School Nursing Evidence-Based

Clinical Practice Guideline: Students with Asthma

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Rationale

Managing asthma in the school setting can be extremely challenging due to multiple complex etiologies and treatment modalities. Medication administration by the school nurse requires knowledge and self-efficacy with unique administration devices, and assessing the need for intervention requires a combination of subjective and objective findings. These clinical practice guidelines and tool kit will assist the school nurse in providing up to date, evidence-based care for the student with asthma, decreasing the many adverse outcomes associated with asthma when not controlled or adequately managed. While there is no cure for this disease, with proper management the student with asthma can avoid asthma exacerbations, hospitalizations, school absences, have improved academic performance, and enhanced quality of life (Asthma and Allergy Foundation of America [AAFA], 2021).

Asthma is a heterogeneous disease with different underlying disease processes (Global Initiative for Asthma [GINA], 2023) which can include allergic, non-allergic, and exercise-induced triggers seen in children and adolescents (MedlinePlus, 2024). Asthma is an intermittent, reversible disease with intermittent dyspnea, cough, and wheezing. Bronchial hyperresponsiveness, an exaggerated response to specific stimuli, results in smooth muscle contraction and narrowed airways. These stimuli can include allergens, weather changes, strong emotions, irritants, exercise, and viral respiratory infections. Airway inflammation occurs throughout the tracheobronchial tree, leading to airflow limitation. Early phase reactions occur when a person is exposed to a trigger, releasing mast cell mediators that contract the smooth muscle. If this is not alleviated, the late phase reaction occurs several hours later with release of inflammatory and immune cells (Liu, 2022).

The pathophysiology of asthma involves complex inflammatory pathways that lead to progressive airway swelling and bronchospasm. This highlights the crucial need for the school nurse to assist the student in trigger avoidance which would potentially decrease this inflammation. It is essential that the school nurse be aware of the early signs of bronchoconstriction so that intervention can be initiated, which can reverse the process before severe airway inflammation occurs, which is more difficult to reverse (Norris, 2020). These clinical practice guidelines emphasize the role of the school nurse in assessing the level of control for the student with asthma, assisting the student with asthma self-management, administering asthma-specific medications with various delivery systems, evaluating and managing environmental control, coordinating collaborative partnerships, and implementing asthma-specific policies in the school setting.

Asthma is the most common chronic disease of childhood, impacting more than 4 million children ages 5-17 years old nationwide in 2021 (Centers for Disease Control and Prevention [CDC], 2023). This equates to a prevalence of 8.1%, with the highest rate for teenagers ages 15-17 at 9.5%. Of these children and teens with asthma, 38.7% experienced an asthma exacerbation, and 36.4% had an asthma-related emergency department visit. Unfortunately, racial, ethnic, and socioeconomic disparities highlight the need for even greater intervention. For those living below the federal poverty threshold, asthma prevalence increases to 10.4% compared to 6.8% for those at 450% of the federal poverty level. Black, non-Hispanic, and American Indian/Alaskan Native children have double the asthma prevalence at 11.6% and 9.2%, respectively. Mexican children have a lower prevalence (5.2%) than non-Hispanic white children (5.5%) while Hispanic children have 7.1% prevalence. In addition, young males have higher rates than young females (CDC, 2023). Mortality statistics are even more startling. Black non-Hispanic children younger than 18 years are seven times more likely to die from asthma than White non-Hispanic children. While asthma exacerbations in children have declined from 2001 through 2020 (National Center for Environmental Health, 2023), it is estimated that 44% of children with asthma had uncontrolled asthma between 2018 and 2020 (CDC, 2022). Additionally, only 46.5% of children ages 0-17 years have been given an Asthma Action plan (AAP) as part of their asthma self-management education (CDC, 2021). There is no national data on how many children have AAPs at school.

Children with poorly controlled asthma face many social and academic challenges as well. In 2018, 2.2 million children aged 5-17 years missed more than 7.9 million school days (American Lung Association, n.d.). DeGardner and Betancourt (2020) found that students with asthma missed a median of seven school days each school year. Children who are chronically absent (at least 10% of school days) in kindergarten and first grade are less likely to read at grade level by the third grade (Ginsburg et al., 2014). For older students, being chronically absent is strongly associated with failing at school. These students are more likely to be suspended, drop out of high school, and experience substance abuse (American Academy of Pediatrics, 2022).

Additionally, the cost burden of asthma underscores the immense impact the school nurse can have on their students with asthma. Song et al. (2020) found that annual direct medical costs were significantly associated with asthma severity, with $3305 for mild asthma, $7250 for moderate asthma, and $9175 for severe asthma. Those diagnosed with mild asthma missed 0.76 work or school days; those with moderate asthma missed 2.31 school or workdays, and those with severe asthma missed 7.19 work or school days. This equates to $106 and $321, with $1000 indirect costs per person per year, respectively. Yaghoubi et al. (2019) predicted the future excess health and economic burden associated with uncontrolled asthma among American adolescents and adults for the next 20 years. From 2019 to 2038, these costs would approach $300.6 billion. The total economic burden would be $963.5 billion when indirect costs are added. American adolescents and adults will lose an estimated 15.46 million quality-adjusted life years.

These statistics highlight the pivotal role of a school nurse in assisting students with asthma. The school nurse promotes student understanding of asthma, including the identification of triggers and symptoms and the correct use of medication to self-manage their disease. These guidelines reflect the *School Nursing Practice Framework™* foundational principle of standards of practice and the practice principles of care coordination, leadership, quality improvement, and community/public health (National Association of School Nurses [NASN], 2024). Care of a student with asthma requires a whole child approach, which focuses on long-term development and success for the child. These guidelines provide the school nurse with a road map for the care of the student with asthma, to ensure supportive healthy environments that are safe from physical and emotional harm, and that enables students to be fully engaged in the management of their chronic disease (ASCD, n.d.). A safe and supportive school environment must exist for students with asthma to be able to self-manage their disease and achieve optimal asthma control. The school nurse must proactively plan and implement risk reduction strategies to minimize actual or potential asthma-related adverse outcomes.

Many professional organizations and government entities put forth recommendations for the assessment and management of students with asthma in the school setting, which support shared decision-making to optimize health outcomes and quality of life (American Lung Association [ALA], 2023a; Expert Panel Working Group of the National Heart, Lung, and Blood Institute, 2020; GINA, 2023). Evidence-based student health care coordination, health education provision, and quality improvement efforts are essential skills for school nurses (NASN, 2020a). Care coordination focuses on purposeful and deliberate student-centered activities for health care delivery. The school nurse provides oversight and alignment of evidence-based strategies that support social, mental, and health concerns and the well-being of students. School health services offer a collaborative and coordinated partnership between students with asthma, their families, health care providers, and educators to prevent, and/or reduce the occurrence of health problems. These strategies include student asthma self-management, asthma medication administration (e.g., asthma reliever and, in some schools, controller medications), and assisting families with needed resources. Outcomes focus on students' optimal health, quality of life, and academic success. These clinical practice guidelines provide a means for school nurses to achieve these goals when caring for students with asthma.

Purpose

The purpose of this Clinical Practice Guideline (CPG) is to provide best practice recommendations for implementation by school nurses to improve student health and educational outcomes and provide high quality care to students with asthma. The focus of this CPG is to provide safe and supportive school and classroom settings for the students to learn. Students with asthma should be able to participate to the full extent of their abilities in all academic, physical education, and extracurricular activities as outlined in the U.S. Office for Civil Rights (OCR) designation of free and appropriate public education (FAPE) (OCR, 2020). This CPG includes practice recommendations and strategies to assist school nurses in improving the health and safety of the school-aged child with asthma. Student goals resulting from successfully implementing the guidelines include:

- Improved management of asthma.
- Improved asthma medication self-efficacy and adherence.
- Improved asthma control.

- Increased number of students with asthma who have an AAP at school.
- Decreased time spent out of the classroom.
- Decreased number of school absences.
- Improved student academic success.
- Increased opportunities for safe participation in all school activities.
- Decreased emergency room visits.
- Decreased hospitalizations.
- Improved quality of life.
- Improved mental well-being.

The care of students with asthma 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 CPG. Recommendations, therefore, are not given for monitoring of adherence or assessment of impact. This CPG is intended as an overview of asthma to guide school nurses in implementing provider-developed treatment regimens and applying nursing judgment based on students' individual needs.

Implications specific to complex treatment regimens are beyond the scope of this CPG. In addition, specific respiratory disorders that are not asthma are beyond the scope of this CPG. Other activities carried out by the school nurse for students with chronic conditions should still be completed but are not included in the CPG. These activities may include assessing and addressing student developmental age, cultural practices, and social determinants of health (SDOH); developing student/family goals; and providing student-specific education/empowerment (Braveman et al., 2017; NASN, 2021a; Ratterman et al., 2021; Schroeder et al., 2018).

Methodology

The *School Nursing Evidence-Based Clinical Practice Guideline: Students with Asthma* 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 the 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 precedence 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 asthma medically safe and ensure the student has the same access to education as other children and is treated fairly (ADA, 1990).

AAP: Asthma Action Plan. Asthma-specific treatment plan completed by the healthcare provider and outlining student-specific symptoms and treatment related to asthma and emergency contact information.

ACT™: Asthma Control Test. A 5-item validated questionnaire for individuals 12 years and older that assesses asthma control.

Appropriate Treatment or Care: Care provided according to evidence-based practice (EBP) and/or current standards of care.

C-ACT: Childhood Asthma Control Test. A 7-item validated questionnaire for children aged 4 to 11 years that assesses asthma control.

Caregiver: Members of a child's support system, including school staff, that may be involved in direct care of a student's health needs, other than parent/guardian and immediate family members.

CDC: Centers for Disease Control & Prevention.

CPG: Clinical Practice Guideline.

DOE: Dyspnea on exertion. The sensation of running out of air and of not being able to breathe fast or deeply enough during physical activity.

DPI: Dry powder inhaler. A type of inhaler commonly used to deliver medications such as inhaled corticosteroids into the lungs. Patient inhalation breaks up the compacted drug powder and aerosolizes as it is breathed in to the lungs.

EAP/ECP: Emergency action or care plan. A child-specific guide/plan for school staff to facilitate quick and appropriate response for an individual student emergency (NASN, 2022).

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.

ED: Emergency department.

EMS: Emergency medical services. A system of coordinated emergency medical response and care (often referred to as 911).

EPR 3: The EPR 3 Guidelines on Asthma were developed by an expert panel commissioned by the National Asthma Education and Prevention Program (NAEPP) Coordinating Committee (CC), coordinated by the National Heart, Lung, and Blood Institute (NHLBI) of the National Institutes of Health (NIH). The EPR 3 is organized around four essential components of asthma care: assessment and monitoring, patient education, control of factors contributing to asthma severity, and pharmacologic treatment. Focused updates were published in 2020 (Expert Panel Working Group of the National Heart, Lung, and Blood Institute, 2007; 2020).

FAPE: Free and appropriate public education. The U. S. Office for Civil Rights (OCR) ensures schools provide a free appropriate public education (FAPE) to all qualified students with disabilities (generally, students with disabilities who are of school age), regardless of the nature or severity of their disabilities, outlined in Section 504 of the Rehabilitation Act of 1973 and Title II of the Americans with Disabilities Act of 1990 (ADA, 1990).

FeNO: Fractional concentration of inhaled nitric oxide. An endogenous (having an internal cause or origin) gaseous molecule which can be measured in the human breath test as a marker of airway inflammation.

FEV1: Forced expiratory volume in one second. This refers to the volume of air that an individual exhales during the first second of a spirometry test. Normally, at least 80% of the forced vital capacity (maximal breath size) is exhaled in the first second.

GINA: Global Initiative for Asthma. Established by the World Health Organization (WHO) and the US National Heart Lung and Blood Institute (NHLBI) in 1993 to improve asthma awareness, prevention, and management worldwide. GINA issues frequently updated asthma guidelines.

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

ICS: Inhaled corticosteroid. Cortisone-like medications utilized to suppress airway inflammation by inhibiting inflammatory cells.

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 (IDEA, 2004; Every Student Succeeds Act [ESSA], 2015).

IHP: Individualized Healthcare Plan, called a nursing care plan in other settings. School nurses develop IHPs to meet the needs of students. IHPs are written by nurses to guide nursing care. The plan is developed in partnership with the student and family and incorporates synthesis of the nursing assessment and medical orders. The plan focuses on meeting a student's health and academic goals (NASN, 2020b).

LABA: Long-acting beta 2 agonist. These medications, which are always combined with an inhaled corticosteroid, relax the tightened muscles in the airways for up to 12 hours and can help control/prevent symptoms at night or during exercise. For children prescribed Single Maintenance and Reliever Therapy (SMART), combination ICS/Long-acting asthma reliever medication containing formoterol are also used to acute symptoms.

LAMA: Long-acting muscarinic antagonist (long-acting cholinergic). Used in combination with ICS/LABA, these medications improve lung function, reduce exacerbations, and modestly improve asthma control in patients with moderate to severe asthma that is uncontrolled.

LPN/LVN: Licensed Practical Nurse or Licensed Vocational Nurse. Scope of practice requires supervision by an RN. LPN/ LVNs may not practice independently.

Medical Healthcare Team: The HCP, along with pharmacists, pulmonologists, allergists, respiratory therapists, nurses, and others who provide support for youth with asthma.

MDI: Metered dose inhaler. A device used to deliver a measured amount of medication to the lungs, in the form of a short burst of aerosolized medicine that is usually self-administered by the patient via inhalation.

NAEPP: National Asthma Education and Prevention Program. A program administered and controlled by the NHLBI that oversees the development of asthma guidelines and creates tools and materials to put the guidelines into practice. The ultimate goal of the NAEPP it to enhance the quality of life for patients with asthma and decrease asthma-related morbidity and mortality.

Nebulizer: A small machine that turns liquid medicine into a mist that can be easily inhaled through the mouth, nose, or artificial airway into airways and lungs. Since COVID-19, CDC recommendations include utilizing nebulizers cautiously and avoided if appropriate alternatives exist. to prevent droplet spread of disease (CDC, 2024).

NHLBI: National Heart Lung & Blood Institute. The NHLBI provides global leadership for a research, training, and education program to promote the prevention and treatment of heart, lung, and blood disorders, to enhance the health of all individuals so that they can live longer and more fulfilling lives.

OCS: Oral corticosteroids. Anti-inflammatory medications that are synthetic versions of hormones used to provide relief for inflamed areas of the body.

PFM: Peak Flow Meter is a small, hand-held device used to monitor a person's ability to breathe out air.

PEFR: Peak expiratory flow rate. A person's maximum speed of expiration, as measured with a peak flow meter.

Reliever Medications: A type of medication that acts as a bronchodilator during an asthma attack to relax the airway muscles to restore air flow in and out of the lungs. Examples of short-acting asthma reliever medications are albuterol, levalbuterol, and metaproterenol. For children prescribed SMART (single maintenance and asthma reliever therapy), combination ICS/long-acting asthma reliever medications containing formoterol are used for acute symptoms.

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], or receives a different intervention).

RN: Registered Nurse licensed by a state board of nursing. Scope of practice allows for independent practice based upon the nursing process, including care coordination.

SABA: Short-acting beta 2 agonist which acts as a bronchodilator by relaxing the muscles that tighten around the bronchi within 15-20 minutes, lasting for 4-6 hours. Bronchodilators are primarily available as inhalers and nebulizer solutions. SABAs are usually dispensed as albuterol (Ventolin), levalbuterol (Xopenex) or a combination of albuterol and ipratropium bromide (Duoneb).

SBHC: School-based Health Center. SBHCs bring comprehensive primary care services to the place where children and youth are during the day and address critical health problems that make it difficult for students to learn.

School Healthcare Team: The school nurse (RN), school psychologist, teacher, and other school personnel who provide support for youth with asthma.

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

SOB: Shortness of breath. A form of breathlessness described as the frightening sensation of being unable to breathe normally or feeling suffocated.

Spacer: Tube-shaped device equipped with mouthpiece or mask that is used with a metered dose inhaler (MDI) to provide more efficient delivery of inhaled medications to the lungs. The most common type of spacer used is the valve holding chamber (VHC).

Special Education Services: Free and appropriate education (FAPE) for children with disabilities that is designed to meet their unique needs and is administered by means of an IEP. Children ages 3 through 21 years receive special education and related services under Part B of the Individuals with Disability Act (IDEA) of 2004 and amended through the Every Student Succeeds Act (ESSA) in 2015.

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

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 asthma 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, 2020a; National Council of State Boards of Nursing [NCSBN] & American Nurses Association [ANA], 2019).

VHC: Valve holding chamber. A type of spacer that includes a one-way valve at the mouthpiece. A VHC traps and holds medication, giving time for individuals to take a slow, deep breath so that all medication is inhaled.

