal differences in positive affect related to age and gender; low rate of participation may limit generalizability	• Measures: Demographics, diabetes-related stress, self-reported positive affect (PANAS scale), observed positive affect, glycemic control, internalizing (e.g. anxiety, depression) and externalizing problems (behavioral problems), quality of life • Baseline A1C 7.6%, fairly high quality of life but negatively correlated with diabetes duration at baseline and T2 • Non-White participants had higher A1C at baseline and at T2. • Non-White race/ ethnicity had higher externalizing problems at T2 than Whites. • Higher levels positive affect on PANAS correlated with lower levels internalizing and externalizing problems at baseline and at T2 and with better glycemic control at T2.	Mental health	II	3	B

				• Regression model: Higher levels positive affect predicted improvements in A1C at T2. • Positive affect can be developed through targeted interventions.				
42. MacMillan et al. (2015). Supporting participation in physical education at school in youth with type 1 diabetes: Perceptions of teachers, youth with type 1 diabetes, parents and diabetes professionals	To explore perceptions of facilitators and barriers to physical education (PE) in youth with T1D; to determine how schools can help these individuals to be physically active in Scotland	Qualitative research using focus groups; interviews and focus groups of 30-45 minutes with youth with T1D aged 7–9 (n = 8) and 12–14 (n = 8) years with T1D, their parents (n = 16), diabetes professionals (n = 9) and schoolteachers (n = 37)	(S): Fills gap in research with perceptions of multiple students and other school personnel (L): All participants from one city in Scotland; no data on ethnic or racial groups; may not be representative of youth with T1D in US	• Four main themes relating to support needs of youth with diabetes in school in general and specifically in PE lessons: (1) differences between primary and secondary schools; (2) areas requiring address in all schools; (3) what teachers can do to help accommodate youth with T1D; and (4) what schools can do to help accommodate youth with T1D. • Recommendations: ∘ Teachers need more education about T1D and PE. ∘ Teachers would like training from diabetes professionals. ∘ School personnel need better communication about the existence of T1D in their students.	Care coordination Care planning CPG Education/ Training	II	3	A

43. March et al. (2020). Modern diabetes devices in the school setting: Perspectives from school nurses	To explore the experiences, practices, and attitudes of school nurses related to modern diabetes devices	Qualitative semi-structured interviews with K-8 public school nurses in PA with experience caring for children with CGM, CSII, and/or hybrid-closed loop insulin infusion systems N = 40 US	(S): Diverse geographic settings, educational backgrounds, and years of school nursing practice; large sample size (L): Limited generalizability outside PA due to varying state regulations regarding diabetes care in the school setting	• School nurses need skills with devices and desire more formal training. • Enthusiasm for devices tempered by concerns about implementation (e.g., students showing up to school with devices, school nurse distrust of technology, remote monitoring by family interfered with school nurse duties) • Barriers to device implementation identified – inadequate internet, school/classroom policies prohibiting student use of Wi-Fi (CGM requires Bluetooth to share data), lack of clear policies and guidelines related to CGM monitoring by school nurse. Many had district policies regarding use of CGM sharing apps on their smartphones, privacy concerns, variable staff engagement. • Limited collaboration between HCP and school nurses resulting in legal concerns about taking orders from parents; school nurses often didn't receive timely updated HCP orders for students. • Recommendations: Collaborative school-based care model; additional structured	Education/Training Leadership/Advocacy Technology	I	3	A

				diabetes technology training for school nurses and staff; drafting of relevant school and district policies				
44. McCabe et al. (2020). School nurses matter: Relationship between school nurse employment policies and chronic health condition policies in U.S. school districts	Examine whether having a district-level policy on full-time (FT) or part-time (PT) school nurses' (SN) employment was associated with having district-level policies on chronic health conditions (CHCs); determine whether the characteristics of school district policies on school nurses' employment varied by US region and locale.	Analysis using complex sampling of the 2016 School Health Policies and Practices Survey (SHPPS) from the CDC; nationally representative sample of all public and private schools in the U.S Unit of analysis = school district N = 521 school districts completing both the health services survey component of SHPPS data and SN employment policy data	(S): Large nationally representative sample (L): Cross-sectional data cannot determine causal relationships between SN employment policies and the presence of health policies. Respondents' job titles unclear and may vary from district to district; policies may exist but may not be implemented in the district.	• Study measures: Yes/No on whether district has adopted policy on FT and PT SNs; Yes/No to 5 selected health policies on chronic condition management from SHPPS 2016. • Districts classified by state, metropolitan locale status (city, suburb, urban, rural), region as identified by US Census Bureau (Northeast, South, Midwest, West). • 52% reported having policy on FT/PT employment • 65.9-76.8% districts had policies on 5 selected health indicators. • Presence of SN employment policy significantly correlated with presence of policies on 5 key health services for CHCs. • Policies on SN employment: Northeast 75.4%; South 57.4%; Midwest 43.8%; West (34%). City 69.3%; town 43.9%; rural (48.6%); suburb (60.6%). • Policies on CHC management: Northeast had highest % for all 5 health services.	Care coordination Care planning	II	3	B

45. McCollum & O'Grady (2020). Diminished school-based support for the management of type 1 diabetes in adolescents compared to younger children	To evaluate diabetes management at school in a large cohort of adolescents with T1D and to compare level of support provided to adolescents with that provided to younger children	Cross-sectional survey distributed November 2014 to June 2015 to adolescents aged 12-18 years in the Republic of Ireland attending regional or tertiary care diabetes center Questionnaire piloted and created by PI of study N = 405	(S): Survey captured perceived support of adolescents; first study to report T1D management in schools from adolescent perspective; response rate 41%; large sample size (L): No record of number of surveys distributed vs. returned; simple statistical analysis with Excel spreadsheets; overestimation of number on CSII due to recruitment setting; unexplained nonuse of multiple daily injection (MDI) modality; self-selection and self-report; Ireland's school system and healthcare system structure and function vary from US.	• Ireland has no legal requirement for creation of ECPs and DMMPs, education and training of school personnel, school nurse presence. • Only 79% (272/343) of those requiring mealtime insulin reported insulin administration at school. • 12% of those on MDI do not administer during school hours. • Presence of written DMMP associated with CSII modality and younger age • Deficits in support to adolescents include lack of DMMP, lack of school staff training, activity restrictions; 58% MDI given in bathrooms (more girls than boys) vs. 85% CSII given in classroom. • Lack of policies requiring emergency plans and few schools with school nurses may be contributing to poorer outcomes in management of T1D.	Care coordination Care planning Education/ Training Leadership/ Advocacy	II	3	B
46. Messaaoui et al. (2019). Flash glucose monitoring accepted in daily life of children and adolescents with type 1 diabetes and reduction of severe hypoglycemia in real-life use.	Describe the use of FGM and T1D outcomes in children and adolescents 1 year after reimbursement.	Observational prospective; measured at baseline, 1st visit, and 12 months; aged 4-20 years N = 334 (278 with FGM) Belgium	(L): Similar A1C in both groups; most patients used same insulin modality which may not yield robust results. May not be representative of youth with T1D in US	• FGM group had fewer severe hypoglycemia events than SMBG. • No changes in A1C in either group (both groups had good glycemic control at start) • Those who reverted back to SMBG had	Care planning Education/ Training Technology	II	3	B

				longer diabetes duration and did so primarily because of adverse events (skin reactions, tech issues). • School nurses should support the use of advanced diabetes technologies that improve health outcomes for students.				
47. Miller et al. (2016). Prevalence and costs of five chronic conditions in children	To examine prevalence and healthcare costs associated with asthma, food allergies, epilepsy, diabetes, hypertension among children aged 0–18 years, which can inform school nurse practice	Data analysis from 2005–2012 Medical Expenditure Panel Surveys (MEPS). Data analysis: Odd ratios, estimate of medical expenditures while controlling for a variety of variables; two-part models Linked data set N = 67,733; n = 8,034 with at least one chronic condition	(S): Data analyses mechanisms and procedures (L): Issues within MEPS of underreporting; ICD9 coding errors; diabetes not separated by type.	• > 60% with private insurance; 59.4% middle and high income • Children and adolescents with diabetes incur an additional $6702.30 per child in healthcare costs per year, compared to those without diabetes. • Care coordination provided by school nurses optimizes health and learning by improving communication between school, parents, and HCPs to ensure appropriate care is in place.	Care coordination	II	3	B
48. Nieto-Eugenio et al. (2020). S.O.S! My child is at school: A hermeneutic of the experience of living a chronic disease in the school environment	To understand the experience of living a chronic disease in the school from the perspective of the parents	Qualitative, grounded theory using semi-structured surveys Examined perspective of the parents (N = 14) with children aged 3-11 years old in Spain who have T1D (n = 6) and severe food allergies (n= 8);	(S): Limited research on parents' perceptions of care of child with chronic condition in schools; adding to gaps in knowledge (L): Lack of demographic heterogeneity in sample; most respondents were the mothers in family; may not be representative of youth with T1D in US.	• 3 main themes: (a) SOS! My child is at school; (b) The systems (don't) answer; (c) Families answer. • Family perception of teacher knowledge and understanding of life-threatening consequences for these diseases was poor.	Care coordination Education/ Training Leadership/ Advocacy	II	3	A