Search and Selection of Relevant Literature

The systematic literature search and selection were conducted according to the steps outlined in the *Model for Developing School Nursing Evidence-Based Clinical Practice Guidelines* (Shannon & Maughan, 2020). The database search included PubMed using MeSH subject headings (minors OR child OR pediatrics AND asthma AND School Nursing AND diagnostic techniques AND respiratory system) to establish the prevalence and impact of asthma among school-age children. The initial search strategy was then translated to CINAHL Ultimate and APA PsychINFO on the EBSCO platform, Nursing and Allied Health databases (Gale ONEFILE), Cochrane Library, Medline (Ovid), Embase (Elsevier), Web of Science Core Collection, Clinicaltrials.gov, Trip Pro, and ProQuest Dissertations and Theses Global (EBSCO) databases to review literature relevant to the management of asthma, the management of asthma in school and community settings, and the role of healthcare providers and professionals in managing asthma. The search strategy was developed in association with the nursing librarian to incorporate plain language and controlled vocabularies. Using the aforementioned multiple electronic databases, a search strategy combined the following key word terminologies or wordforms in multiple combinations:

- minor, boy, boyhood, girl, kid, child, children, schoolchild, adolescent, juvenile, youth, young people or young person, preteen, teen, pubescent, pediatric or pediatric, school, school-age, schoolchild, schoolboy, schoolgirl, elementary, middle school high school, primary school, pupil
- asthma, bronchial asthma, wheezing, asthma control, asthma admission, asthma exacerbation, bronchial spasm, bronchoconstriction, bronchial hyperreactivity, respiratory sounds, respiratory hypersensitivity, allergic hypersensitivity, respiratory system, precipitating factor, trigger, environment, environmental health, adverse childhood events
- diagnostic techniques, diagnosis, sign, symptom, intervention, medication, early medical intervention, early intervention, medication therapy management, action plan, prevention and control, therapeutics, patient education as topic, inhaler, self-management, disease progression, assessment, nebulizers and vaporizers, corticosteroid, steroids, self-carry, peak flow, absent, asthma reliever medication management
- self-care, health education, case management, self-management, patient education, education, train, instruct, teach, patient-centered, patient-focus, coach, knowledge development, tutor, therapist, disability, handicap, accommodation, 504 plan, individualized health plan
- school nursing, school nurse, school health services, school health, school health nursing, educational intervention, attendance, individualized education plan [IEP], coping, health education, professional development

- mental health, psychological, community
- policy or policies, and procedure

Additionally, the Agency for Healthcare Research and Quality's (AHRQ) National Guideline Clearinghouse (NGC) and the National Institute for Health and Care Excellence (NIHCE) specifically focused on managing asthma in the school setting. Further review included Google, Google Scholar, Global Initiative for Asthma (GINA), Expert Panel Review 3 (EPR), National Association of School Nurses (NASN), American Academy of Pediatrics, American Lung Association (ALA), Asthma and Allergy Foundation of America, American Academy of Allergy, Asthma, and Immunology, World Health Organization (WHO), National Heart, Lung, and Blood Institute (NHLBI), National Institutes of Health (NIH), National Asthma Education and Prevention Program (NAEPP), Cleveland Clinic, and the CDC were searched for grey literature to locate toolkits, guidelines, EBP resources, training resources, and expert panel recommendations specific to the care and management of students with asthma.

A hand search of reference lists was performed to build upon the body of evidence captured in the database searches, applying forward and backward citation searching for comprehensive coverage. The search inclusion criteria included English language, peer-reviewed, academic journals published between January 2018-present (dates chosen to capture the current body of evidence). All search results were uploaded to the Zotero citation manager and then transferred to the Covidence, a web-based collaboration software platform that streamlines the production of systematic and other literature reviews, for the screening, appraisal, and data extraction process.

Once a body of literature was located, the Clinical Guideline Evidence Decision Tree (Appendix A) was applied to ensure inclusion of 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 collective search identified 1,951 articles. The Quick Filter Criteria were applied, and duplicates were removed, yielding 104 articles for critical appraisal in the final body of evidence, see Table C1 in Appendix C.

Descriptive studies focusing on the needs of school children with asthma 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, see Table C2 in Appendix C. The following criteria were used to determine the appropriateness of inclusion into the literature review: high quality evidence; relevant to school nursing coordination of care of students with asthma; school-based and community interventions for students with asthma; international studies of the pediatric and adolescent population with asthma 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. Exclusion: Studies conducted outside the U.S. were excluded if the sample and intervention did not apply to the policies and procedures followed in the U.S. Dissertations, theses, and editorials were excluded after title and abstract review consensus. Quick Filter Criteria were applied to the articles and EBP resources. See Figure 1 for the PRISMA flow diagram that reports out the results of the literature review (Page et al., 2021).

Critical Appraisal of Evidence

The CPG author and NASN lead conducted initial and subsequent appraisals of the evidence. Sources of evidence were appraised and evaluated 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 (see Table C1 and C2 in Appendix C). A group of subject matter experts in asthma, including practicing school nurses and healthcare providers, reviewed and contributed to the evidence appraisal and practice recommendations. An additional group of experts in clinical guideline methodology utilized the AGREE II Instrument (2017) to assess the quality of the Guideline and recommendations for use. All panelists and reviewers were provided with a declaration to identify their conflict of interest and the reviews were double-masked. Selected modifications based on expert panel and reviewer 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 asthma, school nursing practice, and CPGs. Selected modifications based on expert panel critical appraisal were incorporated into the Guideline and practice recommendations.

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 asthma. According to the procedures in *A Model for Developing School Nursing Evidence-Based Clinical Practice Guidelines* (Shannon & Maughan, 2020), recommendations are organized by the following domains of care: academic performance, Asthma Action Plan, care coordination, care planning, community partnerships, education/training, emergency medication, environmental management, leadership/advocacy, medication administration, mental health, policies, and telehealth/telemedicine. Recommendations are specific to asthma 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. Practice recommendations are intended to support, not replace nursing judgement (see disclaimer).

Although there is strong evidence surrounding the treatment and management of asthma, research specific to the school setting is limited. After reviewing the available evidence, the panelists and reviewers believe 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 Asthma* 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 Asthma* to professional school nursing practice through education and ongoing support. Further research evaluating the implementation and outcomes from utilizing guidelines should also be conducted. The CPG and implementation toolkit will be available on the NASN Learning Center website free and accessible to all and will be disseminated via NASN education programs and communications. Guidance on implementing this CPG into practice can be accessed in Tables D1 and D2 in Appendix D.

School Nursing Evidence-Based Clinical Practice Guideline:
Students with Asthma Translation into Practice Recommendations

<table>
<thead>
<tr><th>School Nursing Evidence-Based Practice Guideline</th><th>Domain</th><th>Quality/Level/ Strength of Evidence (See Appendix B)</th></tr>
</thead>
<tbody>
<tr><td rowspan="16">
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 asthma including:

Administration of the ACT or C-ACT routinely
Presence of an AAP at least annually, and as needed with any changes in treatment plans
Student health history including frequency of asthma-related 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 asthma
Mechanism or plan for communication with family/caregiver and HCP
Student’s cognition level to understand asthma triggers, symptoms, and asthma reliever medications to demonstrate asthma self-management, including ability to use inhaler therapy with correct technique.
Student target PEFR within target range, if recommended by HCP
Student’s pattern of asthma episodes, including presenting s/s, frequency, and severity; and timing (after physical activity or seasonal occurrences)
Access/availability of asthma reliever medication (albuterol) or SMART inhaler (ICS/LABA combination) for school (including route, dose, expiration date)
Physical and social environment that allows students to perform asthma care at their comfort level (e.g., private space, space in classroom, peer education)
Risks to student health and safety (e.g., co-morbidities, degree of social/family engagement, psychosocial issues, mental health concerns; environmental factors)
Impact on educational success (e.g., participation in physical education, attendance, missed class time due to asthma management)
Extracurricular activities (e.g., school sports, before and after school programs)
Asthma technology used– student understanding of use, and school nurse self-assessment of understanding the technology
School and district policies, protocols, and procedures related to:

Internet and Wi-Fi capabilities for real-time data and data downloads
Use of encrypted devices for communicating PEFRs levels to parents/caregivers and HCPs
Asthma education and training for school staff

</td><td>Academic Performance</td><td>A: 39;66</td></tr>
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</table>

◦ PEFR monitoring and albuterol administration, including access to supplies and appropriate storage ◦ Self-carry of asthma reliever medications ◦ Nursing delegation of asthma care tasks if permitted by state/local regulations ◦ Plan for asthma care, including medication administration, in absence of school nurse ◦ Medical emergency preparedness and response	Emergency Medication	A: 2;9;13;26;65;74;86;87;90;93;94;102
		B: 12;33;80;83
	Environmental Management	A: 9;13;35;48;49;50;51;53;55;60;64;65;66;70;72;74;79;81;91
		B: 25;32;33;101
	Leadership/Advocacy	A: 13;69;74;76;89;102
		B: 12;52
	Medication Administration	A: 9;13;15;26;37;41;57;65;68;86;95
		B: 11;33;42;47;96
		C: 1;24
	Mental Health	A: 3;13;70
		B: 21;29;75
		C: 23;40
	Policies	A: 26;61;65;67;71;74;76;78;85;86;87;90;91;103
		B: 83;99
	Telehealth/ Telemedicine	A: 15;44;104
		B: 5;80
		C: 22
NURSING DIAGNOSES *The school nurse will use the AAP, 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 asthma resilience for asthma self-management ▪ Effective asthma self-management ▪ Readiness to improve asthma self-management ▪ Knowledge gaps and strengths for asthma self-management ▪ Family and/or student coping and/or stress with ongoing asthma management ▪ Unstable respiratory status ▪ Social engagement with peers and/or family ▪ Asthma education for health promotion and asthma management ▪ Readiness for enhanced health literacy for asthma management ▪ Readiness for enhanced asthma health management ▪ Ineffective asthma health management	Academic Performance	A: 39;65
	Asthma Action Plan	A: 9;13;53;55;59;60;68;74;102
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	Community Partnerships	A: 13;18;38;44;69;82;102
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		B: 5;80
		C: 22

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 asthma management. ▪ Receive appropriate care for asthma emergencies. ▪ Receive appropriate treatment and monitoring for respiratory status in the school setting. ▪ Remain free from injury resulting from impaired respiratory status. ▪ Experience reduced risk for suboptimal social engagement in the school setting. ▪ Receive support in facilitating conversations with trusted peers. ▪ Remain free from superimposed yeast/fungal infections from use of asthma medications/inhalers in the school setting. ▪ Receive collaborative support, encouragement, and guidance for the transition of autonomous asthma self-care. ▪ Effective self-management of asthma, as developmentally appropriate and with minimal school/classroom interruptions. ▪ Receive appropriate support to participate as much as possible in all school-based academic and school-sponsored activities. ▪ Achieve academic success (e.g., attendance, classroom seat time, passing grades, graduation).	Academic Performance	A: 39;65
	Asthma Action Plan	A: 9;13;53;55;59;60;68;74;102
		B: 11;12;28;33;100
		C: 8
	Care Coordination	A: 2;13;15;37;38;44;45;64;65;68;70;72;74;76;84;86;88;89;91;92;94;97
		B: 4;7;10;13;17;20;21;33;52;75;80;83
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	Care Planning	A: 6;9;13;18;19;37;41;48;49;50;51;53;64;74;76;81;84;86;88;91;94;97;98
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		B: 83;99
	Telehealth/ Telemedicine	A: 15;44;104
		B: 5;80
		C: 22
PLANNING *Using the AAP, nursing assessment synthesis (i.e., nursing diagnoses), and identified outcomes, the school nurse will develop a modifiable, customizable IHP and EAP/ECP to address, as appropriate:* ■ Respiratory status (RR rate, skin color, presence of retractions, SOB, PEFR, SaO2 (target range, where and when to monitor, interventions to address results ■ Treatment of non-emergency respiratory status ■ Treatment of emergency asthma exacerbation ■ Access to the least restrictive evidence-based asthma reliever medication choice (nebulized vs inhaled), when appropriate ■ Accommodations for daily management of asthma, for example, ○ Self-carry of asthma reliever inhaler ○ 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 (if appropriate) ■ 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 lockdowns) ■ Asthma inhaler administration instructions (if permitted by state/local regulations) ■ Parameters for full and safe participation in physical education and sports (e.g., PEFR greater than 80% PB, RR within normal limits for age) ■ Communication and documentation plans among the student, family, school nurse, and HCP ■ Development and enhancement of asthma self-management skills ■ Development and strengthening of social and emotional support skills ■ School-site specific considerations and accommodations (e.g., trigger control) ■ Other student-specific interventions to address identified goals and outcomes	Academic Performance	A: 39;65
	Asthma Action Plan	A: 9;13;53;55;59;62;68;74;102
		B: 11;12;28;33;100
		C: 8
	Care Coordination	A: 2;13;15;37;38;44;45;64;65;68;70;72;74;76;84;86;88;89;91;92;94;97
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		B: 25;32;33;101

- 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, nurse practice act, and school policy)
- Tiered training of school personnel
- Training needs for out-of-school time personnel, if appropriate
- Skills for transitioning from pediatric to adult asthma care (for the high school student)
- Quality of life issues, adverse childhood experiences, or other mental health concerns associated with asthma

Leadership/Advocacy	A: 13;69;74;76;89;102
	B: 12;52
Medication Administration	A: 9;13;15;26;37;41;57;65;68;86;95
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	B: 85;99
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INTERVENTIONS/ IMPLEMENTATION

The school nurse implements the student-centered plan(s) of care (e.g., IHP, EAP/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 plans as needed. Implementation also includes:

- Developing policies, protocols, and/or procedures related to:
  - Nursing delegation related to asthma care
  - The use of internet and Wi-Fi for real-time data and data downloads
  - The use of devices, if appropriate, to communicate peak flow readings, pulse oximetry and pertinent respiratory symptoms to parents/caregivers and HCPs as encrypted messages
  - Provision of asthma self-management training,
  - Medication administration to allow for delegation of routine and asthma reliever medication administration (if permitted by state/local regulations) or plan for medication administration in absence of school nurse
  - Resources and support (e.g., Certified Asthma Educator (AE-C) and Social Worker) to ensure engagement with the asthma action plan
  - Safe and full participation in physical education and sports,
  - Medical emergency preparedness and response plan specific to asthma
  - Documentation of care provided and outcomes
  - Professional development for the school nurse and school staff on asthma (e.g., updated asthma guidelines, 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
  - Training may be conducted in person or virtually
  - The school nurse may access educational support through professional nursing and asthma organizations, the American Lung Association, and school district educator when available

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<table>
<tr><td rowspan="17">
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:

Monitoring results outside established parameters for peak flow readings and SaO2
Areas of noted concern (e.g., level of engagement, mental health issues, changes from baseline)
Administration of asthma reliever medication
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)
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 asthma self-management skills
Asthma action plans

Managing asthma triggers in schools
Managing asthma symptoms in schools
Checking PEFR and/or RR, SpO2 level
Addressing environmental factors, including air quality
Identify and reduce stress factors

Medications and devices used to treat asthma in school settings

Asthma reliever medications
How to use inhalers: MDI, dry powder
How to use nebulizers
How to use spacers

Asthma management programs available to teach asthma self-management to school aged children, grades Pre-K-12
Staging interventions based on asthma status
Community Partnerships
Collaborating with parents/caregivers to manage asthma in the school setting
Educate the students/parents/school employees for medication usage including spacer and nebulizer
</td>
<td rowspan="2">Emergency Medication</td><td>A: 2;9;13;26;65;74;86; 87;90;93;94;102</td></tr>
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EVALUATION

In addition to regular evaluation of student progress to adjust individual student's care plans (e.g., IHP, EAP/ECP, 504 plan, IEP) needed to meet goals, the school nurse will collect the following information to track progress and evaluate efforts:

- Effectiveness of school nurse interventions
  - Number of students diagnosed with asthma
  - Number of students using asthma reliever inhalers
  - Number of students within target range (TIR) of peak flow meter reading (if available)
  - Number of students who have an asthma action plan (completed by HCP)
  - Number of students who have an IHP, EAP/ECP, 504 Plan, and/or IEP to address asthma- related needs in the school setting
  - Number of students receiving care from UAP
  - Number of health office visits of students with asthma
  - Number of students who experience an asthma exacerbation in the school setting
  - Number of students with impaired respiratory status
  - Number of students who are allowed to self-carry their asthma reliever inhalers
  - Number of school staff educated and trained for asthma response
- Medications used to treat asthma in school settings
- Asthma reliever medications
- How to use inhalers: MDI, dry powder (with and without spacers)
- How to use nebulizers
- Access and how to use spacers
- Asthma management programs available to teach asthma self-management to school aged children (grades pk-12)
- Staging interventions based on asthma status
- Community partnerships
- Collaborating with parents/caregivers to manage asthma in the school setting