		constant comparative method was used for the analysis.		• Lack of sufficient sensitivity on part of school staff. Parents reported difficulty navigating health and education, finding health resources, answers to questions, believed having school nurse helped with support, education and understanding. • Authors recommend more ethnographic studies to more clearly articulate parents' and students' perceptions. • Call for school nurses in buildings. Parents report having a school nurse was a "life-saver." • Safety and trust in education system to adequately care for life-threatening consequences and plan for potential adverse outcomes • Need for support for parents as well as student regarding health education • Desire that all school staff aware of child's disease and demonstrate sensitive and caring attitudes • School needs to address safety, physical and emotional needs of student.				

49. Petruzelkova et al. (2021). Pre-school and school-aged children benefit from the switch from a sensor-augmented pump to an AndroidAPS hybrid closed loop: A retrospective analysis	To test the efficacy and safety of an open-source automated insulin delivery system AndroidAPS in pre-school and school-age children	Retrospective N = 36 (n = 18 aged 3-7 years; n = 18 aged 8-14 years) Czech Republic	(S): Population age as there are few studies in home setting for this age group (L): Retrospective design; self-reported data; short study period; study population with good glycemic control at baseline; parents highly motivated so it is difficult to evaluate safety/efficacy with low parental support, poor adherence, or suboptimal glycemic control; not all patients used same version of open-sourced algorithm, which can affect final results; may not be generalizable to youth with T1D in US.	• Study population switched from sensor-augmented pump to AndroidAPS. • Compared CGM and A1C levels 3 months prior to change, and at 3 and 6 months after initiation of AndroidAPS therapy • Evaluated frequency of adverse events during APS use, reasons for interruptions, experience and benefits of use • TIR significantly increased in both age groups. • Both groups had significantly less time in hyperglycemia. • A1C decreased significantly in both age groups. • No episodes severe hypoglycemia/DKA noted and quality of life improved in both groups. • Reasons for interruption: smartphone updates, basal rate optimization while fasting, sensor transmitter malfunction, summer camp.	Education/ Training Technology	II	3	B
50. Pöhlmann et al. (2019). Nasal glucagon versus injectable glucagon for severe hypoglycemia: A cost-offset and budget impact analysis	To explore economic impact of nasal glucagon (NG) in cost-offset and budget impact analysis for US setting	Cost-offset and budget impact analysis from perspective of insurer similar to Medicare Advantage Plan	(L): Assumptions made on decision-making as no literature available; study use for basis of treatment success was small (n = 31); cost perspective not straightforward to define in US setting with	• Mean cost $992 lower if NG used compared with injectable glucagon; assumed NG treatment would be less likely to need medical help due to higher success rate of administration; assumed equal cost of	Rescue medication	II	3	B

			Medicare Parts B and D; costs based on Medicare Part B schedules	injectable glucagon and NG kits at $280 • Recommendations: NG is a less costly alternative to injectable glucagon.				
51. Pontiroli & Tagliabue. 2020). Intranasal versus injectable glucagon for hypoglycemia in type 1 diabetes: Systematic review and meta-analysis	Compare the effectiveness of nasal glucagon (NG) with IM/SC glucagon in resolution of hypoglycemia in people with T1D.	Meta-analysis and systematic review of N = 8 RCTs (1989-2019) Population: Adults (n = 5) and children (n = 3)	(S): Clinical trial data (L): Studies came from few centers; 7/8 studies induced hypoglycemia with insulin which may not reflect real world use of product; no study compared effectiveness in unconscious patients; just 3 studies on children.	• NG response not significantly different from IM/SC response • Effect of NG and IM/SC not dependent on size of study, age, basal BG level before treatment • NG efficacy not altered by common cold or decongestant use • Quality of studies generally good, risk of bias low • Side effects of both preparations similar. • Recommendations: NG has similar side effects and is as efficacious as injectable glucagon in treating hypoglycemia.	Rescue medication	II	1	A
52. Rachmiel et al. (2015). The use of continuous glucose monitoring systems in a pediatric population with type 1 diabetes mellitus in real-life settings: The AWeSoMe Study Group experience	To compare annual glycemic control in pediatric patients with T1D using healthcare funded CGM to that of those performing SMBG in a real-life setting; to define parameters associated with compliance and glycemic control	Prospective observational real-life case-control trial (Clinicaltrials.gov NCT01525784) N = 149 youth with T1D; 83 in CGM group followed prospectively for 12 months. Mean age 11.8 +/- 3.6 years Israel	(S): Analyzed real-life effects of CGM (L): Observational design; no funding or incentives given as is common with RCTs; treatment less intensive than in RCT; lack of randomization; those using CGM may have been more motivated to improve glycemic control; selection bias; CGM model not most current and may have better tolerated by patients; attrition rate 58% after 12 months; may not be representative of youth with T1D in US.	• Clinic visits q3months encouraged • 90% using CGM used CSII (59% control group). • A1C did not differ after 3, 6, 9, 12 months between CGM and SMBG groups. • A1C was lower in CGM users than SMBG group at all measurement intervals. • Duration of CGM use decreased during the year (38% met criteria for consistent users). • Reasons for DC use of CGM – insertion pain, bruising, skin irritation, lack of accuracy.	Care planning Education/Training Technology	I	2	A

53. Rance et al. (2016). Functional hearing deficits in children with type 1 diabetes	Explore the perceptual, everyday listening and communication consequences of auditory neuropathy in school-aged children with T1D.	N = 19 children aged 9-16 years with at least 2 months post-diagnosis of T1D; matched pairs with peers without diabetes of same age and gender Each child had an audiometric assessment lasting approximately 60 minutes. Children also (with help from parent if <10years) completed functional hearing assessment survey. Australia	(S): Explored functional hearing, not just sound detection; controlled for age and developmental stages; match peer design (L): Small sample size; self-report survey on functional hearing ability; may not be representative of youth with T1D in US	• Statistically and clinically significant differences (poorer hearing) found in those with T1D • No correlation between age at onset of T1D and hearing difficulties • Recommend early detection and use available classroom and enhanced hearing techniques such as preferential seating, microphones and hearing aids when required • Standard audiometry not sufficient for students with T1D; may require formal hearing evaluation • Speech perception and developmental delays may result from impaired hearing.	Academic performance Care coordination Care planning CPG	II	3	B
54. Rickels et al. (2015). Intranasal glucagon for treatment of insulin-induced hypoglycemia in adults with type 1 diabetes: A randomized crossover noninferiority study ** Included in Pontiroli & Tagliabue (2020) systematic review and Singh-Franco et al. (2020) systematic review	To compare efficacy and safety of nasal glucagon (NG) 3 mg versus IM 1 mg glucagon for treatment of Hypoglycemia induced by IV insulin	Randomized crossover 8 clinical centers in T1D Exchange (Clinicaltrials.gov NCT01994746) N = 75 adults	(S): Crossover design (L): Glucagon dosing not blinded; lacked treatment condition that would have controlled for spontaneous recovery from hypoglycemia (hospital policies prevent not treating hypoglycemia < 40); glucagon was administered by trained HCP under nonemergent conditions which may not mimic real-world scenario.	• Outcome measure – increase in plasma glucose to ≥ 70 mg/dL OR ≥ 20 mg/dL from glucose nadir within 30 minutes • Procedure: 2 dosing visits, 1 with each preparation; IV insulin infusion stopped when BG = 60 mg/dL and glucose and glucagon levels drawn at specific intervals • NG success = 74/75 (98.7). IM glucagon success = 75/75.	Rescue medication	I	2	A