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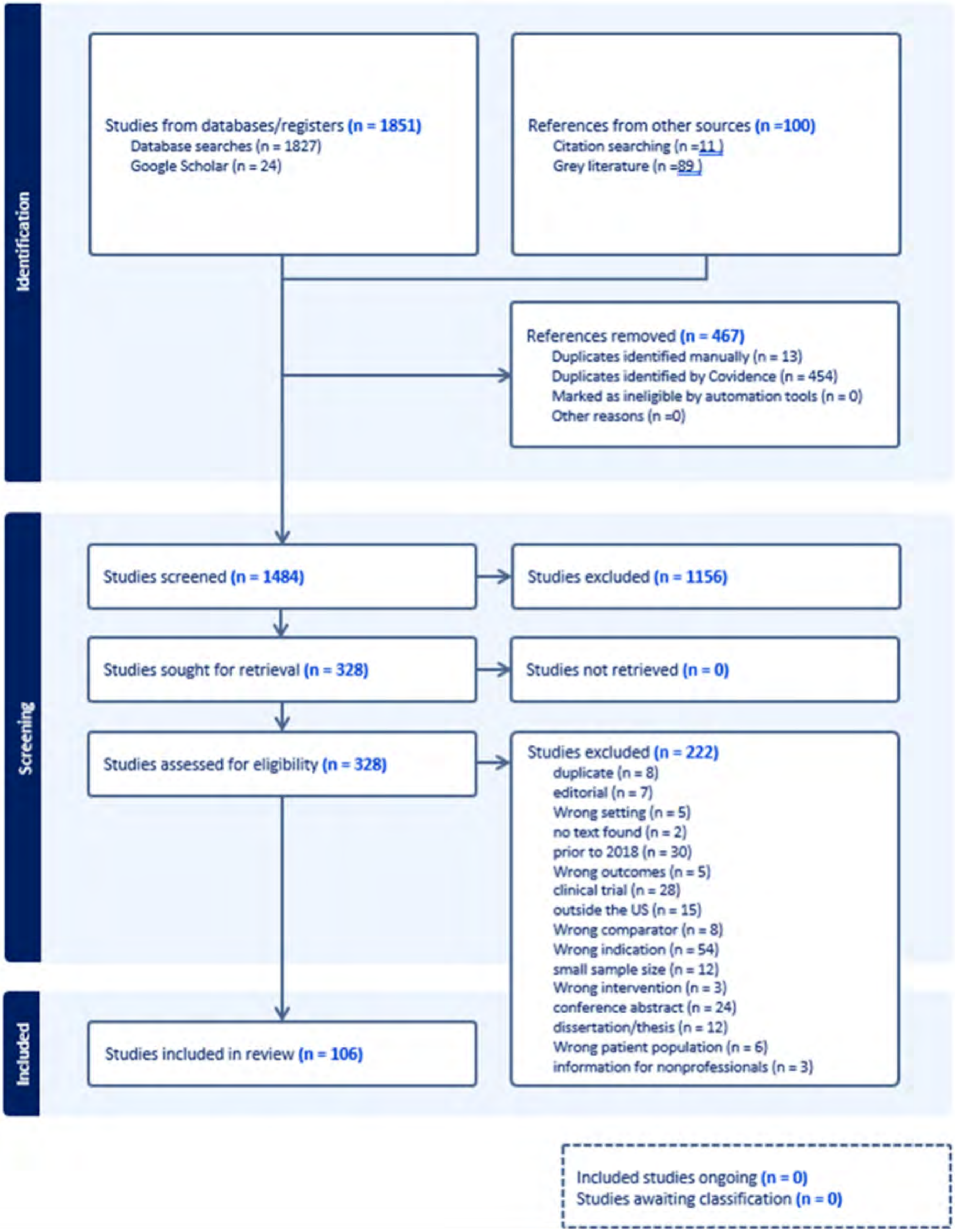
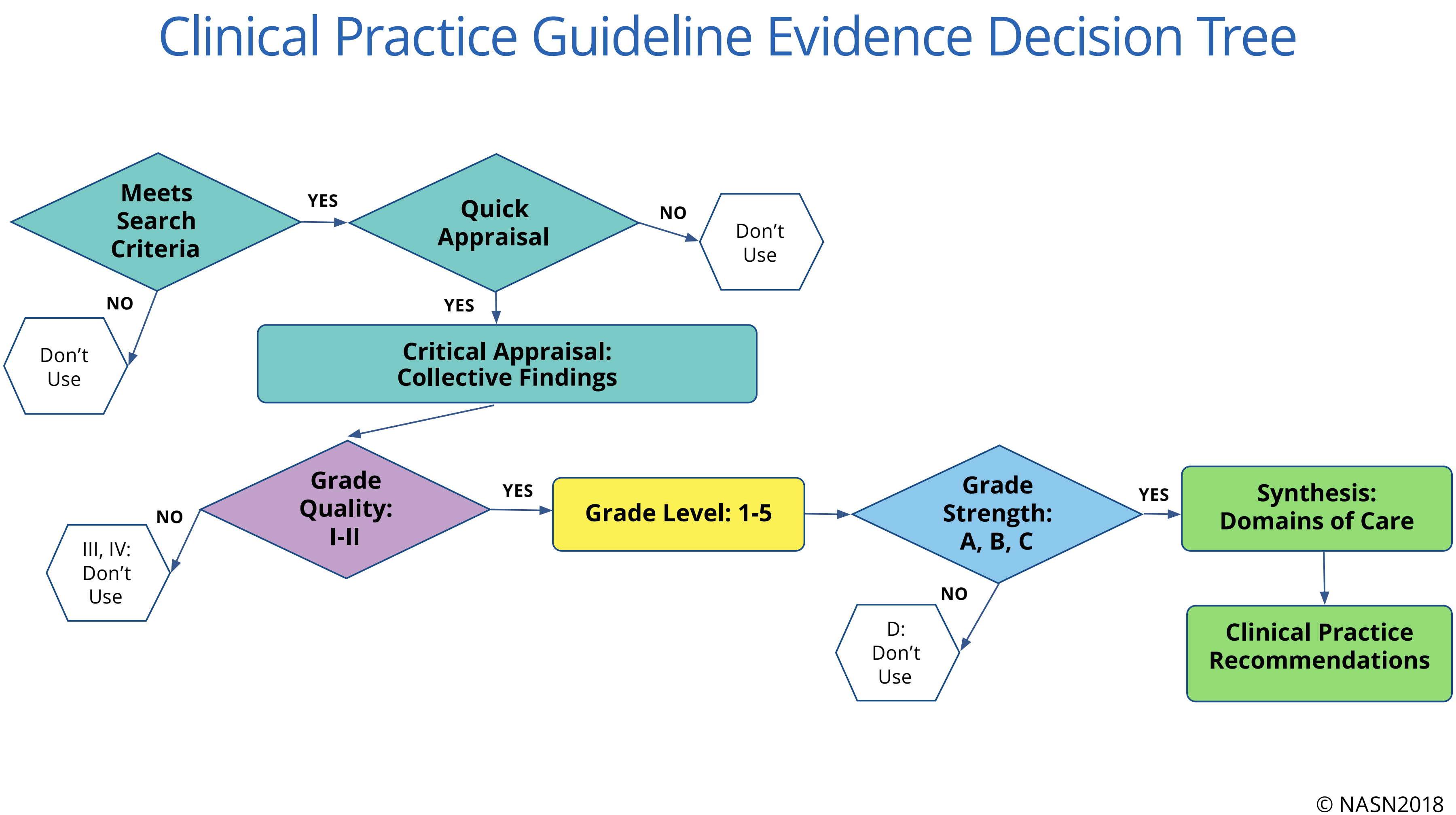
FIGURE 1

PRISMA Flowchart of Studies Included in the Literature Review



APPENDIX A

Clinical Practice Guideline Evidence Decision Tree



APPENDIX B

Grading of Quality, Level, and Strength of Evidence

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 Table: Critical Appraisal of Evidence

Table C1: ***RESEARCH ARTICLES***								
Reference	Purpose/ Research Question	Study Design, Sample Size, and Characteristics	Major Strengths (S) and Limitations (L)	Summary of Findings (F) and Recommendations (R)	Domains of Care	Quality/Level/ Strength of Evidence (See Appendix B)		
1. Al Kindi, Z., McCabe, C., & McCann, M. (2022). Impact of nurse-led asthma intervention on child health outcomes: A scoping review. *Journal of School Nursing, 38*(1), 84–97. https://doi.org/10.1177/10598405211003303	To examine what is currently known about the impact that school nurse-led asthma intervention programs have on child health outcomes by including solely school-based programs that were led by school nurses	Scoping Review N= 7 studies from 6 databases which included school aged children ages 5-18 years, parents, school staff, nurses of any type and other health care professionals; school nurse-led asthma interventions, with outcomes including knowledge and skills needed for asthma management; reduction in health care utilization (ER visits, hospitalization) and missed school/ workdays; medication use, asthma severity, symptoms frequency, number of exacerbations, activity limitations, and quality of life	S: Provides the school nurse with practical implications that ensure the effectiveness of school nurse-led intervention programs that address asthma in school-aged children L: Studies did not explore the effect a school nurse-led asthma program on outcomes such as the number of exacerbations and asthma severity; inability to draw a firm conclusion on the impact of a school nurse-led asthma program due to the need for a longer follow-up period for each outcome; the wide variations in sample size, measurement tools, and the nature of school nurse-led asthma programs in the studies reviewed require a more rigorous type of research; the sustainability of interventions is influenced by the degree to which school nursing services are available, as the partnership between the clinical setting and the	F: 1) School nurse-led asthma programs had a positive impact on children's asthma health-related outcomes, which include medication use, reduction in school absenteeism, reduction in health care utilization, improved asthma knowledge, and quality of life; 2) school nurse-led asthma programs demonstrated positive impact on medication adherence and symptom frequency among children but not significantly prominent among adolescents; 3) The review reported a weakening of inhaler technique skills as early as 1 month after receiving education on best practice inhaler technique skills. 4) while not significant, the five included studies that investigated school absence reported a trend in the declining number of missed school days after the school nurse-led intervention, regardless of the intervention type. 5) educating parents and	Care Coordination Education/ Training Medication Administration	II	1	C

			public school system promotes long-term asthma outcomes sustainability	children was a major component of school nurse-led asthma interventions. However, only two studies examined asthma knowledge outcomes, one among children only and one among children and their parents. A nonsignificant increase in the parent knowledge score showed an improvement R: 1) Supervised asthma medication administration in school settings by school nurses causes an uncompensated workload for school nurses. Schools with limited nursing services can establish a system to maintain the administration of preventive asthma medications, where non-nurses who received additional asthma training assist the school nurse in communicating with the physician, families, and school. An additional strategy to reduce school nurse workload while implementing such programs is the electronic linkage between the hospital health record and school electronic health record, so that the school nurse is aware of any change in the treatment plan. 2) To enable practice sustainability and maintain asthma self-management skills, school nurses need to be involved in planning,				

				implementing, evaluating, and leading the intervention. Further research is needed to compare child health outcomes when asthma interventions are developed by school nurses versus implemented or led by school nurses.				
2. Best, N. C., Nichols, A. O., Waller, A. E., Zomorodi, M., Pierre-Louis, B., Oppewal, S., & Travers, D. (2021). Impact of school nurse ratios and health services on selected student health and education outcomes: North Carolina, 2011-2016. *Journal of School Health, 91*(6), 473–481. https://doi.org/10.1111/josh.13025	To examine the impact of North Carolina school nurse-to-student ratios and school nurse health services on student health outcomes for asthma and diabetes, including self-management of their chronic condition, increased academic performance, and reduced absenteeism.	Longitudinal repeated measures analysis of school health services data 115 public schools in North Carolina representing 1.46 million students enrolled in public elementary (K-5th grades), middle (6th-8th grades), and high (9th-12th) over 5 years (2011/2012 through 2015/2016)	S: 100% participation rate in the survey by all 115 NC school districts. L: Although all school districts participated in the survey, some of the questions were not pertinent for each district (e.g. the district did not have a structured case management program). Only students that were identified as receiving services for asthma and diabetes were included.	F: Elementary school students experienced a higher rate of nursing services for asthma; School nurses provided asthma education for school staff in 38 (33%) and for students in 30 (26%) school districts; Elementary school students experienced a higher rate of nursing services for asthma counseling than middle and high school students; Significantly more elementary school students had provider orders for nebulizer treatments, while more middle and high school students for self-carry asthma inhalers; about 6400 students with chronic and/or complex health care needs received case management by school nurses each year; lower school nurse-to-student ratios were associated with percent improvement in decreased absences related to asthma and student ability to accurately list their asthma triggers; Asthma health	Care Coordination Education/ Training Medication Administration	I	3	A

				counseling was associated with percent improvement in students consistently verbalizing accurate knowledge of the pathophysiology of asthma, students remaining within acceptable peak flow/ pulse oximeter parameters according to the care plan, and improved grades. R: Improving school nurse/student ratios and preserving/increasing school nurse positions.				
3. Carter-Pokras, O. D., Bugbee, B. A., Gold, R. S., Lauver, P. E., Aiken, R., & Arria, A. M. (2021). Utilizing student health and academic data: A county-level demonstration project. *Health Promotion Practice, 22*(2), 193–203. https://doi.org/10.1177/1524839919862796	1) evaluate the strength of the relationship between health status and academic performance as measured by absenteeism and grades; 2) describe the health status of students who are chronically absent. Hypotheses: 1) Students with chronic health conditions would have lower GPAs and more absences than students without chronic health conditions; 2) the prevalence of chronic health conditions would be higher among chronically absent students, compared with students who miss fewer school days.	Cross-sectional cohort study (demonstration project), N=3663 students in grades K-12; 52.1% were male, 96.9% were non-Hispanic White, 45.0% were in Grades K-5, and 47.6% received free or reduced-price meals	S: ability to conduct analyses on a de-identified data set that kept student information confidential; demonstration project used existing health and academic data L: findings might not generalize to other school districts outside of Maryland where the sociodemographic characteristics might be different, or where there are fewer or more resources devoted to managing chronic health conditions of students.	F: 6.8% had asthma only; 1.4% had asthma and ADD/ADHD; Students with asthma and/or mental health conditions had a higher number of absences than students without those conditions, even when accounting for the influence that grade level and socioeconomic status have on health and absences. Students with asthma missed, on average, 12.1 days of school, compared with 10.5 days among students without asthma. Having asthma was not associated with decreased GPA. R: strengthening existing collaborations and establishing new multidisciplinary partnerships to analyze existing data sources to learn more about the relationship between student health and	Academic Performance Mental Health	I	3	A

				academic achievement. School systems would benefit from data collection and analysis of the relationship between chronic health conditions and educational performance markers. Future research would benefit from the use of a larger sample size and more robust data collection				
4. Caruana, M., West, L. M., & Cordina, M. (2021). Current asthma management practices by primary school teaching staff: A systematic review. *Journal of School Health, 91*(3), 227–238. https://doi.org/10.1111/josh.12992	To determine current asthma management practices by primary school teaching staff and any existing supporting legislation/policies/ guidelines	Systematic review. N= 13 articles on providing teaching staff education on asthma management and supporting guidelines, policies, or legislation	S: clearly formulated aim which helped to focus the review with an exhaustive search; this systemic review was carried out in accordance with a fully developed protocol and during every step of the review, inter-rater reliability checks were performed. L: 1) restricted to papers published in English and did not include gray literature which may have introduced a systematic bias; 2) Studies focusing on nonteaching staff were excluded; 3) A narrative approach which was used for the data synthesis has a subjective nature and is difficult to maintain transparency; 4) small sample size of some studies included in this systematic review implies that caution should be taken when interpreting the results of this systematic review	F: teachers were unable to deal with an asthma exacerbation; they lacked knowledge regarding trigger avoidance and exercise-induced asthma and that there was poor communication between teachers and nurses and between schools and parents of children with asthma. The only documented relevant asthma legislation found pertained to New York schools R: Need for studies that investigate benefits of asthma education for teachers over the long-term. Schools need to establish asthma-friendly environments	Care Coordination Education/ Training	II	1	B

5. Crabtree-Ide, C., Lillvis, D. F., Nie, J., Fagnano, M., Tajon, R. S., Tremblay, P., Halterman, J. S., & Noyes, K. (2021). Evaluating the financial sustainability of the school-based telemedicine asthma management program. *Population Health Management, 24*(6), 664–674. https://doi.org/10.1089/pop.2020.0361	To evaluate whether a novel, evidence-based School-Based Telemedicine Enhanced Asthma Management (SB-TEAM) program, designed to overcome barriers to care for families of urban school-aged children, can be financially sustainable in real-world urban school settings. Hypothesis: The SB-TEAM was not more expensive than enhanced usual care, while also improving patient outcomes and decreasing health care utilization.	Randomized pretest/posttest design with cost analysis N= 400 children with physician-diagnosed asthma with persistent symptoms or uncontrolled asthma, ages 3-10 years old	S: The extensive sensitivity analyses and simulations that were conducted to assess the impact of various staffing models on the program's economic performance and sustainability under different scenarios L: 1) study was conducted in a single school district of the United States (Northeast). There is a significant variation in health care prices among individual health care markets. 2) costs of non-health care-related resources contributing to SB-TEAM also vary substantively across geographic areas 3) study sample size was only 200 children per arm. To detect statistically significant differences in overall costs between the treatment arms, a study would need to recruit a sample approximately double in size. 4) intervention reliance on at least a part-time school nurse or health aide to monitor visits and medication administration throughout the program. 5) School RN per student ratios vary throughout the US	F: The SB-TEAM program increased symptom-free days and reduced ED visits and hospitalizations. The SB-TEAM program operating costs may be offset by the reduction in health care costs, caregiver lost wages, and school absenteeism associated with the program health benefit and is likely to remain financially sustainable. R: A school telemedicine model has the potential to improve child health outcomes while remaining cost neutral, indicating that such programs can be maintained in urban settings in a financially-sustainable way.	Telehealth/ Telemedicine	II	2	B