				• NG concentration slower to rise but equal to IM glucagon at 20 min when BG < 50 mg/dL. NG lagged behind by 3 minutes which may be offset by prep time. • More localized head/neck symptoms with NG • Recommendations: NG is as efficacious as injectable glucagon in treating hypoglycemia.				
55. Rohan et al. (2015). Predicting health resilience in pediatric type 1 diabetes: A test of the resilience model framework	To evaluate individual and family level factors that contribute to resilient health status of children with T1D during the transition to adolescence	3-year longitudinal multisite observational study Pediatric patients with T1D aged 9-11 years at recruitment and maternal caregivers (N = 240 patients and their caregivers)	(S): Low attrition rate of 4.2% (n = 10); study design, sample size (L): Homogeneous age range of 9-11 years; authors indicate importance of determining whether theses predictive factors of health resilience are sustained throughout adolescence and young adulthood. Homogeneous sample (75% White and most in higher SES bracket); limited generalizability to more diverse samples; factors that may have contributed to resilience but not measured (anxiety, depression, memory, peer relationships, quality of parent-child relationships)	• Outcome measures: A1C, resilience, BGM frequency, diabetes self-management, responsibility for diabetes tasks, parent support of autonomy, diabetes-related • family conflict, and demographics. • Resilience scale dichotomous: resilient or not resilient • A1C 6%-7% over 3 years for resilient group and 8%-17% in not resilient group • CSII users demonstrated better resilience compared to injection users. • Increased odds for resilience associated with more frequent BGM, more adaptive self-management, lower mastery of T1D management tasks (per mom), lower levels family conflict.	Care planning Mental health	II	3	B

				• Recommendations: Those with optimal glycemic control can receive preventative interventions at the point of care; those at highest risk may require more intensive interventions as multi-systemic therapy.				
56. Seaquist et al. (2018). Prospective study evaluating the use of nasal glucagon for the treatment of moderate to severe hypoglycaemia in adults with type 1 diabetes in a real-world setting **Included in Singh-Franco et al. (2020) systematic review	To evaluate real-world effectiveness, tolerability and ease of use of nasal glucagon (NG) in treatment of moderate/severe hypoglycemia events in adults with T1D	Prospective Phase III; single arm, real-world study (Clinicaltrials. gov NCT02171130) Efficacy analysis: N = 69 adults with 157 hypoglycemia events. Safety analysis: N = 74 adults with 179 events.	(S): Real-world study design (L): Single arm study; did allow for use of IM glucagon and EMS if needed	• Moderate hypoglycemia = neuroglycopenia with BG < 60 mg/dL at time of treatment • Severe hypoglycemia = event that renders person incapacitated requiring third-party assistance. • 12 severe hypoglycemia events = awakened and returned to baseline status in 15 minutes without external medical help. • 151/157 evaluable events resolved within 30 min (96.2%) • Most reported NG was easy to use (80.5%). Instructions easy to understand = 91% events; overall satisfaction 94.4% • Most adverse events local and low/moderate severity; most common nasal irritation • Caregivers administered within 30 seconds in 70.4% events and within 60 seconds in 92.7% events.	Rescue medication	I	2	A

				• Recommendations: NG is easy to use and efficacious in treating moderate and severe hypoglycemia.				
57. Settles et al. (2020). Nasal glucagon delivery is more successful than injectable delivery: A simulated severe hypoglycemia rescue	To compare success rates of nasal glucagon (NG) and injectable glucagon (IG) administration for trained and untrained users in treating simulated severe hypoglycemia episodes	Randomized crossover simulation study; single center (Clinicaltrials.gov NCT03765502). Trained users n = 33 Untrained users n = 33 *Users had to find the NG or IG in simulation room.	(S): Crossover study design (L): Simulation may not translate to real-world, but user performance unlikely to be better when administering to treat severe hypoglycemia in real-world setting	• Outcome 1 = successful administration of NG/IG following steps. • Outcome 2 = time to successful administration NG/IG by trained and untrained users; % users who completed critical steps; % all successful NG administration for ALL users • Trained user group = 28/31 (90.3%) success with NG, 5/32 (15.6%) success with IG. • Untrained user group = 30/33 (90.9%) success with NG, 0/31 success with IG. • Total success with NG = 58/64 (90.6%). Total success with IG = 5/63 (7.9%). • Trained user time to administer NG = 47.3 seconds, trained user time to administer IG = 81.8 seconds. • Recommendations: NG is faster to administer and more efficacious than IG in treating hypoglycemia.	Education/ Training Rescue medication	I	2	A

58. Sherr et al. (2016). Use of insulin pump therapy in children and adolescents with type 1 diabetes and its impact on metabolic control: Comparison of results from three large, transatlantic paediatric registries.	Describe differences in metabolic control and pump use in youth with T1D using data collected from 3 multicenter registries.	Quantitative; regression modeling. N = 54,410 < 18 years old. US T1D Exchange (TIDX): n = 13,755 German/Austrian Prospective Diabetes Follow-up Registry (DPV): n = 26,198 English/Welsh National Paediatric Diabetes Audit (NPDA): n = 14,457	(S): Large international sample size. (L): Period of CSII use not reported; analysis included those within first year of diagnosis so it's possible residual endogenous insulin production may have led to lower A1C; all T1DX patients received care at specialized tertiary care centers but this was not the case in the other 2 registries; mode of insulin delivery submitted for ~60% of patients in NPDA.	• Ethnic minority status less likely to be treated with CSII in all 3 registries • CSII use 22.1% in ethnic minority patients and 34.5% in non-ethnic minority patients • Boys treated with CSII less frequently than girls • Adolescents in T1DX had highest rates of CSII use compared to all other ages in T1DX. • CSII associated with lower mean A1C versus injection	Care coordination Technology	II	3	B

59. Sherr et al. (2016). Glucagon nasal powder: A promising alternative to intramuscular glucagon in youth with type 1 diabetes
 	
**Included in Pontiroli & Tagliabue (2020) systematic review and Singh-Franco et al. (2020) systematic review
	To assess safety and pharmacokinetics and pharmacodynamics of nasal glucagon (NG) compared with IM glucagon in children and adolescents with T1D aged 4 to < 17 years; to investigate whether weight-based dosing was needed	Crossover design RCT of 7 clinical centers of T1D Exchange. (Clinicaltrials.gov NCT01997411)
		
		N = 48 youth
		
		3 cohorts:
		• 4 to < 8 years (n = 18)
		• 8 to < 12 years (n = 18)
		• 12 to < 17 years (n = 12)
		
		• Cohorts 1, 2 random assignment 2:1 ratio (12 + 6). Group of 12 received 2 mg NG and then 3 mg NG. Group of 6 received 1 weight-based dose IM glucagon.
			(S): Crossover design
			
			(L): Hypoglycemia not induced as authors felt it burdensome to have participants in younger groups undergo 3 separate studies which precluded direct comparison of IM to NG in each individual; glucagon administered by trained individuals which may not reflect real-world experiences
				• Outcome measure was ↑ BG ≥ 25 mg/dL within 20 min of glucagon administration
				  ○ 100% IM (24)
				  ○ 98.3% NG (58/59) *1 participant blew nose immediately after IN glucagon.
				• Adverse effects
				  ○ More nausea and vomiting in IM group (67%) than NG groups (39%-43%)
				  ○ More head/facial discomfort in NG groups (17%-24%) than IM group (13%)
				• Recommendations: NG is as safe and efficacious as IM glucagon. In children < 12 years, NG 2 mg and 3 mg dosing had similar plasma glucose effects. Adverse effects of both doses similar
					Rescue medication	I	2	A

		• Cohort 3 randomly assigned to 3 mg NG or 1 mg IM then crossover						
60. Singh-Franco et al. (2020). Efficacy and usability of intranasal glucagon for the management of hypoglycemia in patients with diabetes: A systematic review	Describe efficacy, usability, tolerability of NG 3 mg in patients with diabetes.	Systematic review. N = 10 (7 published) Excluded healthy subject participants Population: Adults (n = 8) and children (n = 2)	(S): Limitations of included studies identified (L): None identified	• Participants receiving NG = 336; participants receiving IM glucagon = 251 in 7 studies • Almost all met criteria for success within 30 min of administration (defined slightly differently in studies). Mean time to success between 10-20 min with both preps • Patients, caregivers, acquaintances preferred NG over IM. • NG administered within 60 sec by most caregivers, acquaintances, third parties; IM administered within 1.3-5 min by same • Adverse effects: head/facial discomfort, red, itchy, or watery eyes, runny nose, nasal itching and congestion, sneezing, nausea, vomiting • Recommended dose NG 3 mg regardless of body weight • NG not affected by colds, congestion, use of nasal decongestants • Activate EMS after administration; if no response after 15 min, administer 2nd dose.	Rescue medication	I	1	A

				• Recommendations: NG is as safe and efficacious as IM glucagon. NG 3 mg dosing recommended; adverse effects of both doses similar				
61. Stankute et al. (2019). Factors affecting cardiovascular risk in children, adolescents, and young adults with type 1 diabetes	To analyze the risk factors for cardiovascular disease in children and young adults under the age of 25 years with T1D in Lithuania	Secondary analysis of patients under the age of 25 studied longitudinally for 6 months (N = 883); must be diagnosed with T1D for longer than 6 months n = 590 aged 1-17 years n = 293 aged 18-25 years Lithuania	(S): Large sample size of study participants; adds to knowledge of cardiovascular risk factors in youth with T1D (L): Lack of blood pressure monitoring at home, which may have demonstrated real prevalence of hypertension; other risk factors for cardiovascular disease not assessed (smoking, alcohol, apolipoprotein B and carotid artery intime-media thickness); no data on smoking and physical activity; may not be representative of	• Study subjects' mean A1C was 8. 5 ± 2%; 19.5% were overweight and 3.6% obese. Hypertension and dyslipidemia were diagnosed in 29.8% and 62.6% of participants, respectively. • A1C positively correlated with levels of total cholesterol, LDL, and triglycerides, and negatively associated with levels of HDL. • The frequency of cardiovascular risk factors is high in youth with T1D and associated with diabetes duration, obesity, and metabolic control. • Even though ADA and AHA have clinical recommendations for preventing dyslipidemia in youth with diabetes, there is still lack of clinical trial data on treatment efficacy and safety of dyslipidemia in these patients. • Recommend need to monitor obesity and blood pressure.	Care coordination	II	3	A

62. Stenberg et al. (2019). How can we support children, adolescents and young adults in managing chronic health challenges? A scoping review on the effects of patient education interventions.	To understand the characteristics, participants and types of patient intervention studies on young people with chronic health conditions or impairment loss.	Scoping review of the literature between 2008 – 2018; examined over 7600 published literature articles with exhaustive database and keywords searches with education intervention studies children aged 0-25 years N = 69 articles; articles were compared according to the type of patient intervention, diagnosis, and type of outcome to find patterns and similarities.	(S): Examined large numbers of studies; comprehensive search (L): Scoping reviews do not access for evidence strength of the studies examined, only to describe the studies with findings for comparison; publication bias may contribute to inflated positive outcomes found in the published literature; most studies were related to research on asthma and diabetes.	• Patterns and similarities in education intervention studies showed participants reported less distress from symptoms, improved medical adherence, and increase in medical knowledge. • Interventions decreased hospitalizations, urgent care visits, and school absences. Sharing in groups also contributed to insight and learning on management of chronic conditions. • Patient education interventions targeting young children contribute to improved health and education outcomes.	Academic performance Care coordination Care planning Mental health	I	4	A
63. Stough et al. (2020). Disasters, schools, and children: Disability at the intersection.	To present systematic examination of studies that have investigated schools and children with disabilities in the context of environmental hazards; to identify new developments and discussions both empirical and conceptual, since the first discussion of the educational vulnerabilities of children with disabilities impacted by disaster in 2010	Systematic literature review; search across the following parts of the academic literature: (a) disaster studies, (b) education, (c) disability studies, (d) public health and medicine, and (e) psychiatry and psychology; included grey literature of policy and practice guidelines due to limited peer-reviewed research available	(S): Well-articulated, comprehensive review of literature (L): Lack of available research in this topic; not specific to T1D	• Repeating study of this literature from 2010 found little change in research and knowledge gaps still exist. • Most notably little research with children to gain understanding from their perspective • Little attention to post-disaster mental and behavioral health • Concern in countries and areas where children with disabilities are not in school – still need information on how those children are affected.	Care coordination Care planning Education/ Training	II	1	C

		Located N = 28 articles but not all were research; no grey literature located		• Little research or understanding of how children with disabilities are affected by a disaster • Children with disabilities are disproportionately overlooked in the research leading to little ability to guide EBP interventions.				
64. Sullivan-Bolyai et al. (2020). Development and psychometric testing of the Peer-Mentor Support Scale for parents of children with type 1 diabetes and for youths with type 1 diabetes	To develop and evaluate the psychometric properties of the Peer-Mentor Support Scale (PMSS), a measure of peer-mentor support provided to parents of children with T1D and to youths with T1D.	Scale development with item construction based on previous research for instrument development published earlier; evaluated content validity assessment, pilot testing of the scale, and psychometric evaluation of the PMSS N = 163 Parents of children with T1D (n = 120) and youths aged 18-25 with T1DM (n = 43) recruited from the Children with Diabetes website	(S): Use of social desirability bias survey to control for confounders; ability to quantify use and effectiveness of peer-support (L): No power analysis reported; limited generalizability as study participants mainly educated Whites	• The PMSS is a reliable and valid 17-item instrument that can be used to measure the unique contributions of peer mentorship for parents of children with T1D and for youths with T1D. • Demonstrated value of peer-support and mentoring for parents and young adults • School nurses can suggest use of support for parents of children with T1D and for those students who are transitioning to adults	Care coordination Mental health	II	3	B

65. Thorstensson et al. (2016). Swedish school nurses' experiences in supporting students with type I diabetes in their school environment	To describe school nurses' experiences in supporting students with T1D in school	Qualitative N = 6 school nurses Sweden	(S): Multiple authors experienced in qualitative method (L): Purposive sampling; school structure and resources may be different than US.	• Creating a network around the student by enabling a continuous dialogue with student, parents, school staff; responsibility and preparedness • Creating mutual commitment by initiating participation and security between school nurse, students, parents; being present and available • The school nurse's perceived competence (knowledge through courses, contact with healthcare facilities) – school nurses who lacked ability to support students expressed more uncertainty regarding knowledge of treatment. • Recommendations: School nurses should engage in effective communication with students, parents, and school staff and document in care plans.	Care coordination Care planning Education/ Training	II	3	B
66. Tiu et al. (2019). Characteristics associated with school health services for the management of chronic health conditions	To describe health services staffing and school-based characteristics associated with the on-site provision of identification or school-based management, tracking, case management, and referrals for	Analysis using complex sampling of the 2014 School Health Policies and Practices Survey (SHPPS) from the CDC; nationally representative sample of all public and private schools in the U.S.	(S): Geographically representative survey of U.S. schools to understand care, policies and practices for chronic health conditions in schools; high response rate (L): Cross-sectional design; self-report bias; interpretation of definitions may vary.	• Schools in the northeast and public schools were more likely to provide services to students with chronic health conditions. • Only 57% of schools in the U.S. provided all four chronic health illness services. • 35% of schools had a school physician that was available for	Care coordination Care planning Education/ Training Leadership/ Advocacy	II	3	B

	students with chronic health conditions; to determine how health services staffing and school-based characteristics are associated with the number of services provided at school to students with chronic health conditions	N = 588 of 828 eligible schools (71%) completed the Health Services interview.		consult during school day. • Health disparities evident in schools with larger proportion of non-white and free and reduced lunch had less chronic health illness services • Schools with a school nurse and school physician more likely to provide these services. • Presence of a school nurse or access to consult with a school physician and the number of services provided to students with chronic health conditions increases • Schools should consider prioritizing staffing and funding for these critical roles, especially in underserved communities. • Need state and local policies that would support, enforce and implement chronic health condition management				
67. Tournilhac et al. (2020). Evaluation of a new training program to reassure primary school teachers about glucagon injection in children with type 1 diabetes during the 2017–2018 school year	Evaluate a video training program (VTP) to improve the level of confidence of teachers in administering IM glucagon during severe hypoglycemia.	Interventional Pre-test/post-test of confidence and knowledge after viewing 10-minute training video Pre-test questionnaire N = 157 teachers	(S): Expert multidisciplinary review panel for making of training video and questionnaires; matched participant responses and paired analysis (L): Self-report bias; no controls for access to sources of information	• VTP consisted of 3 video clips: administration of capillary BG test, glucagon injection, and insulin injection. • VTP significantly improved teachers' confidence (scale 1-4) to administer glucagon injection and knowledge (scale 1-20) of diabetes.	Education/ Training Rescue medication	II	3	A