6. D'Agostino, E. M., Zhang, S., Day, S. E., Konty, K. J., Armstrong, S., Skinner, A., & Neshteruk, C. D. (2023). The longitudinal association between asthma severity and physical fitness among New York City public school youth. *Preventive Medicine, 170*. https://doi.org/10.1016/j.ypmed.2023.107486	To evaluate the relationship between asthma severity and subsequent fitness in New York City public school youth enrolled in grades 4-12 using the NYC Fitnessgram dataset (2010-2018).	Longitudinal mixed models study. N=663,362 students. Of the 663,362 students included in the analysis: 51.2% male, 30.7% non-Hispanic Black, 39.7% Hispanic, 15.4% Asian/Pacific Islander, 13.5% non-Hispanic White. High household poverty (70.2%), 54.9% 4th-8th grade. 1.3%, 11.3% and 87.4% of students had severe, mild, or no asthma, respectively.	S: diverse pool of >600,000 children in a large metropolitan area, providing the opportunity for analyses across levels of asthma severity and stratified by sociodemographic subgroups; dataset provided annual standardized measures of physical fitness over multiple years of data collection at the individual student level, allowing examination of the longitudinal relationship between asthma severity and lagged fitness L: Not all students completed a Fitnessgram test, including students with chronic conditions such as asthma; the NYC FITNESSGRAM only includes data from NYC public schools, excluding charter and private schools. Findings may not generalize to youth attending those schools, or other NYC students outside of the study's age range. Furthermore, the analysis did not consider air pollution or overweight and obesity in the children with asthma.	F: 1) Median fitness scores were lower for students with severe asthma compared to students with mild asthma and without asthma. Among students with severe asthma, median fitness scores were lowest among non-Hispanic Black and Hispanic students, respectively, compared with non-Hispanic White and Asian students. Median fitness -scores were similar in male students with severe asthma compared to female students with severe asthma. 2) An inverse association between asthma severity and physical fitness the subsequent year was found. A student with persistent severe or mild asthma each year could be ex¬pected on average to have more than ½ and ¼ of a SD decrease in fitness over the middle school period. R: Future studies should address the asthma severity-physical fitness relationship by weight category	Care Planning	I	3	A

7. Elliott, J. P., Morphew, T., Gentile, D., Williams, P., Barrett, C., & Sossong, N. (2022). Improved asthma outcomes among at-risk children in a pharmacist-led, interdisciplinary school-based health clinic: A pilot study of the CAReS program. *Journal of the American Pharmacists Association, 62*(2), 519-525.e1. https://doi.org/10.1016/j.japh.2021.11.008	To investigate program impact on follow-up appointment attendance, delivery of guideline-based care, asthma control, asthma morbidity (emergency department [ED] visits, oral corticosteroid [OCS] requirement), and asthma-related knowledge and quality of life.	Pretest/posttest design. N= 50 children with asthma, ages 6-11 years, from 6 elementary schools (September 2014-December 2017)	S: Population appropriate to school nursing. Methods show evidence of interventions that can effect change L: 1) approximately 10% of children/ caregivers did not complete the treatment plan knowledge nor the ACT survey at 1 or more follow-up visits; 2) unable to demonstrate improved medication compliance due to child/ caregiver inconsistency in bringing medications to visits; 3) reductions in hospitalizations were not analyzed owing to limited data; 4) limited generalizability due to high-risk pediatric patients, African American children, living in underserved areas, and with exposure to secondhand smoke higher than the national average; 5)small sample size	F: 1)pharmacist-led, school-based asthma clinic resulted in compliance with chronic disease management appointments, statistically significant improvements in asthma treatment plan knowledge, asthma-related quality of life, and improved scores on the asthma control test, as well as decreased ER use or oral corticosteroid burst post intervention; 2) findings support the feasibility and value of a pharmacist-led, interdisciplinary school-based health care delivery model in providing comprehensive asthma care to at-risk pediatric populations. R: 1) Future studies are needed to explore the cost-effectiveness of pharmacist management of asthma and other chronic diseases in the school setting. 2) Replication of this study in a larger population of at-risk children and in other settings with other providers would further substantiate and increase generalizability of the study findings.	Care Coordination Community Partnerships Education/ Training	II	3	B

8. Ellis, A. G., Henry, L. D., Meadows, L. A., Roehm, B. L., Mahl, C. S., & Loman, D. G. (2019). Effect of a school-based asthma clinic on asthma outcomes. *Allergy & Asthma Proceedings, 40*(3), 154–161. https://doi.org/10.2500/aap.2019.40.4218	To determine whether two or more visits per year to the Healthy Kids Express Asthma (HKEA) program were associated with improved asthma control	Retrospective quality assurance study. N=1076 children with asthma ages 5-15 years recruited from three school districts during three school years	S: The HKEA program provides a much-needed bridge to specialty asthma care by allergy/pulmonary trained pediatric nurse practitioners with the assistance of social workers to help children become responsible for their own asthma care. L: 1) retrospective data not obtained specifically for research purposes; 2) participant/ parent report about emergency department visits, hospitalizations, and oral corticosteroid courses; 3) some instruments used for evaluation of the HKEA program were not validated; 4) no students had severe asthma; different allocation of time for HKEA among the schools	F: 1) participants showed a reduction in emergency department visits (36.9% to 14.2%) and hospitalizations (7.1% to 5.0%) from the year before beginning the program to the third year of the program; 2) Absenteeism was significantly improved, from 59.1% to 27.1%. Staff and student knowledge of asthma improved significantly after completing asthma education programs; 3) More than 90% of participants completed three technique checks of their inhaler and spacer technique and showed significant improvement in their tech check (an inhaler/aero chamber technique check) scores; 4) Parent satisfaction with the HKEA program was rated excellent or very good by 96.9% of the parents. R: 1) Provision of on-site care with school-based programs based on evidence-based guidelines and school-based interventions; 2) provision of asthma reliever medications at school based on written asthma action plans; 3) educating students about self-treatment skills via programs like Open Airways for Schools; 4) educating school faculty to recognize and treat acute asthma symptoms	Asthma Action Plan Care Coordination Education/ Training	II	3	C

9. Expert Panel Working Group of the National Heart, Lung and Blood Institute. (2020). 2020 focused updates to the asthma management guidelines: A report from the National Asthma Education and Prevention Program Coordinating Committee Expert Panel Working Group. *The Journal of Allergy and Clinical Immunology, 146*(6), 1217–1270. https://doi.org/10.1016/j.jaci.2020.10.003	To update the Expert Panel Report 3 using systematic reviews that includes practical implementation guidance for each recommendation	Practice Guideline Update	S: Use of GRADE, the internationally recommended approach for developing recommendations that clinicians can trust L: 1) absence of strong recommendations that clinicians should adhere to for almost all individuals with asthma as the standard of care due to the variations in asthma phenotypes and endotypes and in the outcomes used in the studies reviewed to develop the recommendations; 2) Issues with study designs, heterogeneity of study results, or small numbers of events led to downgrading the certainty of evidence; 3) For most of the asthma recommendations, the overall certainty of the evidence was downgraded because of inconsistencies in study results, risk of bias, or absence of critical standardized outcome measures.	F: The six priority topics identified for systematic review were as follows: 1. Fractional exhaled nitric oxide (FeNO) in diagnosis, medication selection, and monitoring of treatment response in asthma 2. Remediation of indoor allergens (e.g., house dust mites/pets) in asthma management 3. Adjustable medication dosing in recurrent wheezing and asthma 4. Long-acting antimuscarinic agents in asthma management as add-ons to inhaled corticosteroids 5. Immunotherapy and the management of asthma 6. Bronchial thermoplasty (BT) in adult severe asthma	Asthma Action Plan Care Planning Education/ Training Emergency Medication Environmental Management Medication Administration	I	1	A

10. Francis, L., DePriest, K., Sharps, P., Wilson, P., Ling, C., Bowie, J., & Thorpe, R. J., Jr. (2021). A mixed-methods systematic review identifying, describing, and examining the effects of school-based care coordination programs in the US on all reported outcomes. *Preventive Medicine, 153*, 106850. https://doi.org/10.1016/j.ypmed.2021.106850	To identify, describe, and examine school-based care coordination programs implemented in the US and the effects on all reported outcomes (i.e., health, social needs, learning, behavioral, cognitive outcomes). RQs: What components of the US school-based care coordination programs are documented in research, and what are their effects on all reported outcomes?	Mixed methods systematic review. N=11 articles were included that described a US school-based care coordination program	S: 1) using a mixed-methods approach to account for all types of research methodologies and using the Mixed Methods Appraisal tool to assess the strength of each study respective of the research methods used. L: 1) school-based efforts and program implementation results are sometimes found in reports published by organizations. that may not be found in the peer-reviewed databases. Grey literature not examined, potential for to publication bias 2) criteria of school-based where schools served as the hub for care coordination activities excluded care coordination programs for schools that were housed in other settings, such as primary care clinics.	F: 1) Adolescent users of School-Based Health Centers (SBHCs) and their parents perceive SBHCs to provide high-quality, convenient, trusting, compassionate, culturally competent, and coordinated care 2) negative perceptions: Program staff, parents, and students perceived barriers to program success were attributed to staff shortages and lack of time, family distress related to poverty and unmet social needs, HIPPA, and FERPA compliance and data sharing/ communication issues, lack of medications, and lack of policies specific to medication administration 3) significant increases in knowledge of asthma management and control among students upon implementation of the Step-Up Asthma program in Denver public schools 4) Implementing school-based asthma care coordination programs led to significant decreases in asthma exacerbations, emergency room or urgent care visits, use of systemic corticosteroids or short-acting beta-agonists, and school absences among school students with asthma R: 1) Support school-based research on care	Care Coordination Care Planning Education/ Training	II	1	B

				coordination program development and evaluation, SBHCs, and community schools. 2) Explore the challenges and opportunities posed by privacy laws and privacy concerns regarding the sharing of student data 3) Leverage nurses' competencies and skill set to encourage nurse-led interdisciplinary school-based teams to address the health and social needs of children and families 4) Advocate for policies to strengthen and expand SBHCs, community schools, with care coordination at its core 5) Supplement state school budgets with funds provided by the American Rescue Act				
11. Gerald, J. K., Fisher, J. M., Brown, M. A., Clemens, C. J., Moore, M. A., Carvajal, S. C., Bryson, D., Stefan, N., Billheimer, D., & Gerald, L. B. (2019). School-supervised use of a once-daily inhaled corticosteroid regimen: A cluster randomized trial. *Journal of Allergy and Clinical Immunology, 143*(2), 755–764. https://doi.org/10.1016/j.jaci.2018.06.048	To evaluate the effectiveness of supervised once daily therapy in a school setting and population	Randomized Control Trial N=322 students with asthma from 20 schools	S: The supervised therapy program allows the child with asthma to receive daily ICS administration when present at school. L: 1) asthma was self-report without evidence of persistent asthma; 2) measurement of asthma control was based on child-reported recall; 3) ICS treatment was not facilitated at home on weekends, holidays, and absences so supervised therapy might not have been sufficient by itself to improve asthma control; 4) study not generalizable since sample was predominately Latino;	F: 1) At baseline, 39% of students reported taking a controller medication, and 24% had well-controlled asthma; 2) few caregivers reported difficulty accessing or paying for asthma-related care, likely because most were publicly (74%) or privately insured; 3) 80% of students receiving immediate intervention were prescribed mometasone; 4) Schools administered 98% of prescribed doses when students attended school; 5) Absences, weekends, and holidays reduced calendar adherence to 53%; 6) The Supervised	Asthma Action Plan Care Coordination Medication Administration	II	2	B

			5) findings should be viewed with caution	Asthma Medicine in Schools (SAMS) study students were 25% less likely to have excellent/ very good health and 50% more likely to have fair/ poor health; 7) 41% of the SAMS study students met the federal definition of chronic absenteeism, but only 4-5 were attributed to asthma; 8) despite use of a once-daily ICS regimen, the program did not improve asthma control, school absences, or health care use compared with usual care.				
12. Gessner, L., Thompson, D., Torres, R., & Fu, L. (2021). Implementing the Asthma Scripts to School Programs to facilitate student access to albuterol. *Journal of Health Care for the Poor and Underserved, 32*(2), 622–630. https://doi.org/10.1353/hpu.2021.0091	To pilot the Asthma Scripts to School Program which sends albuterol inhalers directly from pharmacies to schools at no cost to families, the day after a child's discharge for an asthma-related hospitalization or an outpatient encounter in primary care or an asthma clinic.	Descriptive study N=109 patients had their albuterol inhaler delivered to school; Program referrals were made by 43 health care providers.	S: To provide information about Asthma Scripts to School Program that provides a means for in-school medication access for students with asthma L: 1) more albuterol inhalers than spacers and asthma action plans were delivered to school; 2) some parents did not provide signed forms to the pharmacy	F: 1) 1/3 of the 109 participating students had their corticosteroid inhaler delivered to school, an option most often selected for students who had been hospitalized for asthma; 2) over 1/3 of parents chose to have the second prescribed albuterol inhaler mailed home instead of picking it up at the pharmacy; 3) six months after enrolment, 8 parents affirmed that delivering to and administering asthma medication at school was extremely helpful and reassuring and delivery of albuterol to the home was convenient. R: 1) Use paper prescriptions with pre-filled inhaler and spacer instructions and dispensing information for faxing	Asthma Action Plan Community Partnerships Emergency Medication Leadership/ Advocacy	II	3	B

				orders; 2) utilize schools to distribute and collect the Medication Transfer Authorization Form with the annual student health certificate so that nurses can fax the form to the pharmacy; 3) utilize a centralized registry for HCPs, school nurses, and parents to enhance data-sharing				
13. Global Initiative for Asthma. (2023). *Global strategy for asthma management and prevention*. https://ginasthma.org/wp-content/uploads/2023/07/GINA-2023-Full-report-23_07_06-WMS.pdf	To improve the lives of people with asthma by translating medical evidence into better asthma care worldwide	Evidence-based asthma management strategies primary care practitioners, specialists and allied health professionals; Two PubMed searches are performed each year, each covering the previous 18 months, using filters established by the Science Committee. The search terms include asthma, all ages, only items with abstracts, clinical trial or meta-analysis or systematic review, and human.	S: 1) Prior to publication each year, the GINA Strategy Report undergoes extensive external review by patient advocates and by asthma care experts from primary and specialist care in multiple countries; 2) continuous external review throughout the year in the form of feedback from end-users and stakeholders through the contact form on the GINA website L: Recommendations must be adapted to fit local practices and the availability of healthcare resources	F: 1) Asthma Definition/ description and dx -asthma assessment -controlling asthma and minimizing risk in specific populations and levels of severity; 2) medications; 3) asthma/COPD -managing exacerbations -managing asthma for adults, children and adolescents -primary prevention in children -translating evidence into practice R: disseminate and implement evidence-based recommendations and integrate into health systems and clinical practice	Asthma Action Plan Care Coordination Care Planning Community Partnerships Education/ Training Emergency Medication Environmental Management Leadership/ Advocacy Medication Administration Mental Health	I	1	A

14. Grape, A., Rhee, H., & Sanchez, P. (2019). Evaluation of a peer-led asthma self-management group intervention for urban adolescents. *Journal of Pediatric Nursing, 45*, 1-6. https://doi.org/10.1016/j.pedn.2018.12.011	To 1) to evaluate the acceptability of peer-led asthma self-management intervention in comparison to the program led by adult educators based on participant feedback, 2) to compare the program acceptability by site and sociodemographic characteristics, and 3) to evaluate peer leaders' qualification based on adolescent learners' feedback	Pretest/posttest with control group. N= 259 Children 12–17 years old with physician-diagnosed persistent asthma that required health service use (preventive or acute) within 12 months prior to enrollment living in inner city zip codes	S: demonstrates that peer-led asthma education is an acceptable and effective method for teaching students with asthma about self-management L: 1) attendance varied across sessions. The number of no shows resulted in fewer age and gender matched peers in attendance than originally planned which may have negatively affected peer dynamics between peer leader and campers as well as among campers; 2) sample was homogeneous limiting the generalizability; 3) Because the program evaluations were self-reports, it is unclear whether the high satisfaction rating was a reflection of the social desirability effect; 4) reliability of the Asthma Knowledge Survey used to test pre-and post-intervention asthma knowledge was low; 5) Because the scope of the study being limited to program evaluation, effects of the program on asthma outcomes are not presented here	F: 1) Knowledge test mean scores improved significantly from pre- to post-tests. No significant group differences were found between the peer-led and adult-led group in the improvement of the knowledge scores; 2) Overall program evaluation showed high acceptability with average score of 4.5 (±.87) out of 5 and no treatment group differences were found. R: Further refinement and modification of the asthma knowledge survey by adding more items for each topic area of asthma self-management is needed for future research	Education/ Training	II	3	B