		Both questionnaires N = 77 teachers France	other than VTP so that teachers' self-confidence and knowledge may not be fully attributable to VTP; excluded high school teachers; may not be representative of school system and school nurse presence in US	• Predictors of poor level of knowledge: poor training, having never met school physician or school nurse, lack of confidence in glucagon injection, information from colleagues rather than formal training, not having received information • Predictors of low confidence in administering glucagon injection: information from colleagues, poorly trained, low knowledge scores • Recommendations: School nurses should train school personnel in glucagon administration according to state laws. Maintaining communication with school personnel can raise confidence and knowledge levels.				
68. Wang et al. (2017). Incidence and risk factors for developing diabetic retinopathy among youths with type 1 or type 2 diabetes throughout the United States	To identify risk factors for diabetic retinopathy (DR) in youth with diabetes; to compare DR rates for youth with T1D and type 2 diabetes (T2D); to assess whether adherence to DR screening guidelines promoted by the American Academy of	Retrospective, longitudinal analysis of The Clinformatics DataMart database; studied individuals 21 years or younger at their initial enrollment during January 1, 2001, through December 31, 2014 n = 2,240 T1D n = 1,768 T2D	(S): Large longitudinal cohort analysis (L): May not reflect general population who are under or uninsured, or have Medicaid; concerns regarding referral bias to eye care providers in vulnerable populations; study demographics indicate not reflective of general population; included only participants visiting eye care providers;T1D	• 20.1% of youth with T1D received a DR diagnosis. • Every one point increase in A1C increased the hazard of developing DR by 20% among those with T1D. • Results suggest DR may be more common than suspected in T1D. • Suggest undergoing screening sooner than CPGs recommend	Academic performance Care coordination Care planning CPG	II	3	B

	Ophthalmology, American Academy of Pediatrics, and ADA adequately capture youth with DR	Used Medical claims from inpatient and outpatient healthcare encounters and associated ICD-9-CM diagnosis codes 17–19 for all ocular and non-ocular conditions	85.1% White; visual acuity, retinal exam findings unavailable; some lacked A1C data.	• Some caution here as the population sampled is not generalizable, and only captured eye care professionals.				
69. Wang et al. (2017). Ophthalmic screening patterns among youths with diabetes enrolled in a large US managed care network.	To assess the rate of obtaining ophthalmic examinations and factors associated with receipt of eye examinations for youths with T1D and type 2 diabetes (T2D)	Retrospective, longitudinal analysis of The Clinformatics DataMart database. Studied individuals 21 years or younger at their initial enrollment during January 1, 2001 through December 31, 2014 n = 5,453 T1D n = 7,233 T2D	(S): Large longitudinal cohort analysis; diverse population; numerous practice settings represented; all with health insurance (L): May not reflect general population who are under or uninsured, or have Medicaid; focused on one large US care network; complete A1C data, visual acuity, retinal exam unavailable	• 64.9% of T1D had an eye exam by 6 years post diagnosis (recommended time frame). • Black and Latino youths were significantly less likely to obtain an eye exam by 6 years post diagnosis. • Odds of having eye exam increased with household income. • Suggests that all T1D youth are not likely to have an exam as recommended • Adherence to recommended eye exams for DR suboptimal • Health inequities apparent with race and socioeconomic status	Academic performance Care coordination Care planning CPG Leadership/ Advocacy	II	3	B
70. Willgerodt et al. (2020). Enhancing care coordination for students with type 1 diabetes	To gain deeper understanding of how care coordination for T1D currently operates and identify strategies for its support and facilitation in schools	Qualitative Focus groups (N = 20) with school nurses (n = 50), parents of T1D children aged 5-13 years old (n = 38), and providers (n = 8) in 9 educational service districts in WA	(S): Validates existing literature that identifies diabetes expertise, partnerships, and tracking as important to managing children's T1D in school (L): Sample predominantly White females; small number	• Context dependent: family/home environment, child developmental level, school environment • Knowledge/experience of school nurses, child, parent/guardian, provider	Care coordination Care planning Education/ Training	I	3	A

		Each focus group consisted of at least 1 parent, 1 school nurse, and 1 provider.	of providers/clinicians; self-selection bias possible	• Access/availability of parent, school nurses, providers • Communication: daily communication, formal documentation, planning • Relationships: trusting relationships within entire team • Recommendations: Promoting supportive relationships and team- based approaches improves care coordination.				
71. Winnick et al. (2017). Metabolic control and academic achievement over time among adolescents with type 1 diabetes	To examine the dynamic relationship between metabolic control fluctuation and academic performance of adolescents diagnosed with T1D over a 2.5-year period	Longitudinal study recruited from one endocrinology clinic; sampled every 6 months for 2 ½ years N = 252 adolescents (10-14 years).	(S): Sample size; longitudinal design (L): 10% missing data from key outcome variables mitigated by multilevel modeling utilizing maximum likelihood (ML) estimation, which allows for the inclusion of cases with missing data; GPA may reflect bias; sample homogeneous (90% Non-Hispanic White), well-educated, higher socioeconomic status	• Youth with T1D with poor metabolic control are at-risk for academic performance or learning difficulties • Higher A1C levels limited GPA • GPA scores did not predict changes in A1C. • Youth with shorter disease duration or lower IQ experienced slower increases in A1C over time if higher GPA scores were evidenced. • Factors associated with higher GPA scores may protect recently diagnosed adolescents or adolescents with low cognitive ability from later deterioration in metabolic control.	Academic performance Care coordination	II	3	B

72. Yale et al. (2017). Faster use and fewer failures with needle-free nasal glucagon versus injectable glucagon in severe hypoglycemia rescue: A simulation study **Included in Singh-Franco et al. (2020) systematic review	Compare NG and injectable glucagon (IG) for ease of use by caregivers of people with diabetes and by others in treating simulated episodes of severe hypoglycemia.	Quantitative n = 16 instructed caregivers who received 3 educational sessions over 2-4 weeks n = 15 non-instructed acquaintances who received one 40-minute educational session about types of glucagon with no instruction Both groups administered NG and IG to manikins	(S): Study design; sample size (L): Real-world experience may differ in emotional distress and fear; as each participant encountered simulated emergency situation twice, the 2nd episode may have been less stressful, although this was controlled for by ½ participants using NG first and the other 1/2 using IG first. Different stressor elements used in both scenarios (noises, interruptions); there may have been additional stress if measuring was needed in pediatric population.	• Nasal glucagon o 15 caregivers (94%) and 14 acquaintances (93%) administered full dose (mean time 0.27-0.44 min). o 2 did not depress plunger fully. o 2 caregivers administered both insulin and NG. • Injectable glucagon o 8 caregivers (50%) injected glucagon (mean time 1.89 min) but only 2 (13%) gave full dose. 3 acquaintances (20%) injected partial dose (mean time 2.4 min); none gave full dose. o Errors included injecting diluent only, bending needle. o 3 injected insulin instead of glucagon. • Recommendations: NG is more efficacious, faster, and easier to use than IG.	Education/ Training Rescue medication	I	3	A
73. Yi-Frazier et al. (2015). The association of personal resilience with stress, coping, and diabetes outcomes in adolescents with type 1 diabetes: Variable- and person-focused approaches	To explore impact of personal resilience in adolescents with T1D through analysis of 3 hypotheses: Higher resilience is associated with (1) lower diabetes-related distress; (2) improved outcomes (self-management, quality of life,	Pilot study of N = 50 adolescents with T1D aged 13-18 years US	(S): Despite small sample, large differences observed between different levels of resilience (L): Homogeneous sample (94% White; 38% with income < $75,000) limits generalizability; resilience composite score had mix of general and diabetes-specific constructs limiting use of assessment to study	• Measures: Resilience factor (self-esteem, optimism, self-efficacy); coping; diabetes-related distress (DRD); quality of life; self-management; glycemic control • Resilience scores quantified as low, moderate, high • DRD negatively correlated with resilience.	Care coordination Mental health	II	3	B

	glycemic control; (3) increased coping strategies.		population. Low sample size has limited power to detect effects.	• A1C highest among those with low resilience • High resilience associated with better coping and problem solving • Implications: Interventions that increase resilience and coping skills can positively impact DRD, self-management, glycemic outcomes.				

Table 2: OTHER EBP RESOURCES (Non-research articles, electronic sources)								
Reference (Author, Year, Title)	Purpose	Description (literature review, guideline, practice/ policy, etc.)	Major Strengths (S) and Limitations (L)	Summary of Findings and Recommendations	Domains of Care	Quality/Level/ Strength of Evidence (See Appendix B)		
74. American Association of Diabetes Educators. (2019). Management of children with diabetes in the school setting	To describe the role of the diabetes educator in optimizing care of the student with diabetes in the school setting	Position statement from AADE (now known as Association of Diabetes Care & Education Specialists)	(S): Promotes collaboration between school nurse and diabetes educator (L): From the perspective of the diabetes educator and not the school nurse	• Written plans (DMMP, IHP, ECP, 504 Plan, IEP) are essential to foster understanding and standards of care. • Role of diabetes educator and school specific outcome measures: Healthy eating, being active, monitoring, taking medication, problem solving; healthy coping; reducing risks • Goals and recommendations: Safe environment, self-management when appropriate, healthy eating plan and physical activity, access to, accommodation, and discrimination free environment, written care plans for students with diabetes, advocacy for training UAP to administer glucagon and insulin, active participation of diabetes educator in working with school nurse and other personnel	Care coordination Care planning CPG Education/ Training	1	5	B

75. AAP Council on School Health. (2016). Role of the school nurse in providing school health services	Policy statement to understand the benefits, roles, and responsibilities of the school nurse in promoting health and wellness of school-age children	Policy statement from the American Academy of Pediatrics	(S): School nurse presence in authorship and consulting (L): Due to be reviewed/revised in 2021	• School nurses participate in surveillance, chronic disease management, emergency preparedness, behavioral health assessment, health education, and case management. • School nurses collaborate with HCPs, families, school personnel, school physicians and UAP to provide optimal health care to students in school. • Caring for children with chronic conditions such as T1D requires the services of a registered professional nurse. • When registered professional nurses are unavailable, training and delegation to UAP, consistent with state nurse practice acts and professional nursing organization guidelines, are necessary to ensure student safety.	Care coordination Care planning Education/ Training Leadership/ Advocacy	I	5	A
76. Buschur et al. (2017). Transition of care for patients with type 1 diabetes mellitus from pediatric to adult health care systems	To highlight the challenges and successes of implementing a young adult transition program for patients with T1D	Review article	(S): Clearly elucidates challenges faced by adolescents transitioning to adult care (L): Data collected thus far on transition program unpublished	• Last expert consensus opinion was published in 2011 (Peters et al.); there is a lack of evidence-based strategies for transition. • Challenges associated with transition to emerging adulthood o Financial security o Independence in self-management o Deteriorating glycemic control o Insurance issues o Paying for diabetes supplies o Mental health issues: anxiety, depression o Keeping clinic appointments o Substance abuse (alcohol, drugs) o Disordered eating/insulin restriction o Preconception planning	Care coordination Mental health	I	5	B

				• Transition program instituted o Multidisciplinary, includes financial counselor. o Adult and pediatric providers o Conversations begin at age 14 and become more specific at age 16 using checklist. o Goal for full transition at 18-22 years old o At least 2 visits with transition team before full transfer o Educational materials, close follow-up				
77. Chiang et al. (2018). Type 1 diabetes in children and adolescents: A position statement by the American Diabetes Association	To provide recommendations for current standards of care for youth with T1D	Position statement from the ADA	(S): Comprehensive recommendations for all aspects of T1D care (L): Recommendations rely on supportive evidence from cohort/registry studies or expert consensus/clinical experience.	• Most children/adolescents should be treated with intensive insulin therapy (multiple daily injections of prandial insulin + basal insulin or CSII). • CSII + CGM or CGM alone has demonstrated better glycemic control and reduced hypoglycemia events. • Children should see the pediatric endocrinologist and diabetes educator quarterly and have A1C levels measured. • All children/adolescents should have BGM up to 6-10x/day, including before meals, before bed, and PRN for safety in situations such as exercise, driving, illness, or s/s hypoglycemia. • Blood or urine ketones should be monitored in children/adolescents with prolonged hyperglycemia or acute illness to determine if insulin requirements should be adjusted. o All individuals should have access to insulin to prevent DKA. • CGM should be considered for all children/adolescents regardless of insulin modality.	Care coordination Care planning Education/Training Technology	I	5	A

				• Nutrition therapy should include carb counting for optimal glycemic control and children should see nutritionist at diagnosis annually. Diet should include vegetables, fruits, legumes, complex CHO, whole grains, and high fiber. • Hypoglycemia treatment o Conscious, BG < 70 mg/dL: 15 g CHO; repeat BG in 15 minutes o If BG remains < 70 mg/dL, repeat 15 g CHO. o Once BG returns to normal, consider meal or snack and/or reduce insulin to prevent recurrence. o Caregivers should be instructed in use of glucagon. o Those with hypoglycemia unawareness or episode of severe hypoglycemia may need to have BG targets raised by HCP. • All children should exercise at a moderate to vigorous level for 60 minutes daily. o Pre-glucose levels should be 90-250 mg/dL; CHO should be individualized to type/intensity of activity. o Strategies to prevent hypoglycemia during and after exercise and overnight: reduce mealtime insulin prior to exercise; increase CHO intake (0.5-1.0 g CHO/kg/hr of exercise ~30-60 g CHO); eat snacks at bedtime; use CGM; reduce basal insulin dose ~10-50% or suspend for 1-2h during exercise. o Frequent BGM before, during, after exercise important to prevent, detect, and treat hypoglycemia				

				◦ Post-exercise hypoglycemia can occur up to 6-12 hours post activity. • Adolescents may show 2-3x rate of psychological distress as peers without T1D. • Comprehensive eye exam recommended beginning age 10 or after puberty started, whichever is earlier, once youth has had T1D for 3-5 years and every 1-2 years thereafter • Comprehensive foot exam recommended for adolescents beginning age 10 or after start of puberty, whichever is earlier once youth has T1D for 5 years • BP should be measured at each quarterly visit. • Fasting lipid profile recommended ≥ 10 years once glycemic control has been established. If normal, repeat every 3-5 years.				
78. Dickinson et al. (2017). The use of language in diabetes care and education	To provide recommendations for language used by HCP and others when discussing diabetes with colleagues, people with diabetes, or the general public to enhance the communication process	Consensus report/ Expert opinion from ADA and American Association of Diabetes Educators (now known as Association of Diabetes Care & Education Specialists)	(S): Expert opinion building on international organizational recommendations on the use of language in diabetes care; provides examples of rephrasing common words and phrases with negative connotations (L): None	• 4 principles ◦ Diabetes is a complex and challenging disease involving many factors and variables. ◦ Stigma that has historically been attached to the diagnosis of diabetes can contribute to stress and feelings of shame and judgment. ◦ Every member of the healthcare team can serve people with diabetes more effectively through a respectful, inclusive, and person-centered approach. ◦ Person-first, strengths-based, empowering language can improve communication and enhance the motivation, health, and well-being of people with diabetes.	Care planning Mental health	I	5	A

				• Definitions: o Strengths-based: Emphasizing what people DO know and CAN do; focus on strengths o Person-first language: Words that indicate awareness, sense of dignity, positive attitudes towards people with disabilities/diseases • Recommendations to use language that o is neutral, nonjudgmental, based on facts, actions, or physiology/biology o is free from stigma o is strengths-based, respectful, inclusive, and imparts hope o fosters collaboration between patients and providers o is person centered				
79. Fox et al. (2020). Medical neglect in children and adolescents with diabetes mellitus	To review the consequences of medical neglect of children with diabetes and the optimal community response to concerns of neglect	Review article of 19 relevant articles dating back to 1980; exclusion criteria adults and type 2 diabetes; only from PubMed database	(S): First review in literature (per author) on medical neglect in children with diabetes (L): Literature dated back to 1980, methods for inclusion not well described	• Utilized standards of care from ADA 2017 • DKA associated with missed medical appointments and medical neglect • Identifying medical neglect should be done in coordination with pediatric endocrinologist, physician specializing in maltreatment, or other HCP. • 5 criteria for diagnosis of medical neglect are child being harmed or at risk for harm due to lack of health care; care that is widely available must provide benefit to child; benefit of treatment is such that caregiver would choose treatment over non-treatment; evidence of available health care that is not used; and caregiver understands medical advice given. • Lack of consistent and adequate supervision in adolescents and children is a form of medical neglect.	Care coordination Mental health	I	5	B