15. Halterman, J. S., Fagnano, M., Tajon, R. S., Tremblay, P., Wang, H., Butz, A., Perry, T. T., & McConnochie, K. M. (2018). Effect of the School-Based Telemedicine Enhanced Asthma Management (SB-TEAM) Program on asthma morbidity: A randomized clinical trial. *JAMA Pediatrics, 172*(3), e174938. https://doi.org/10.1001/jamapediatrics.2017.4938	To evaluate the effect of the SB-TEAM program on asthma morbidity among urban children with persistent asthma. RQ: Can a novel school-based intervention that includes supervised asthma therapy and telemedicine visits overcome key barriers to guideline-based preventive care and improve outcomes for urban children with asthma?	Randomized Control Trial; N=400 children ages 3-10 years with persistent asthma diagnosed by a physician (200 in SB-TEAM and 200 in enhanced usual care)	S: demonstrates effectiveness of telehealth for school nurses in managing asthma L: 1) blinding of caregivers, children, and physicians was not possible. However, outcome assessments as well as objective measurements were blinded; 2) children in the eUC group may have experienced improved care simply through participating in the study, creating a conservative bias; 3) While telemedicine is now used in many different settings to improve care, this study was done in a medium-sized city in elementary schools, and therefore, findings can only be generalized to similar settings and age groups; 4) Only 82% of children in the SB-TEAM group received DOT at school; with more consistent protocol adherence, more significant findings might be observed	F: 1) Children in the SB-TEAM group had more SFDs per 2 weeks postintervention compared with children in the eUC group; 2) children in the SB-TEAM group also had fewer symptom days, symptom nights, and days with limited activity compared with children in the eUC group; 3) SB-TEAM children were 8 times more likely to be prescribed a preventive asthma medication and half as likely to need emergency department visits or hospitalization for asthma compared with children in the eUC group; 4) the FeNO improved more in children in the SB-TEAM group; 5) all caregivers expressed high satisfaction with the program. R: 1) Need to consider resources available in each community to build collaborations; 2) school-based programs that incorporate telemedicine to link to primary care can improve outcomes for urban children with asthma.	Care Coordination Medication Administration Telehealth/ Telemedicine	I	2	A

16. Harris, K., Kneale, D., Lasserson, T. J., McDonald, V. M., Grigg, J., & Thomas, J. (2019). School-based self-management interventions for asthma in children and adolescents: a mixed methods systematic review. *The Cochrane Database of Systematic Reviews*, *1*(1), CD011651. https://doi.org/10.1002/14651858.CD011651.pub2	To employ a mixed-methods approach to assess 1) which components of an intervention contribute to the success or failure of the intervention; 2) whether school-based self-management interventions are effective in improving outcomes for children with asthma	Cochrane Review; 33 Randomized Controlled Trials involving 12,623 children	S: 1) Large sample size; 2) Provides evidence for school-based interventions for the child with asthma L: Effects of interventions on school absences and data on medication use were insufficient	F: 1) Compared with no intervention, school-based self-management interventions could reduce mean hospitalizations by an average of 0.16 admissions per child over 12 months. 2) may also reduce the number of children who visit hospital emergency departments from 7.5% to 5.4% over 12 months, as well as reduce unplanned visits to hospitals or primary care from 26% to 21% at 6 to 9 months. 2) School-based self-management interventions could also reduce the number of days students were restricted in their activity by just under half a day over a two-week period. 3) Quality of life was shown to slightly improve	Education/ Training	I	1	A
17. Hay, R., Namey, B., Ripper, L., Bunk, E., & Elliott, J. (2023). Analysis of school-based asthma screenings and need for care coordination in underserved urban communities. *Journal of the American Pharmacists Association*, *63*(4S), S48–S51. https://doi.org/10.1016/j.japh.2022.12.010	To describe a school-based asthma screening program's ability to identify children at risk of undiagnosed and uncontrolled asthma and the need for care coordination	Retrospective descriptive review. N=561 children in grades pre-K to 12th grade	S: demonstrates the feasibility of screening for asthma to identify uncontrolled or undiagnosed children L: 1) survey response bias, Surveys are more likely to be returned if a child has asthma or asthma symptoms; 2) low response rates: only 9% of asthma screening tools were completed and returned.	F: 1) 13% of participants (n=73) displayed asthma symptoms but did not have a diagnosis of asthma; 2) Of those 73 participants, 9.6% (n=54) were at risk of uncontrolled asthma; 3) screening tool also identified 5.6% of participants (n=32) who had a diagnosis of asthma and were at risk of uncontrolled asthma R: 1) regular screening for asthma symptoms; 2) follow-up on those children who screened positive but did not have an asthma diagnosis	Care Coordination	I	3	B

18. Isik, E., Fredland, N. M., & Freysteinson, W. M. (2019). School and community-based nurse-led asthma interventions for school-aged children and their parents: A systematic literature review. *Journal of Pediatric Nursing, 44*, 107–114. https://doi.org/10.1016/j.pedn.2018.11.007	To explore school- and community-based educational intervention programs for school-aged children and their parents and to examine the effectiveness of the programs in asthma management	Systematic literature review: N=8 studies: population: school-aged children between 5 and 18 years old and their parents, intervention: educational asthma interventions for children and/or their parents with comparisons with the usual asthma care and educational asthma intervention, outcome: asthma knowledge and skills needed to manage asthma	S: Implications for nurses equivalent to NAEPP guidelines L: Only articles published in English were retrieved; only four databases were searched; family households were not identified (eg. single mother or father, grandparent as primary caregiver, foster family)	F: 1) Student-friendly educational asthma interventions focused on asthma control approaches significantly improved knowledge and skills of self-management behaviors in studies' participants, improved school attendance and quality of life for children with asthma and their parents; 2) enabled access to healthcare and better asthma management for all populations, including rural and low socio-economic populations; 3) increased school attendance and school performance; 4) reduced ER visits, hospitalization rates, and unplanned doctor visits. R: 1) Use culturally relevant, age-appropriate interventions designed to meet both children and parents' needs; 2) repeat so that knowledge is sustained over time; 3) small presentations and health fairs for students and their parents in combination with case management methods to follow and maintain students' progress	Care Planning Community Partnerships Education/ Training	II	1	A

19. Isik, E., Fredland, N. M., Young, A., & Schultz, R. J. (2021). A school nurse-led asthma intervention for school-age children: A randomized control trial to improve self-management. *Journal of School Nursing, 37*(6), 480–490. https://doi.org/10.1177/1059840520902511	To examine the effectiveness of a theoretically based school nurse–led asthma intervention on asthma symptoms, self-management, peak flow meter usage, daily activities, and school absences in children 7–12 years old	Randomized Control, two-group repeated measures N= 71 English speaking with an asthma diagnosis with no comorbidities	S: This study demonstrated that benefits of a school nurse–led asthma intervention increased awareness of asthma management techniques and self-care abilities L: 1) outcomes were only measured for a 12-week period. It would be important to capture the long-term retention and self-care ability at 3, 6, and 12 months; 2) the subjects' age, cognitive ability, and experiences may influence the understanding of the concepts; 3) sample was drawn from one urban school district of the region, which limits generalizability. 4) the study was limited by the school schedules, rules, and regulations including the time and place of the intervention program; 5) parents' thoughts and experiences were not included in this study	F: The treatment group had statistically significant differences in reported symptoms, asthma control with a peak flow meter usage, and daily activities at 6 weeks and at 12 weeks; 2) although difference in school absences was not statistically significant, the treatment group missed fewer school days than the control group	Care Planning Education/ Training	I	2	A
20. Isik, E., & Isik, I. S. (2019). Asthma care coordination in schools by school nurses: An integrative literature review. *Public Health Nursing, 36*(4), 498–506. https://doi.org/10.1111/phn.12610	To document and synthesize the available evidence on school nurse asthma care coordination challenges and explain the components of asthma care coordination/case management at schools	Integrative review N=12 Inclusion criteria were asthma care coordination, case management, school-aged children, school settings, and school nurses	S: Successful asthma care coordination may prevent health care fragmentation, emergency room visits, hospitalization, and school absenteeism, and can increase asthma knowledge and the quality of life for students and parents L: 1) the use of specific search terms that may have missed some published studies;	F: 1) There should be clear guidelines for asthma care coordination components at schools to minimize health care fragmentation and to deliver optimal health care; 2) Student- and parent-centered care enable student and parent collaboration with school nurses, allowing students and their parents to feel like they are partners with school nurses; 3) clear communication with students and parents is	Care Coordination	II	4	B

			2) 3 nursing databases were used for this integrative review; 3) The search was only in the English language; 4) there were a small number of studies for this review; 5) asthma care coordination challenges at schools may not be generalizable in all school settings	essential; 4) needed recognition of risk factors for asthma episodes; 5) asthma education should be tailored to each student and parent; 6) barriers were identified: poor communication, poor asthma knowledge, socioeconomic and health access, lack of support for asthma care coordination in school settings, nursing shortage, inadequate				
21. Joseph, S. P., Borrell, L. N., Lovinsky-Desir, S., Maroko, A. R., & Li, S. (2022). Bullying and lifetime asthma among children and adolescents in the United States. *Annals of Epidemiology, 69*, 41-47. https://doi.org/10.1016/j.annepidem.2022.02.001	To examine the association of experiencing bullying within the past year with the prevalence of lifetime childhood asthma in U.S. children and adolescents; and whether this association varies with sex of the child and selected socioeconomic indicators.	Secondary analysis retrospective cross-sectional design. N= 19766 children ages 6-17 years with 2,028 with asthma and 17,738 without asthma	S: 1) a large racially/ethnically diverse national representative sample allowing for control of potential confounders and investigation of interactions; 2) use of a nationally representative sample allows the study findings to be generalized to more communities within the U.S. population; 3) use of a recent, nationally representative data set to study the association of bullying and asthma L: 1) When cross-sectional data are used, causality cannot be established. Reverse causation cannot be ruled out. It is possible that having asthma increases the chance of peer victimization; 2) information on bullying was asked of the survey respondents, not the children experiencing bullying, which may have under- or over-estimated the amount of bullying	F: 1) Children who experience bullying have a significantly greater probability of having asthma; 2) The probability of childhood asthma increased with the frequency of bullying; 3) This association did not differ with sex of the child or selected socioeconomic indicators R: 1) future studies should include cyberbullying and its effect on children and adolescents; 2) HCPs need to assess bullying in school age patients when treating a child with refractory asthma	Care Coordination Care Planning Mental Health	I	3	B

			the child was experiencing; 3) The survey did not collect information on cyberbullying; 4) asthma severity not assessed; 5) BMI not included in analysis since ht and wt only collected ages 10 and older and would have limited sample size					
22. Kim, C. H., Lieng, M. K., Rylee, T. L., Gee, K. A., Marcin, J. P., & Melnikow, J. A. (2020). School-based telemedicine interventions for asthma: A systematic review. *Academic Pediatrics, 20*(7), 893–901. https://doi.org/10.1016/j.acap.2020.05.008	To conduct a systematic review evaluating impact of school-based telemedicine programs on improving asthma-related outcomes	Systematic review 7 articles included (original research, including quasi-experimental studies without restriction on type of telemedicine)	S: Some of this data supports the potential benefit of using telehealth in the school setting but more evidence is needed L: 1) Variability in intervention designs and outcome measures make comparisons and quantitative analyses across studies difficult; 2) only 2 of 7 studies were randomized controlled trials; 3) some studies had small sample sizes	S: 1) 7 studies reported significant increases in symptom-free days and/or decrease in symptom frequency; 2) 5 of 6 reported increases in at least one quality-of-life metric, 2 of 7 reported a decrease in at least 1 health care utilization metric, 1 of 3 showed reductions in school absences, and 1 of 2 reported improvements in spirometry measures. R: Studies should include school absences and cost-effectiveness analyses to help schools determine whether to invest limited resources in telemedicine technologies.	Care Planning Telehealth/ Telemedicine	II	1	C
23. Lack, S., Brown, R., & Kinser, P. A. (2020). An integrative review of yoga and mindfulness-based approaches for children and adolescents with asthma. *Journal of Pediatric Nursing, 52*, 76-81. https://doi.org/10.1016/j.pedn.2020.03.006	To explore the state of the science about yoga and mindfulness interventions for physical and mental health in children and adolescents with asthma	Integrative review N=11 articles from 5 databases with subjects ages 19 and younger, key words yoga, mindfulness, and asthma	S: School nurses can recommend inclusion of mindfulness and yoga in schools to see if these activities make a difference in asthma outcomes L: 1) due to the wide variation in the styles of yoga, the length of each intervention, and the	F: The use of yoga in children and adolescents with asthma is associated with improved lung function, anxiety, and quality of life; 2) higher rates of trait mindfulness are associated with lower rates of wheezing and coughing in adolescents with asthma and are related to decreased asthma specific stress and	Care Planning Mental Health	II	4	C

			inclusion of children with exercise induced asthma and children with varying asthma severity, it is difficult to determine which components and how much yoga is needed to be effective for children and adolescents with asthma; 2) most studies did not conduct long-term follow-up after the end of the intervention	improved asthma control and quality of life. R: Further studies are warranted to determine the exact effects and mechanisms of yoga and mindfulness-based interventions for children and adolescents with asthma in order to evaluate their physiological and psychological effects.				
24. Lee, E., Grayson, M., Klaver, D., Fuller, B., Dasgupta, M., Steinberg, J., & Meurer, J. (2022). Asthma Smarts Education: Increased disease knowledge and reduced school nurse visits. *Progress in Community Health Partnerships, 16*(2), 193–203. https://doi.org/10.1353/cpr.2022.0023	To evaluate the efficacy of a brief, school-based asthma education, for students with asthma in grades three to five.	Prospective pretest/ posttest/ cohort study N=2066 children with asthma in grades 3-5 from 77 different schools from 2014-2018	S: 1) Asthma Smarts curriculum demonstrates the positive outcomes from providing asthma self-management education; 2) education consistent with National Institutes of Health L: 1) No resources for a control group; 2) schools could not adjust how absenteeism was recorded; 3) asthma control for participants could not be measured; 4) data sources could not be linked to specific students, and students could not be tracked to measure retained knowledge; 5) only a limited subset of asthma-related visits to the school nurse was queried and individual Asthma Smarts participants were not matched to nursing visit records.	F: 1) Significant improvement upon post-testing was shown for all questions in all years: identifying triggers, when to use controller medicines, knowledge on when to use both controller and quick relief medicines, correct use of a spacer and cough as an asthma symptom, impact of smoking on asthma; 2) Asthma-related school nurse visits from 2008 to 2013 for students (n = 110) who participated in Asthma Smarts made fewer asthma-related visits to the school nurse. R: 1) Focus more education on trigger identification, controller medication use and vaping; 2) Partner with community members to implement the program	Community Partnerships Education/ Training Medication Administration	II	3	C

25. Li, Z., Xu, X., Thompson, L. A., Gross, H. E., Shenkman, E. A., DeWalt, D. A., & Huang, I.-C. (2019). Longitudinal effect of ambient air pollution and pollen exposure on asthma control: The Patient-Reported Outcomes Measurement Information System (PROMIS) Pediatric Asthma Study. *Academic Pediatrics, 19*(6), 615-623. https://doi.org/10.1016/j.acap.2019.03.010	To test longitudinal associations of air pollution (particulate matter and ozone) and pollen exposure with the change of asthma control status in children/ adolescents over a 26-week period by using data collected from the Patient-Reported Outcomes Measurement Information System (PROMIS) Pediatric Asthma Study (PAS)	Longitudinal descriptive correlational. N= 229 dyads of pediatric patients ages 8-19.9 years old with asthma and their parents, having at least two asthma-related health care visits during the past 12 months; and having access to internet and a telephone within the past six weeks who were followed-up for 15 months	S: Highlights the need for the school nurse to monitor air quality for their students with asthma and assess asthma control and intervene as necessary L: 1) participants were recruited from Florida Medicaid and SCHIP and may not be generalizable; 2) socio-demographic data (other than age and sex) and past asthma events were not available from non-participants; 3) sources and severity of indoor pollutants (e.g., radon, carbon monoxide, tobacco smoke) were not collected; 4) pollen index was an aggregate of different origins and types of pollen (e.g., tree, grass, and weed pollen); 5) study relied on the zip codes of the residences to link air pollution data from the nearby EPA monitoring sites rather than the use of portable/direct measurements; 6) poor asthma control associated with particulate matter and ozone exposures may not indicate a causal relationship unless other co-pollutants (SO, CO, NO, etc.) have been accounted for	F: Elevated particulate matter concentration and pollen severity were associated with poorer asthma control status, yet elevated ozone concentration was marginally associated with better asthma control R: develop air quality control policies to address air quality	Care Planning Environmental Management	II	3	B