				• Psychosocial and environmental factors influencing medical neglect: difficulties with access to care; understanding complexity of care; caregiver motivation; child behavior or parenting issues • Recommend community responses to concerns of neglect				
80. Goss et al. (2018). ISPAD position statement on type 1 diabetes in schools	ISPAD position statement on the minimal level of T1D care at school in all countries	Position statement based on Clinical Guidelines for Management of T1D in School (Bratina et al., 2018)	(S): International; addresses delegation issues (L): None	• Minimal level of care in all countries: right to safety, equal opportunity to participate fully in education and activities, allow BGM in location of student's choosing. • All school personnel must receive appropriate diabetes education, including basic school-related needs and management of hyperglycemia and hypoglycemia. • Collaborative approach with student, school, medical team optimal; single member of medical team should be identified as source of contact. • Each student should have written DMMP which should include s/s low and high BG with treatment; age-appropriate skills/responsibilities that can be undertaken by child. The DMMP cannot be altered without consent and authorization by parent and medical team. • Parents should not be expected to attend to medical management during school day. • Schools must permit students to manage nutrition, perform BGM and insulin administration, and treat high and low BG without delay. • Students must be assessed for their self-management capabilities regardless of age and diabetes duration.	Care coordination Care planning CPG Education/ Training Mental health Rescue medication Technology	I	5	A

				• Students should be able to participate in physical activity. • Quality of care in school must be comparable to quality of care at home. • Schools must have guidelines related to use and handling of supplies. • State and federal legal frameworks to protect the rights of students with T1D must be followed including "reasonable adjustments" which may include insulin and/or glucagon administration, CGM interpretation and intervention, and use of CSII. • Adult supervised management of hypoglycemia is recommended. • Schools have duty to protect students from discrimination, bullying, stigmatization. • All aspects of T1D management should occur in a timely manner with minimal disruption to normal routines and activities. • Schools are responsible for education and training of school personnel with parental permission. • Exam accommodations should include access to T1D supplies and monitoring (CGM, smartphone, insulin, CHO, water, bathroom) and extra time if needed.				

81. Hopkins & Hughes (2016). Individualized health care plans: Supporting children with chronic conditions in the classroom	Case studies demonstrate that providing support and services for children with special healthcare needs is complex. At risk children may be eligible for special education services not always identified and/or receiving the legally required school services	Descriptive article depicting case studies to demonstrate best practices, information regarding legal requirements for students with special needs	(S): Excellent references to resources; provides a sample IHP (L): Information not specific to only T1D	• Application of IHP to chronic health conditions • Importance of "go bag" • IHP legal requirements vary by state but they can increase safety and positive outcomes for children with chronic conditions in school. • IHPs support school nurses, students, parents, and school personnel.	Care coordination Care planning	I	5	B

82. Jackson et al. (2015). Diabetes care in the school setting: A position statement of the American Diabetes Association	To provide diabetes management recommendations for students with diabetes in elementary and secondary school settings	Position statement by ADA	(S): Comprehensive and specific; covers situations without access to daily school nurse presence
			
			(L): None
				• Federal law provides legal protections for students with diabetes.
				  o Required accommodation should be documented in a written plan.
				• Students with diabetes must receive appropriate care in school to minimize complications.
				  o School nurse and school personnel need to be trained to meet the needs of students with diabetes.
				• DMMP should be developed by HCP in collaboration with parent/guardian and student and should be used as basis for 504 Plan and IEP plans, and include
				  o BGM frequency, circumstances, use of CGM and other technologies
				  o Insulin type, modality, frequency, circumstances, storage, authorization for dosage adjustments
					Academic performance
					
					Care coordination
					
					Care planning
					
					CPG
					
					Education/Training
					
					Leadership/Advocacy
					
					Mental health
					
					Rescue medication
					
					Technology
						I	5	A

				o Meals content and timing o s/s and treatment of hypoglycemia including glucagon o s/s and treatment hyperglycemia, including ketone checks if ordered by HCP o Participation in physical activity o Emergency/evacuation/ lockdown instructions, contacts, plans o Student's self-management capabilities. ALL students will need assistance during diabetes emergencies. • Parent responsibilities include the provision of all equipment, supplies, materials, DMMP, hypoglycemia treatment supplies, emergency contact phone numbers, information about snack schedule, signed release allowing school to communicate with HCP about diabetes related care. • School responsibilities include ongoing training/education for school nurses and personnel: o Level 1 – overview of DM, recognition of low and high BG (ALL staff) o Level 2 – training for those with primary responsibility for student with diabetes, includes Level 1 + recognition and treatment low and high BG and required accommodations o Level 3 – training for small # staff to perform student-specific tasks such as BGM, insulin and glucagon administration + Levels 1, 2 o Immediate access to treatment and supervision of hypoglycemia by knowledgeable adult				

				o Immediate access to treatment and supervision of hyperglycemia per DMMP o Privacy for management of diabetes tasks o School nurse and trained staff; to check BG, ketones, administer insulin and glucagon; awareness of meal/snack schedule with notification to parent of changes o Permission i. To self-carry equipment, supplies, medications, snacks and to perform self-management tasks anywhere ii. For smartphone/ technologies and direct communication with parent/guardian and HCP iii. To see SN and staff as requested iv. For student to snack anywhere v. To miss school for any diabetes related excuse vi. To use restroom and have access to fluids o Appropriate storage location for medications, supplies o Plan for sharps disposal o Nutritional information on serving size, CHO count, calorie and fat content should be provided to parent/guardian in advance. o Accommodations for testing (BGM, medications, food) • School nurse should be key coordinator and provider of care and should identify adequate numbers of personnel who are willing to be trained by the school nurse to provide care and notify parent.				

				• At least 1 trained staff member must be available in the school nurse's absence to provide care in school, on field trips, during after school activities, and during transportation to and from school. • Diabetes self-management needs should be assessed by the school nurse and assistance provided accordingly.				

83. Jennings & Hussain (2020). Do-it-yourself artificial pancreas systems: A review of the emerging evidence and insights for healthcare professionals	To synthesize and summarize emerging literature on DIY artificial pancreas systems (DIYAPS) and identify range of evidence from users, HCPs, researchers; provide commentary that explores implications of DIYAPS for practice	Review article
		
		24 publications = 5 quantitative, 2 qualitative, 6 conference abstracts, 11 miscellaneous (review article, monograph, case report, commentaries, editorials)
			(S): Up to date review of DIYAPS from perspectives of users, HCPs, researchers
			
			(L): Some lower quality evidence in miscellaneous publications
				• Approximately DIYAPS 1500 users worldwide
				• Few to no RCTs to date
				• Benefits of DIYAPS
				  o Decreased A1C
				  o Increased TIR
				  o Reduced glucose variability
				  o Reduced hypoglycemia episodes
				  o Less reliance on accuracy of CHO counting
				  o Improved overnight control
				  o Reduced mental/psychological burden for caregivers/ patients
				  o Lower cost than commercial APS systems
				  o Can improve efficiency of visits with HCPs
				• Ethical/regulatory issues
				  o Lack of regulation/off-label use
				  o Unclear line of accountability
				  o Lack of professional guidelines regarding use
				• HCPs cannot prescribe DIYAPS systems but should support and educate patients who choose DIYAPS.
				• HCPs must evaluate patients' ability to self-manage using CGM and CSII.
				• HCPs must stay current on DIYAPS technology to support patients' use.
				• Recommend that formal reporting system for DIYAPS issues be initiated (such as FDA's Medwatch)
					Care coordination
					
					Education/ Training
					
					Technology
						II	5	A

84. Kesavadev et al. (2020). The do-it-yourself artificial pancreas: A comprehensive review	To provide description of DIY artificial pancreas system (DIYAPS)	Review article	(S): Provides an overview on DIYAPS that may be helpful important for school nurses (L): None	• DIYAPS integrates CGM, loopable CSII, and smartphone technology to run openly sourced algorithms found on platforms such as GitHub, CGM in the Cloud, Twitter, and Nightscout. o OpenAPS o Loop (Apple iPhone) o AndroidAPS (Google Andoid smartphones) • Developed by people with diabetes and family members to fill a need – APS are expensive and not available to all. • Disadvantages/Concerns o Difficult to set up o Not commercially available or regulated and no oversight from device makers or regulatory bodies o Lack of safety data, funding o There is a need for high quality evidence in a real-world context. o Use of out of warranty pumps exploits a flaw that allows DIY. o Hacking is a potential issue as data is exported to the cloud. • Observational, retrospective, prospective, and self-reported data on DIYAPS reveal improvements in time-in-range (TIR), time-in-hypoglycemia, A1C, and quality of life. Improves disease management and lessens psychological burden. • Safety mechanisms o Algorithms updated continuously o Reverts to conventional CSII mode in case of communication failure	Care coordination Education/ training Technology	I	5	A

85. National Association of School Nurses. (2016). Diabetes management in the school setting	To describe the current state of the school nurse's role in diabetes management in the school setting	Position statement from the NASN	(S): Based on current literature and provides comprehensive diabetes background	• DMMP is completed by HCP and includes medical orders to manage the student's diabetes during school day and at school-sponsored activities. • School nurse develops IHP in coordination with student and family based on DMMP orders and nursing assessment. • IHP describes school personnel's roles/responsibilities. • The school nurse provides ongoing supervision and training when delegation is needed. • School nurse develops the ECP, based on DMMP medical orders, which summarizes how to recognize and treat low and high BG and states actions to be taken in emergency. Copies of ECP should be distributed to all personnel interacting with student. • The school nurse assesses students' capabilities and cognitive level in determining the level of care necessary. • Students experiencing hypoglycemia should not be left alone, sent anywhere alone, or escorted by another student. Communication systems and trained school staff should be in place. • Students with diabetes are afforded equal opportunities for full participation in all school activities (Section 504, Americans with Disabilities Act). • School nurse must attain and maintain current knowledge and competence in the coordination and delivery of care to students with diabetes.	Care coordination Care planning Education/ Training Rescue medication	I	5	A

86. National Association of School Nurses. (2018). Wearable medical technology in schools: The role of the school nurse	To delineate the role of the school nurse in caring for students with wearable medical technology	Position brief from the NASN	(S): Delineates school nurses' responsibilities as more students are using CGM and CSII in school setting	• The school nurse is involved in planning care for students with wearable medical technology in the school setting. • The school nurse leads the development of policies and procedures that focus on safe and effective use of wearable medical technology in school and complies with HIPAA and FERPA laws. • The school nurse advocates for sufficient internet and WiFi capabilities that may be required for data transmission from wearable medical technology. • The school nurse must be knowledgeable in the care and use of the device, recognize device malfunction, and intervene as necessary. • The school nurse may be responsible for remote monitoring, responding to data transmission, and plan care based on this data. • The school nurse includes wearable medical technology in the IHP and ECP and trains appropriate school personnel on its use, safety, s/s malfunction, and actions that should be taken. • The school nurse develops a plan for potential device failure or interruptions in internet and WiFi capabilities. • The school nurse collaborates with multidisciplinary team to plan for students with IEPs or 504 Plans to include wearable medical technology in the plans. • The school nurse must prevent sharing of HIPAA or FERPA protected information on non-encrypted devices (e.g., the school nurse should not send BG readings via text message to parents or school staff on a personal cell phone).	Care coordination Care planning Education/ Training Technology	I	5	A

87. National Diabetes Education Program. (2016). Helping the student with diabetes succeed: A guide for school personnel	To educate school personnel about effective diabetes management; to share a set of practices that enable schools to create a safe learning environment	Guide for care of students in school	(S): Collaborative effort of best practices sponsored by NIH and CDC; examples of DMMP, IHP, ECP, and separate role/responsibility action checklists for various school personnel
			
			(L): None
				• Diabetes overview
				• Actions for school personnel, parents/guardians, students – defines roles and responsibilities of each
				• Tools for effective diabetes management (DMMP, IHP, ECP)
				• School responsibilities under federal law
				• Glossary of terms
				• Additional resources
				• Students must be able to perform SMBG any time in any place to
				  o Reduce seizure/coma likelihood
				  o Expedite treatment of high and low BG
				  o Reduce out-of-class time
				  o Promote independence
				  o Reduce stigma of SMBG – it becomes normal part of the day
				• Levels of T1D training should include
				  o Level1 – All school personnel on overview T1D, how to recognize and respond to s/s hypo- and hyperglycemia, who to contact for emergency
				  o Level 2 – Teachers and all school personnel with direct responsibility for the student; Level 1 + training for individual responsibilities and actions during emergency, + expanded overview
				  o Level 3 (referred to as trained diabetes personnel, UAP, assistive personnel, paraprofessionals, trained school staff, trained nonmedical personnel) – At least 1 school staff member to receive in-depth training for each student from school nurse, diabetes educator, or other qualified healthcare
					Care coordination
					
					Care planning
					
					CPG
					
					Education/ Training
					
					Rescue medication
					
					Technology
						I	5	A

				professional with experience in T1D; includes Levels 1, 2 + general diabetes care tasks (BGM, insulin and glucagon administration, CHO counting, ketone testing; student-specific training on care tasks, documentation				
88. Peters et al. (2011). Diabetes care for emerging adults: Recommendations for transition from pediatric to adult diabetes care systems: A position statement of the American Diabetes Association	To provide a framework for healthcare delivery during the transition period from pediatric to adult provider	Position statement by the ADA	(S): Collaborative effort, supported by adult and pediatric healthcare provider organizations (L): Outdated but most recent position statement available	• Challenges during transitional period o Lack of empirical evidence on best approaches o Fundamental differences in healthcare delivery between adult and pediatric providers o Lack of defined criteria for transition readiness o Gaps in health insurance o Learning style differences o Deficiencies in training of HCP in care delivery for emerging adults with T1D o Poor glycemic control o Loss to follow-up/ disengagement /lapses in care o Increased risk for acute complications such as severe hypoglycemia, DKA o Psychosocial issues and eating disorders o Sexual and reproductive health • Recommendations o Pediatric providers should prepare teen at least 1 year prior to transfer during the adolescent years. o Focus on self-management skills, including ordering supplies and making appointments. o Education about health insurance options and differences in care models between pediatric and adult providers	Care coordination	I	5	A

				○ Pediatric provider should prepare written summary, such as problem list, medications & self-management skills.				
89. Teuten et al. (2016). Recognition and nursing management of diabetes in children	To increase awareness of HCPs on s/s through use of "4Ts" approach to support recognition and diagnosis of T1D in children: toileting, thirsty, tired, thinner; promotes early recognition of early diagnosis to prevent DKA and potential poor outcomes, including death	Practice/policy with guidelines Developed in UK	(S): Evidence-based, current information that includes policy development and actionable nursing interventions; easy to remember the "4Ts"	• Presents two case studies of ED admissions which may result in missed diagnosis or DKA that is masked by other presenting illness • Provides specific implications for nursing, S/S and management of DKA • Noticing early s/s of T1D can prevent life-threatening complications • Provides sick day rules for managing diabetes • Cases distinguish between a child with new onset T1D without DKA and a timely diagnosis and a child with established T1D presenting with DKA.	CPG Education/ Training	I	4	A
90. Wasserman et al. (2016). Screening of neurocognitive and executive functioning in children, adolescents, and young adults with type 1 diabetes	To offer suggestions for screening and management of neurocognitive dysfunction in pediatric T1D patients in various settings, as well as recommendations for future research	Practice/policy for neurocognitive screening of T1D; implications for school setting	(S): Addresses issues related to school setting and offers suggestions for assessment taking with out-of-range BG (L): Difficult to ascertain if literature cited is the best evidence	• School problems are often first sign of deterioration in cognitive dysfunction. • Problems with executive function can impact students' ability to self-manage T1D at home and at school. This is particularly concerning with comorbid ADHD. • Recommend screening by HCP for cognitive dysfunction of at-risk children: onset < 7 years, DKA events, poor glycemic control, glycemic variability; unexplained decline in school performance, glycemic control, or regimen adherence. • School recommendation: If BG out of range, allow student to take exam at a different time. Use of apps for memory impairment at home and school; school nurses should include in the 504 Plan and wherever applicable (e.g., IHP, IEP, DMMP).	Academic performance Care planning CPG Leadership/ Advocacy	II	5	B