26. Lowe, A. A., Gerald, J. K., Clemens, C., & Gerald, L. B. (2022). School-based stock inhaler programs and neighborhood disadvantage. *Journal of Health Care for the Poor and Underserved, 33*(2), 1083–1093. https://doi.org/10.1353/hpu.2022.0082	To assess the relationship between area-level socioeconomic disadvantage and stock inhaler events reported during the 2017-2018 academic year	Descriptive Correlational N=228 schools, all public, charter, and private/parochial schools, enrolled in the Pima County Stock Inhaler Program.	S: Stock inhaler programs can ensure equitable access to asthma reliever medication for all students with asthma. L: 1) many school districts offer open enrollment to students who live outside of a school's designated boundary so ADI may not accurately describe the socioeconomic characteristics of the households of enrolled students; 2) some schools in disadvantaged neighborhoods may benefit from other health programs that affect the health of children with asthma or their access to needed controller and asthma reliever medications; 3) study may not have captured confounding factors that resulted in need for stock inhaler use	F: 1) Among 228 participating schools, those in the second worst area deprivation index (ADI) quartile were twice as likely to use a stock inhaler as those in the most deprived quartile; 2) Middle schools were two times more likely to use a stock inhaler than elementary schools	Emergency Medication Medication Administration Policies	II	3	A
27. Mammen, J. R., McGovern, C. M., Schoonmaker, J. D., Philibert, A., Schlegel, E. C., & Arcoleo, K. (2022). A multilevel perspective on goals, barriers, and facilitators of school-asthma management. *Journal of Asthma, 59*(12), 2461–2474. https://doi.org/10.1080/02770903.2021.2018704	To explore multi-level perspectives and barriers regarding school-based asthma medical management for inner city, school-aged children with poor asthma control	Qualitative N=66 people participated: 16 children, 14 caregivers, 5 secretarial personnel, 7 medication monitors, 12 school nurses, 1 home health nurse, 2 pharmacists, 2 primary care providers, 6 Administrators, and 1 Payor.	S: Identified barriers to asthma care and highlights the need for a more pro-active approach in managing the child with asthma L: 1) data from a population of symptomatic, at-risk children in a single geographic region; 2) child focus groups included broad age ranges, and did not elicit developmental differences; 3) use of	F: 1) School based care generally beneficial; 2) the different stakeholders had different goals for care, ranging from quality of life to fiscal concerns; 3) Facilitating care attributed to continuity-of-care and strong relationships between care community members with having a school nurse fulltime; 4) Barriers: insufficient systems and policy level support; asthma managed in crisis mode; communication challenges;	Care Planning Community Partnerships	II	3	B

			broadly mixed adult focus groups could have obscured important racial differences in perceptions and experiences; 4) findings differed from the almost exclusively positive feedback about SBC reported anecdotally to program administrators.	discordance between members of the asthma care community which may negatively impact collaborative asthma management; lack of knowledge and belief barriers R: Moving away from a crisis-based approach to asthma management for high-risk children will require increased systemic support for proactive asthma care and optimized communication within the asthma care community				
28. McCabe, E. M., McDonald, C., Connolly, C., & Lipman, T. H. (2019). A review of school nurses' self-efficacy in asthma care. *Journal of School Nursing, 35*(1), 15–26. https://doi.org/10.1177/1059840518808886	To gain a greater understanding of school nurses' self-efficacy (SE) in asthma care	Integrative review. 68 unique publications were reviewed with 10 accepted for inclusion that met criteria: (1) school nurses in the sample; (2) measurement of the school nurses' self-efficacy, confidence, or competence as either an outcome or a predictor variable; (3) the measurement of the school nurses' self-efficacy, confidence, or competence was specific to asthma; (4) publication in peer-reviewed journals	S: 1) Studies were included based on the Johns Hopkins Nursing Evidence-Based Practice Evidence Level and Quality Guide; 2) evidence level was rated on a scale from Level I to Level V, where Level 1 is the highest quality study. L: 1) Studies included used convenience samples of nurses; 2) diversity of the sample was either not reported or reported in a limited manner; 3) only 10 studies were included; 4) studies lacked consistency in the instrument used to measure self-efficacy; 5) some accepted articles were from other countries with different health care systems; 6) some articles more than 5-year-old and some more than 10 years old	F: 1) School nurses' SE in asthma care was found to have a positive association with the presence of Asthma Action Plans (AAP) in the school setting; 2) school nurses who complete continuing education and training on asthma care have higher confidence and competence, regardless of method of education delivery; 3) there is a significant correlation between SE ratings in asthma care and asthma knowledge, asthma attitude, performance, and perceptions of the importance of asthma management behaviors; 4) nurses with <1 year of experience were significantly less confident in medication administration, peak flow monitoring, and use of	Asthma Action Plan Education/ Training	II	4	B

				inhaled medication than their more experienced counterparts R: 1) Continued use of the AAP to positively influence SE and increase nurse confidence in asthma management; 2) an exploration of factors that may influence school nurses' SE in asthma care has the potential to create optimal outcomes for students and effective use of health-care resources; 3) School health settings must champion the confidence and empowerment of school nurses to support improved child well-being				
29. McCabe, E. M., & Strauss, S. M. (2022). Risk factors associated with bullying at school and electronic bullying in U.S. adolescent females with asthma. *Journal of School Nursing, 38*(4), 380–386. https://doi.org/10.1177/1059840520951635	(1) To examine the prevalence of bullying at school and electronic bullying among high school females with asthma in the United States (2) to examine relationships between demographic characteristics, mental health, and substance use and bullying at school and electronic bullying among this group of female adolescents with asthma	Descriptive Correlational, secondary data analysis. N=1634 female adolescents with asthma in the YRBS 2017	S: Large sample size L: 1) Use of cross-sectional data prevented analysis of causal relationships between demographics, mental health issues, and substance use and types of bullying; 2) missing data. The question related to cigarette use had about 20% missing data; 3) self-reported data, with the potential for social desirability in responses; 4) the questions and response options were dichotomous answer options	F: 1) 27.5% of adolescent females with asthma were bullied at school compared with 72.5% who were not, and 24.7% of adolescent females with asthma were electronically bullied as compared with 75.3% who were not; 2) Almost 2/3 (62.7%) were 16 years or older, 52.2% were White, and almost half (47.3%) were in high school Grades 11 or 12; 3) Bullying at school: the relationship between race/ ethnicity and bullying at school was statistically significant; 4) compared with females with asthma who were not bullied at school, a smaller proportion of those who were bullied at school were Black/African	Mental Health	I	3	B

				American and a greater proportion was White; 5) females with asthma who were bullied at school were significantly less likely to be 16 years or older and in Grades 11 or 12 rather than in Grades 9 or 10; 6) significantly more likely to report (a) feeling sad or hopeless, (b) considering suicide, (c) making a suicide plan ($p < .001$), (d) ever using cigarettes, (e) using electronic vapor products, (f) ever using alcohol, (g) ever using marijuana, and (h) having contact with illegal drugs at school 7) Electronic bullying: there were no statistically significant relationships between electronic bullying and either race/ethnicity or grade in school; 8) compared with females with asthma who were not electronically bullied, females with asthma who were bullied electronically were significantly less likely to be 16 years or older; 9) significantly more likely that females with asthma who were not electronically bullied to report (a) feeling sad or hopeless, (b) considering suicide, (c) making a suicide plan, (d) ever using cigarettes, (e) using electronic vapor products, (f) ever using alcohol, (g) ever using marijuana , and (h) having contact with illegal drugs at school				

				R: 1) future research studies that explore substance use as a coping means in female adolescents with asthma who are victims of bullying; 2) investigation of protective factors that may show an influence regarding bully victimization, chronic illness (asthma), and gender				
30. McClure, N., Seibert, M., Johnson, T., Kannenberg, L., Brown, T., & Lutenbacher, M. (2018). Improving asthma management in the elementary school setting: An education and self-management pilot project. *Journal of Pediatric Nursing, 42*, 16–20. https://doi.org/10.1016/j.pedn.2018.06.001	To increase daily asthma symptom self-assessments of elementary school students using Green Means Go, an asthma education and self-assessment program, via a partnership between an elementary school and a school of nursing	Quality improvement N=90 elementary school children with asthma; N=12 teachers with children diagnosed with asthma	S: This program provided a method of recording the frequency of a child's asthma symptoms during the school day, which was thought to be a potential method of improving access to school-based asthma resources L: 1) participants were asked to self-identify without confirmation of a child's diagnosis. Students without asthma may have participated in the program and others with a diagnosis may have elected not to participate in the program. 2) more robust evaluation is needed, including school attendance, ER visits and hospitalizations 3) no pretest given 4) low teacher participation	F: 1) Of the children who participated in the sessions, 100% were able to correctly verbalize their asthma zone at the end of each education session; 2) twelve classrooms (63%) with a child with asthma participated in daily asthma zone recording for a total of 48 students. Daily participation of the 12 classrooms ranged from 9% to 85%, with average daily participation at 31.87%	Care Planning Education/ Training	III	5	C

31. McClure, N., O'Kelley, E., & Lutenbacher, M. (2020). Using academic community partnerships to improve asthma care in elementary schools with limited school nurse services. *Journal of School Health, 90*(2), 158–161. https://doi.org/10.1111/josh.12859	To highlight a program that provides education and asthma screening through an academic community partnership	Descriptive Correlational N=118 pre-K through grade 4 students identified by a parent to have asthma participated in asthma symptom screening and education sessions	S: An academic community partnership in asthma management is valuable for elementary schools with limited nursing services L: 1) 87% of children in the program did not have access to a quick relief inhaler; 2) attendance data was not used to evaluate this project since the school district did not track the reasons for absence	F: 1) Over 8 months, 71.1% of students had no episodes of wheezing when screened and 28.8% had at least one wheezing episode; 2) only 13% had a quick relief inhaler at school along with an appropriate medication form on file, allowing these students to use medication if needed; 3) if a child did not have an inhaler or required forms, the parent pick up the child from school the child had to be transported to the ED via EMS (N=2) R: 1) Communication between the school and health providers can better manage chronic disease in the school setting; 2) Consider providing stock albuterol for children with medication forms signed by a provider who do not have an inhaler at school	Care Planning Education/ Training	II	3	B
32. Mirabelli, M. C., Flanders, W. D., Vaidyanathan, A., Beavers, D. P., & Gower, W. A. (2023). Ambient air quality and fatal asthma exacerbations among children in North Carolina. *Epidemiology, 34*(6), 888-891. https://doi.org/10.1097/EDE.0000000000001648	To investigate associations between particulate matter ≤2.5 μm in aerodynamic diameter (PM2.5) and ozone (O3), two ambient air pollutants associated with airway hyperresponsiveness, airway inflammation, and oxidative stress, with fatal exacerbations of asthma among children	Retrospective case control study N= 80 children 5-7 years of age who died from asthma	S: Highlights the need for school nurses to be aware of air quality and follow the EPAs recommendations for activity for ozone and particulate matter L: 1) unable to assess heterogeneity in the associations across demographic categories or within regions; 2) unable to assess the influence of weather events (e.g., heat waves and thunderstorms),	F: Higher odds of fatal asthma exacerbations in association with higher PM2.5 and O3 3–5 days before death	Environmental Management	II	3	B

			pollen, or other potential asthma triggers; 3) did not account for decedents' behaviors, activities, or health status in the days before the fatal exacerbations; 4) analyses were limited to the use of county-level ambient air pollution					
33. National Heart Lung and Blood Institute, National Asthma Education and Prevention Program. (2007). *Expert panel report 3 (EPR3): Guidelines for the diagnosis and management of asthma*. Bethesda, MD. https://www.ncbi.nlm.nih.gov/books/NBK7232/	To provide recommendations for managing asthma	Guidelines	S: Evidence-based strategies L: 1) only four topics (FeNO, ICS, Long-Acting Muscarinic Antagonists, Immunotherapy, indoor allergen reduction, bronchial thermoplasty) have been updated since 2007 (2020 Updates); 2) The remaining topics did not have enough evidence to recommend changes	F: 1) Definition, pathophysiology and pathogenesis of asthma, and natural history of asthma; 2) Components of asthma management: measures for asthma assessment and monitoring; education for a partnership in asthma care; control of environmental factors and comorbid conditions; medications 3) Managing long term asthma by age: 0-4 years, 5-11 years; Youth12 years and older and Adults; special situations 4. managing asthma exacerbations	Asthma Action Plan Care Coordination Care Planning Community Partnerships Education/ Training Emergency Medication Environmental Management Medication Administration	I	1	B

34. Patel, A., Cook, S., Mattingly, D. T., Barnes, G. D., Arenberg, D. A., Levy, D. T., Meza, R., Fleischer, N. L., & Hirschtick, J. L. (2023). Longitudinal association between exclusive and dual use of cigarettes and electronic nicotine delivery systems and asthma among U.S. adolescents. *Journal of Adolescent Health, 73*(3), 437-444. https://doi.org/10.1016/j.jadohealth.2023.04.009	To investigate whether exclusive and dual use of cigarettes and ENDS was prospectively associated with incident diagnosed asthma among a sample of adolescents as they age into young adulthood using recent data from a longitudinal, nationally representative study in the U.S.	Prospective cohort study N=9141 adolescents 15 -17 years at baseline, 2013-2016 data from the Population Assessment of Tobacco and Health	S: 1) Large sample size;2) nationally representative longitudinal data on U.S. adolescents L: 1) Data from the PATH Study are self-reported and may be subject to response biases; 2) inclusive definition for current cigarette or ENDS use (i.e., one day in the past 30 days) which does not distinguish between experimental and established use; 3) small sample sizes for exclusive ENDS and dual use limited the statistical power needed to detect potential associations; 4) unable to adjust for well-known asthma risk factors such as allergies, exposure to air pollution, family history of asthma, and physical activity; 5) study was observational, not causal; 6) loss to follow-up over five waves was significant and attrition may not have been random; 7) generalizability was limited since only adolescent respondents 12-17 years old were followed	F: 1) short-term exclusive cigarette use was associated with a higher risk of incident diagnosed asthma compared to never or non-current use; 2) short-term exclusive ENDS use or dual use of cigarettes and ENDS were not statistically significant for higher risk of incident diagnosed asthma over the five years of follow-up R: Future analyses should update these findings to account for evolving ENDS products	Care Planning	II	3	B

35. Plott, C. F., Spin, P., Connor, K., Smith, B., & Johnson, S. B. (2022). Classroom temperatures and asthma-related school-based health care utilization: An exploratory study. *Academic Pediatrics, 22*(1), 62–70. https://doi.org/10.1016/j.acap.2021.07.027	To characterize indoor temperatures and explore the relationship between classroom temperatures and asthma-related school-based health care utilization at 2 urban schools with high asthma prevalence and an aging climate control system	Descriptive correlational N= students in grades K-8 who received health care from a school-based health center (SBHC) (n = 647) or school nurse (n = 1244) in 2 co-located urban public schools between 2016 and 2018	S: Results lend support to a growing body of literature underscoring the need to consider the school environment in the context of pediatric asthma L: 1) indoor temperature readings were conducted for the purposes of school operations rather than for research; potential for unmeasured sources of error in measurement; 2)Temperature measurements were collected once per day, typically in the morning; thus, in the warmer months, these readings likely underestimated the maximum building temperature during the day; 3) unable to control for confounders such as home temperature and pollutant exposure, which could affect risk of asthma symptoms at schools; 4) temperatures inside the school may have been neither sufficiently nor persistently low enough to have a detrimental effect on asthma symptoms;5) students may have sought health care outside the school setting	F: 1) exposure to warmer indoor temperatures above an observed trough of 70F to 76F was associated with higher predicted asthma visit rates to the SBHC and school nurse on the same day of exposure; 2) Predicted rates for SBHC asthma visits were higher for those comparing a ten degree increase in temperature above 75˚, both at day 0 and day 5 after temperature exposure, although not all effects reached statistical significance; 3) no association with cold classroom temperatures R: 1) Update heating and cooling systems; 2) Future research that focused on optimal temperature range to minimize asthma symptoms	Environmental Management	II	3	A

36. Quaranta, J. E., Geoghegan, R., Gutierrez, C., Kim, Y., & Stala, O. (2020). Evaluating outcomes of children's asthma self-management education through sustainable community–university partnerships. *Public Health Nursing, 37*(4), 525–532. https://doi.org/10.1111/phn.12739	To evaluate the outcomes of a children's asthma management education program delivered through a community–university partnership	Quasi-experimental pretest/posttest design N=50 children with asthma grades 2-5 and parents/ caregivers from 9 elementary schools in NYS	S: Demonstrates that partnering with schools of nursing to implement asthma management programs is an effective and efficient way to improve asthma status of the child with asthma L: 1) generalizability: only those students whose parents gave consent participated; 2) socioeconomic data was not collected which may contribute to outcomes; 3) internal validity limited as not all programs implemented the same way	F: 1) After completing Open Airways for schools implemented by nursing students: improved asthma management self-efficacy and improved asthma control for children with asthma; 2) Parent asthma knowledge was high pre- and posttest with no significant change; 3) Parental knowledge regarding inhaled corticosteroids was consistently low. R: 1) Collaboration between universities and local school systems allows for mutually beneficial exchange of knowledge and resources to address the need for asthma self-management for children with asthma; 2) Nursing students trained in asthma management develop expertise and provide sustainable resources for this education	Community Partnerships Education/ Training	II	3	B
37. Rabner, M., Bissett, K., Johnson, S. B., & Connor, K. A. (2020). A risk stratification algorithm for asthma identification and prioritization in a low-income urban school. *Journal of School Health, 90*(7), 538–544. https://doi.org/10.1111/josh.12903	To test a low-burden screening algorithm to stratify students based on priority for nurse outreach at 2 large, urban schools with high asthma prevalence	Descriptive correlational N= 1397 children in grades 1-8	S: Low-cost risk stratification procedures allow school nurses to identify high risk students for poor asthma outcomes to ensure appropriate in-school asthma care L: 1)The APS relied on student self-report questionnaire data which may inaccurately capture symptoms; 2) students absent at the time of screening may have been	F: 1) primary stratification included only those students who completed the asthma questionnaire showed 42.9% in low risk group, 35.4% in medium risk group, and 21.7% in the high-risk group; 2) secondary stratification included children who did not complete and looked at school health and absenteeism data: decreased the number of students in the high and medium priority groups	Care Coordination Care Planning Medication Administration	I	3	A

			misclassified by virtue of being assigned to medium priority by default; 3) classifying students in the high priority group who were known to have asthma but did not have an in-school asthma reliever medication may have inflated the number of students in the high priority category; 4) A gold standard to confirm asthma diagnosis was not used in this study, and because we conducted phone outreach to confirm cases of asthma only in the high priority group, we cannot report on the sensitivity or specificity of the APS approach; 5) when data were not available, state-level asthma prevalence was used which might have led to overestimation	resulting in 68.1% of students in the low priority group, 17.5% in the medium priority group and 14.4% in the high priority group; 3) among children in the high priority group (N = 201), 60% of students did not have an asthma diagnosis known to the school clinicians. In families contacted to substantiate an asthma diagnosis, 46.4% (N = 33) reported the child had a current diagnosis of asthma; 4) 33 students were newly identified with asthma; 5) of the 201 high priority students 40.3% (N = 81) were children with known asthma who did not have a asthma reliever inhaler and/or order in the school health center at the time of stratification; 6) phone outreach to these parents/ guardians resulted in 48% of these students/ families updating their asthma order and/or their asthma reliever medication; 7) Of the 52% of students who still had outstanding orders and/or medication, 81% (N = 25) had parents/ guardians who were successfully contacted to update their asthma reliever medication order and/or bring their medication to the school nurse R: Low resource, risk stratification tools may increase efficiency and				

				efficacy of school-based asthma intervention. By applying this approach, school health staff may be better equipped to identify and prioritize students needing more intensive intervention				
38. Ramdzan, S. N., Suhaimi, J., Harris, K. M., Khoo, E. M., Liew, S. M., Cunningham, S., & Pinnock, H. (2021). School-based self-management interventions for asthma among primary school children: A systematic review. *NPJ Primary Care Respiratory Medicine, 31*(18). https://doi.org/10.1038/s41533-021-00230-2	To review the effectiveness of school-based self-management interventions for primary school children with asthma and to examine the components associated with successful programs ages 6-12 years	Systematic review 23 studies included	S: 1) Used comprehensive search terms similar to the Cochrane review which this study expanded and searched seven relevant databases; 2) Two reviewers conducted full text screening and data collection was duplicated; 3) A pre-publication update was performed to ensure the findings were up to date L: 1) Some studies may have been missed; 2) abstract and title screening was conducted by one reviewer, but good agreement resulted after training; 3) Only two studies were conducted in low- and middle-income countries and many studies (15/23) were conducted in the US, reducing generalizability of the review; 4) variation in methodologies, instrumentation and data analysis; 5) poor reporting of interventions	F: The only component that seemed to be associated with positive outcomes was substantial parental involvement R: 1) Future research needs to focus on implementation strategies and effectiveness using this framework; 2) Partnership between schools, parents and healthcare services could create a pragmatic and effective school plan/ policy to improve asthma control among children	Care Coordination Community Partnerships Education/ Training	I	1	A

39. Senter, J. P., Smith, B. M., Prichett, L. M., Connor, K. A., & Johnson, S. B. (2021). Pediatric asthma is associated with poorer 3-year academic achievement in urban elementary and middle-school students. *Academic Pediatrics*, *21*(6), 1009–1017. https://doi.org/10.1016/j.acap.2020.11.006	1) To examine the relationship between asthma and academic achievement over 3 school years in an urban, low-income, predominantly Black sample of elementary and middle school students; 2) to explore whether the relationship between standardized test performance varied by the significance of a student's asthma	Descriptive correlational N=1409 students at 2 co-located urban public charter schools in the Northeast, 1 elementary (grades K-5) and 1 middle (grades 6-8)	S: Highlights the use of standardized testing as an objective measure of academic performance L: 1) Selection bias since the analysis was limited to students enrolled in the SBHC;2) clinical asthma severity and diagnosis were not available so study relied on school-based screening questionnaires and electronic health records to approximate asthma severity, which could lead to misclassification; 3) comorbid conditions or environmental exposures could have influenced the results;4) limited generalizability since study is only conducted in 2 schools	F: 1) 38.5% of students had asthma, were more likely to be male and in elementary school; 2) students with asthma had more absences than their peers; 3) 62% sought health care for their asthma and averaged 11.3 days absent compared with 9.81 days for students in the school overall; 4) student asthma was associated with significantly lower Measures of Academic Progress (MAP) scores in both reading and math; 5) students who sought care for asthma scored lower on both the MAP and readiness for college and careers exam when compared to students without asthma. R: Findings emphasize the need for early and sustained intervention	Academic Performance	I	3	A
40. Shankar, M., Fagnano, M., Blaakman, S. W., Rhee, H., & Halterman, J. S. (2019). Depressive symptoms among urban adolescents with asthma: A focus for providers. *Academic Pediatrics, 19*(6), 608. https://doi.org/10.1016/j.acap.2018.12.004	To determine the prevalence of depressive symptoms among urban teens with asthma and to investigate associations between depressive symptoms and asthma-related clinical and functional outcomes among urban teens with asthma	Cross sectional descriptive correlational study which used data from a randomized control trial N= 277 children ages 12-16 years with a physician diagnosis of asthma per caregiver report and persistent or poorly controlled asthma according to national guidelines	S: Findings underscore the importance of addressing depressive symptoms to improve quality of life in teens with asthma and identify gaps in preventive care in this population L: 1) Self-report data from a cross-sectional study cannot establish a causal link between depressive symptoms and asthma-related outcomes among teens with asthma; 2) data from teen and caregiver report carries a risk of	F: 1) teens with depressive symptoms experienced significantly worse 14-day symptom severity than teens without depressive symptoms; 2) Teens with depressive symptoms also reported experiencing more days with symptoms, nights with symptoms, and days needing to stop or slow down normal activity; 3) 38% of teens with depressive symptoms reported having at least one emergency department, urgent care	Mental Health	II	3	C

			recall error and reporting bias; 3) data were not confirmed with medical or school records; 4) study did not consider comorbidities such as anxiety and obesity; 5) survey did not ask about behavioral health services teens may have received; 6) limited generalizability due to teens recruited from a low-income urban community	visit, or hospitalization for asthma in the last year compared to 24% of teens without depressive symptom; 4) no significant difference in missed school days; 5) Teens with depressive symptoms reported an average of 4.1 nights with enough sleep in the last week compared to 5.3 nights among teens without depressive symptoms; 6) Teens with depressive symptoms also had more than 2 times greater odds of report R: 1) Longitudinal study needed to clarify exact nature of associations between depressive symptoms and asthma related outcomes; 2) Future studies should include objective measures of asthma, such as biomarkers indicating asthma severity, as well as an assessment of comorbidities of depressive symptoms, such as anxiety and obesity				

41. Shillan, H. N., Luther, J. P., Ryan, G. W., Hoque, S., Spano, M. A., Lessard, D. M., Gerald, L. B., Pbert, L., Phipatanakul, W., Goldberg, R. J., & Trivedi, M. K. (2022). School-supervised asthma therapy is associated with improved long-term asthma outcomes for underrepresented minority children. *Journal of School Nursing*, 105984052 21100470. Advance online publication. https://doi.org/10.1177/10598405221100470	To determine whether children enrolled in Asthma Link (school nurses supervise the administration of ICS for children with poorly controlled asthma) experienced sustained reductions in ED visits and hospital admissions for up to four years	Time-series. N=83 children with poorly controlled asthma as identified by their pediatric provider	S: 1) Study population included a large percentage of underrepresented minority and Medicaid-insured children, enhancing applicability to the populations that suffer the most from asthma-related morbidity; 2) study demonstrated a model wherein school nurses participate in preventive asthma care, rather than acute asthma care; 3) school nurses work through a sustainable partnership between school nurses and pediatric practices, two groups that are fully committed to child health; 4) because Asthma Link is ongoing and operates using the established infrastructure of pediatric practices and school nursing staff rather than research staff, this program was not time-limited by a grant, facilitating data collection up to four years. L: Study design does not include a control group. This makes it difficult to assess whether children not enrolled in Asthma Link would have had a natural decrease in ED visits or hospital admissions over time	F: 1) Compared with the year prior to enrollment, asthma-related ED visits decreased by 67.9% at one year, 59.5% at two years, 70.2% at three years, and 50% at four years post-enrollment; 2) mean numbers of total ED visits, asthma-related hospital admissions, and total hospital admissions over one to four years post-enrollment significantly declined; 3) there were no statistically significant differences according to asthma type (allergic vs non-allergic) and exposure time (number of years enrolled in program) at each time point examined R: 1) School nurse-supervision for preventive asthma therapy could potentially produce sustainable improvements in health outcomes, particularly for populations of children who bear the greatest burden of asthma symptoms and morbidity; 2) a larger randomized controlled trial of Asthma Link with assessment of long-term outcomes is needed to provide a more robust evaluation of this program	Care Planning Medication Administration	I	3	A

42. Simoneau, T., Langton, C. R., Kuo, C.-L., Marrero, J., Gherlone, N., Cloutier, M. M., & Hollenbach, J. P. (2020). A school nurse-led asthma program reduces absences: Evaluation of Easy Breathing for Schools. *Academic Pediatrics, 20*(1), 73–80. https://doi.org/10.1016/j.acap.2019.07.007	To analyze the effectiveness a school-nurse led asthma management program that requires minimal time commitment from the school nurse: evaluated use of the program by school nurses and evaluated school absenteeism among students with asthma enrolled in the program	Case control study N= 28 school nurses trained and implemented the program; N=126 students with physician-confirmed asthma	S: 1) This study used a tool that was quick to use, and school nurses could choose the component that was appropriate for the student with asthma; 2) Study demonstrated the significant impact school nurses can have on improving inhaler technique; 3) Absentee data was reported directly from school records L: 1) inability to obtain asthma-specific absentee data as this is not routinely collected 2) Study participation was voluntary and there was limited data on program implementation; 2) The program was used primarily by school nurses working in elementary schools; 3) Because of the pragmatic study design, there were no inclusion/exclusion criteria, enrollment cut-off dates, or standardized intervention. School nurses could choose elements to utilize, resulting in an individualized approach and limited implementation of certain program elements; 4) these factors could have led to possible selection bias	F: 1) students who participated in the program had a significant decrease in their absenteeism. Compared to students with asthma who did not participate in the program, there was a 25% reduction rate in absenteeism; 2) students who participated in the program showed significant improvement in inhaler technique R: 1) This individualized approach that empowers the school nurse to tailor an appropriate intervention strengthens the significance of results; 2) Future efforts on a sustainable, cost-effective approach to program training and implementation will focus on collecting crucial process outcomes	Community Partnerships Education/ Training Medication Administration	II	3	B

43. Slas, E., Nguyen, Y., & McIltrot, K. (2022). Communication between school nurses and health care providers on students with asthma: An integrative review. *Journal of School Nursing, 38*(1), 48–60. https://doi.org/10.1177/10598405211045693	To examine what strategies have been used to increase communication between school nurses and primary care providers and what gaps still exist in the literature	Integrative review Twelve articles published between 2006 and 2020 met the inclusion criteria (articles with a focus on communication or care coordination between school nurses and health care providers with a focus on asthma)	S: 1) Demonstrates the impact of direct communication with HCPs to increase asthma action plans and impact asthma outcomes; 2) highlights the need to have good communication with parents L: 1) Few studies found; 2) lack of research which focuses solely on communication; 3) wide variety of sample populations and no consistency in outcome measures	F: 1) availability of documentation from the health care provider, specifically asthma action plans increased with direct school nurse to provider communication; 2) inclusion of parents in care coordination for students with asthma is imperative to successful care coordination as school nurses need consent forms signed by guardians of the child to exchange information with a student's healthcare providers. Review indicated deficiencies in communication with parents, HCPs and school nurses; 3) interventions are more successful when school nurses initiate communication with providers, rather than waiting for the provider to initiate, or talking to the provider through the child's parents. Use of the Asthma Assessment Communication Tool aided in nurse to HCP communication; 4) improving communication between school nurses and health care providers improved outcomes of children with asthma R: To improve communication between nurses and HCPs.	Community Partnerships	II	4	C

44. Smith, B. M., Sharma, R., Das, A., Aboumatar, H., Pitts, S. I., Day, J., Holzhauer, K., Bass, E., & Bennett, W. L. (2021). Patient and family engagement strategies for children and adolescents with chronic diseases: A review of systematic reviews. *Patient Education and Counseling, 104*(9), 2213-2223. https://doi.org/10.1016/j.pec.2021.02.026	1) identify available evidence from systematic reviews in the past five years that evaluated patient and family engagement strategies used to help children, adolescents, and their parents and caregivers manage chronic conditions, and 2) identify gaps in the literature that may inform future practice, research, and policy decisions	Review of systematic reviews Sample size: PubMed and CINAHL from January 2015 to January 2020 search for systematic reviews on patient and family engagement strategies in the pediatrics population (<18 years). 25 systematic reviews were identified	S: Demonstrates the effect of asthma self-management education that can be done in schools L: Small sample size	F: Specific to asthma: 1) Engaging patients and families has been shown to improve health outcomes, quality and safety measures, and healthcare costs. Self-management is essential. The earlier self-management is learned, the greater the influence on outcomes. In children with asthma, interventions have been shown effective in young children, using e-health approaches, and implemented in the community; 2) overall, findings demonstrated a focus on direct patient care strategies, including self-management support and shared decision making; 3) technologies like video games, mobile health applications, and tele-pharmacy platforms demonstrated improved self-management outcomes, such as medication adherence and improved asthma control R: Investments in mHealth technologies to aid in asthma medication adherence should be considered	Care Coordination Community Partnerships Education/ Training Telehealth/ Telemedicine	I	1	A

45. Szefler, S. J., Cloutier, M. M., Villarreal, M., Hollenbach, J. P.,Gleason, M., Haas-Howard, C., Vinick, C., Calatroni, A., Cicutto, L., White, M., Williams, S., McGinn, M., Langton, C., Shocks, D., Mitchell, H., & Stempel, D. A. (2019). Building bridges for asthma care: Reducing school absence for inner-city children with health disparities. *Journal of Allergy and Clinical Immunology, 143*(2), 746-754.e2. https://doi.org/10.1016/j.jaci.2018.05.041	To implement and assess the effect of the Building Bridges for Asthma Care Program on improving school attendance and measures of asthma control	Pretest/posttest design. N=463 children with asthma ages 5-14 years in public schools in Denver and Hartford Colorado	S: large sample; demonstrates the effectiveness of asthma management programs in effecting change with asthma outcomes L: nonrandomized design, including selection bias that could lead to overestimation of effect sizes. It is possible that the control group of nonparticipant families was less engaged than the intervention participants and it is not known whether their ACT/cACT scores changed over time. Information on psychosocial or familial factors that might have influenced school attendance by both the control and intervention students was not collected	F:1) Participants experienced a 22% absolute decrease in school absenteeism, 2) the number of children with an Asthma Control Test/ Childhood Asthma Control Test score of less than the control threshold of 20 decreased from 42.7% to 28.8%, 3) bronchodilator use greater than 2 times per week decreased from 35.8% to 22.9% R: Expansion of these programs to a national level could serve to assist more children with asthma and further support school systems with limited resources.	Care Coordination Education/ Training	I	3	A
46. Uchima, O., Keaulana, S., Okihiro, M., & Sentell, T. (2023). A scoping review of school-based asthma education programs for reducing children's need for acute care services. *Children's Health Care, 52*(3), 296–320. https://doi.org/10.1080/02739615.2022.2091568	To identify whether school-based asthma education programs lead to reduced acute care services, including hospitalizations, ED visits, and urgent care visits among children with asthma	Scoping review from 546 studies identified through database searching, 15 were eligible for review. Randomized controlled trials and observational studies conducted in the US were included	S: Provides justification for implementing asthma management programs in the school setting that extend beyond on-to-one teaching with the student with asthma L: 1) It was not possible to perform a meta-analysis to analyze the effectiveness and strength of school-based asthma education programs given the differences in study design; 2) the wide variability across studies was a major barrier to generalization	F: 1) School-based asthma education programs can reduce acute health care services, minimize the economic impact of childhood asthma, and provide preliminary evidence into the optimal structure of such these programs; 2) systems level interventions were found to be more effective than one-to-one asthma management education with the student with asthma. R: Future research is needed to determine more	Education/ Training	II	1	A

				definitive conclusions about the effectiveness of school-based asthma education programs and which components yield significant changes				
47. Volerman, A., Toups, M., Hull, A., Dennin, M., Kim, T. Y., Ignoffo, S., Sharp, L. K., & Press, V. G. (2019). Assessing children's readiness to carry and use quick-relief inhalers. *Journal of Allergy and Clinical Immunology, 7*(5), 1673-1675.e2. https://doi.org/10.1016/j.jaip.2018.11.040	To identify factors associated with children's readiness to self-carry inhalers using an objective tool and to determine how this tool aligns with traditionally utilized subjective readiness measures	Cross-sectional design N= 64 children with physician-diagnosed in 3rd - 8th grades, their parents, and school nurses from four Chicago schools	S: Used validated tool to assess readiness L: 1) This study did not assess prior education about inhaler knowledge or skills, which could impact self-carry readiness since asthma education may be associated with improved outcomes; 2) the objective tool is based solely on student knowledge and skills, while parent and child confidence incorporate holistic factors (e.g. child's maturity, self-efficacy, applied knowledge demonstrated by day-to-day behaviors; school environment); 3) generalizability; 4) small sample size; 5) bias in recruitment: children who use inhalers at school or families may be more engaged	F: 1) Using data from American Lung Association Student Readiness Assessment Tool, higher level of self-carry readiness was associated with older age, higher grade level, and parent familiarity with asthma policy; 2) compared to the objective tool, parents and children were significantly more likely to subjectively deem children ready to self-carry; parents were 46.00 times and children 42.09 times more likely; 3) only one-quarter of children who self-carry inhalers at school were objectively ready R: Need for objective self-carry readiness measures to facilitate appropriate, timely, and effective access to critical medications for children with asthma	Medication Administration	I	3	B

Table C2: ***Other Resources (e.g., non-research articles, electronic sources, & *seminal works)***								
Reference	Purpose/ Research Question	Description (Literature review, Guideline, Practice/ Policy, etc.)	Major Strengths (S) and Limitations (L)	Summary of Findings (F) and Recommendations (R)	Domains of Care	Quality/Level/ Strength of Evidence (See Appendix B)		
48. Airnow.gov. (n.d.). *Air Quality Index (AQI) basics*. https://www.airnow.gov/aqi/aqi-basics/#:~:text=Think%20of%20the%20AQI%20as,300%20represents%20hazardous%20air%20quality	Provides information about the color coding for air quality for ozone and particle pollution and which population is impacted	Chart for reporting air quality	S: 1) Links to activity guides appropriate for each index on the chart; 2) links to how to use the index	F: 1) The higher the AQI value, the greater the level of air pollution and the greater the health concern: Green (0-50) is good Yellow (51-100) is moderate Orange (101-150) is unhealth for sensitive groups Red (151-200) is unhealthy Purple (201-300) is very unhealthy Maroon (301 and higher) is hazardous; 2) Five major pollutants: ground-level ozone particle pollution (also known as particulate matter, including PM2.5 and PM10) carbon monoxide sulfur dioxide nitrogen dioxide	Care Planning Environmental Management	I	5	A
49. Airnow.gov. (n.d.). *Air Quality Flag program*. https://www.airnow.gov/air-quality-flag-program/	To explain air quality alerts based on the color of flags that match EPA's Air Quality Index	Guideline	S: Allows an organization to adjust physical activities on unhealthy days to help reduce exposure to air pollution, while still keeping people active	F: provides information on implementing the air quality flag program in schools	Care Planning Environmental Management	I	5	A
50. Airnow.gov. (2014). *Air quality and outdoor guidance for schools*. https://document.airnow.gov/air-quality-and-outdoor-guidance-for-schools.pdf	To provide air quality and outdoor activity guidance that can help protect the health of all children, including teenagers, from air pollution	Guideline	S: School nurses can use this to monitor air quality and recommend appropriate outdoor physical activity for the student with asthma	F: 1) The table shows when and how to modify outdoor physical activity based on the Air Quality Index to protect the health of all children, including teenagers, who are more sensitive than adults to air pollution; 2) Provides information on symptoms to look for and what to do	Care Planning Environmental Management	I	5	A

51. Allergy and Asthma Network. (n.d.). *Asthma and exercise*. https://allergyasthmanetwork.org/what-is-asthma/asthma-exercise/		Informational	S: Provides the school nurse with information concerning exercise-induced asthma	F: Benefits of exercise for people with asthma: improve lung function, muscle strengthening, promotion of blood flow to lungs and heart, weight loss to reduce the risk of asthma flares; improve immune system function, sense of well-being, and quality of life; stress reduction R: 1) Before exercise, warm up and cool down for 15-20 minutes each; 2) use quick-relief medication before exercise as needed and albuterol after if needed during exercise; 3) stay hydrated, and pay attention to the environment (temperature, pollen level, humidity)	Care Planning Education/ Training Environmental Management	I	A	5
52. Allergy and Asthma Network. (n.d.). *Asthma patient assistance*. https://allergyasthmanetwork.org/what-is-asthma/what-if-i-cant-afford-my-asthma-medication/	To explain steps that help with asthma medication costs	Informational	S: Provides school nurse with resources for students with asthma having difficulty affording their medications	F: 1) provides steps to help with asthma medication costs 2) provides manufacturers of asthma medications and any patient assistance they offer	Care Coordination Leadership/ Advocacy	I	5	B
53. Allergy and Asthma Network. (n.d.). *Lifestyle changes to manage asthma*. https://allergyasthmanetwork.org/what-is-asthma/lifestyle-changes-to-manage-asthma/	To provide the school nurse with information to promote a healthy lifestyle for the student with asthma	Informational	S: Information for the school nurse to work with students with asthma that can be incorporated into self-management education	F: 1) Discusses lifestyle changes for managing asthma: sleep, exercise, nutrition, stress and anxiety, minimizing environmental factors that impact asthma; 2) Provides links to pdfs for asthma action plans, asthma journal, asthma goals, asthma triggers, preventing symptoms	Asthma Action Plan Care Planning Education/ Training Environmental Management			

54. Allergy and Asthma Network. (n.d.). *Vaping and smoking with asthma*. https://allergyasthmanetwork.org/what-is-asthma/vaping-smoking-with-asthma/	To provide information about forms of smoking and their effect on asthma	Informational	S: Provides the school nurse with information about the hazards of tobacco exposure and ways to quit	F: Provides the school nurse with information about the hazards of tobacco exposure and ways to quit	Education/ Training	II	5	B
55. Allergy and Asthma Network. (n.d.) *Asthma medication and treatment*. https://allergyasthmanetwork.org/what-is-asthma/how-is-asthma-treated/	To provide a resource for asthma management and medication use	Informational	S: Offers the school nurse concise explanations of asthma medications and routes as well as treatments	F: 1) provides tutorials on asthma medication, asthma basics and management; 2) provides information on bronchodilators, controller medications (anti-inflammatory), combination inhaler medications, biologics; 3) provides information on bronchial thermoplasty; 4) provides guidance on how to use the different administration devices: MDS, DPI. slow moving mist inhaler, breath actuated inhaler, and nebulizers, spacers and holding chambers; 5) provides information on trigger management and reducing asthma symptoms; 6) asthma action plans; 7) Provides information on assessing asthma control: rules of Two, asthma control test, asthma impairment and risk questionnaire; 8) provides resources for assistance with purchasing medications	Asthma Action Plan Education/ Training Environmental Management	I	5	A

56. Allergy and Asthma Network. (n.d.). *Asthma management and control*. https://allergyasthmanetwork.org/what-is-asthma/asthmamanagement-and-control/	To provide guidance on how to determine whether asthma is managed and controlled.	Informational	S: provides school nurses with assessment tools to use to determine level of asthma control of students	F: 1) provides information on asthma control and provides assessment tools to measure level of asthma control; 2) discusses management of asthma symptoms	Care Planning	I	5	B
57. American Academy of Allergy Asthma & Immunology. (2023). *Inhaled asthma medications*. https://www.aaaai.org/tools-for-the-public/conditions-library/asthma/inhaled-asthma-medications	To provide a short summary of inhaled asthma medications, types of inhalation devices, and healthy tips	Informational	S: Provides a concise summary of asthma medication and types of delivery	F: Discusses the two general classes of asthma medications: quick-relief and long term/controller and how to administer these medications correctly. Reviews the different inhalation devices: metered dose inhaler/dry powder inhaler/nebulizer. Incudes a video demonstrating technique	Medication Administration	I	5	A
58. American Academy of Allergy, Asthma & Immunology. (2023). *Spacers and valved holding chambers (VHSc) for use with metered dose inhalers (MDIs)*. https://www.aaaai.org/tools-for-the-public/conditions-library/asthma/spacers-and-valved-holding-chambers-(vhcs)-for-use	To provide information about spacers and valved hold chambers as devices for use with inhaled medications and how to properly clean them	Practice	S: Short and concise information on use of spacers	F: Discusses the need for these devices. Provides step by step instructions for correct use of metered dose inhaler with spacer/valved holding chamber and cleaning and care instructions	Education/ Training	I	4	A

59. American Academy of Allergy, Asthma & Immunology. (2023). *Peak flow meter*. https://www.aaaai.org/tools-for-the-public/conditions-library/asthma/peak-flow-meter	To provide guidance in use of peak flow meter and how to interpret readings	Practice	S: Provides a concise explanation for proper peak flow use, interpretation, and response	F: Explains the purpose of performing peak flow readings. Provides step by step instructions in using a peak flow meter and how to determine personal best. Explains the "traffic light system" to interpret peak flow readings and actions needed based on results	Asthma Action Plan Education/ Training	I	5	A
60. American Academy of Allergy, Asthma & Immunology. (2023). *Asthma triggers and management*. https://www.aaaai.org/tools-for-the-public/conditions-library/asthma/asthma-triggers-and-management-ttr		Informational	S: Provides the school nurse with information about asthma trigger management	F: Provides information on asthma triggers, medications, asthma management plans, and healthy tips	Asthma Action Plan Education/ Training Environmental Management	I	5	A
61. American Lung Association. (n.d.). *Model policy for school districts: Stock bronchodilators*. https://www.lung.org/getmedia/92bd8d3f-c5ca-46c0-9063-9d5719ec690b/model-policy-for-school.pdf.pdf	To inform development of policies allowing use of stock bronchodilators in schools. The purpose of this model policy is to improve the health and academic outcomes of students with asthma	Model Policy	S: Includes a list of questions each school/ school district can address when creating their "Protocols and Procedures." L: The policy assumes an ideal school setting so revisions and customization of the policy prior to adoption and implementation is needed.	F: 1) Provides guidance on the development of policies allowing use of stock bronchodilators in schools; 2) Suggests verbiage to be used and delineates conditions for obtaining, administering and storing bronchodilators R: 1) Assure policy addresses best practice; 2) each school develop protocols and procedures and disseminate appropriately	Policies	I	5	A

62. American Lung Association (n.d.). *Student readiness assessment tool*. https://lung.training/assessment.html	To assess student readiness to self-carry	Questionnaire	S: 1) Assesses student readiness to self-carry; 2) Provides links for questionnaire administrator for specific information needed to meet each criterion; 3) Provides cut-off points for students needing more education	F: 1) Questions include knowledge about basic understanding of asthma, understanding of symptoms and asthma management; 2) using asthma medications; 3) avoiding or limiting asthma triggers. Scores less than 70 indicate the student is not ready to self-carry, 70-105 almost ready, and more than 105 ready to self-carry	Education/ Training	I	5	A
63. American Lung Association (n.d.). *About Kickin' Asthma*. https://www.lung.org/lung-health-diseases/lung-disease-lookup/asthma/health-professionals-educators/kickin-asthma	To provide a standardized online training to prepare volunteers to facilitate the Kickin' Asthma program to teens	Guideline	S: Provides school nurse with information about an asthma management program for students in grades 6-10, with information about becoming a facilitator for the program	F: 1) Kickin' Asthma includes different learning techniques suitable for teen-aged kids and highlights self-management practices, such as recognizing triggers and proper medication use; 2) Teens who participated in the pilot study of Kickin' Asthma experienced significantly fewer symptoms, days with activity limitation, nights of sleep disturbances, and emergency department visits R: Complete Kickin' Asthma Facilitator Training as a first step to starting the Kickin' Asthma program in the school	Education/ Training	I	5	A

64. American Lung Association (2022). *Asthma-Friendly Schools Initiative Toolkit*. https://www.lung.org/lung-health-diseases/lung-disease-lookup/asthma/health-professionals-educators/asthma-friendly-schools-initiative/toolkit	To provide a planning tool based on real-life activities that have been used in schools to create a long-term asthma management plan	Toolkit	S: Provides school nurses with strategies to create an asthma-friendly school	F: 1) Asthma-Friendly Schools Initiative Toolkit is a planning tool which provides step-by-step guidance to create a long-term asthma management plan; 2) Includes tools, templates and resources that aim to keep students healthy, in school and ready to learn; 3) Provides 4 strategies: 1) maximize school health services 2) build asthma education 3) provide a healthy school environment 4) manage physical education and activity	Care Coordination Care Planning Education/ Training Environmental Management	I	5	A
65. American Lung Association (2022). *National public policy agenda for schools*. https://www.lung.org/policy-advocacy/healthcare-lung-disease/asthma-policy/national-asthma-public-policy-agenda/schools	To provide four policy recommendations for asthma from the National Public Policy Agenda for Schools	Policy Recommendations	S: Provides nurses with strategies to address to keep children with asthma safe in school	F: 4 policy recommendations: 1) Every state should put in place laws and regulation to improve asthma management in schools. Includes establishing laws for stocking of asthma medications in schools; funding to support school nurses in every school; expand Medicaid programs to allow schools to bill for services delivered to Medicaid enrolled students; State Boards of Education should address alternative methods for providing care in schools in the absence of school nurses; State Departments of Health and State Departments of Education should coordinate activities to support asthma policies and practices in schools; States should use funding from ESSA to improve	Asthma Action Plan Care Coordination Education/ Training Emergency Medication Environmental Management Medication Administration Policies	I	5	A

				school buildings; 2) policies and procedures for medical management of asthma based on current research and best practices: care coordination and educating students and caregivers on asthma self-management; provide case management for students with poorly controlled asthma; education all school staff on asthma; implement emergency protocols for students in respiratory distress; track students with asthma and refer those at risk or have asthma not controlled; asthma action plans for all students; ensure immediate access to quick relief medications and readiness for self-carry; identify alternate options for care when school nurses not available; 3) After-school programs, youth serving organizations and licensed childcare systems should adopt and implement policies and procedures for the management of asthma that are based on current research and best practices 4) All educational systems should adopt and implement environmental assessment and management protocols that are based on current research and best practices: indoor air quality program; acceptable ventilation systems; reduce exposure to				

				cleaning agents and disinfectants; require schools to be 100% tobacco free; minimize exposure to outdoor air pollution; use zero-emission buses and prevent personal car idling; develop a disaster plan for exposure to pollutants, access to medications and cleaning up schools				
66. American Lung Association (2022). *Strategy 2: Build asthma education*. https://www.lung.org/lung-health-diseases/lung-disease-lookup/asthma/health-professionals-educators/asthma-friendly-schools-initiative/toolkit/strategy-2	To provide examples of policies, letters, and outlines to promote asthma education in the school	Guideline	S: Provides school nurses with methods to establish asthma education as part of the school's asthma management plan	F: 1) Provides sample district policy on asthma education; 2) Provides links to asthma education programs, provides links for Open Airways, and assists with ways to provide asthma education to parents	Education/ Training	I	5	A
67. American Lung Association (2024). *Strategy 3: Provide a healthy school environment*. https://www.lung.org/lung-health-diseases/lung-disease-lookup/asthma/health-professionals-educators/asthma-friendly-schools-initiative/toolkit/strategy-3	To provide information about how to ensure healthy air quality at school	Guideline	S: provides the school nurse with strategies to manage and maintain healthy school environments	F: Discusses steps to maintain healthy indoor and outdoor environments, including indoor air quality, tobacco free buildings and grounds, use of integrated pest management techniques, exposure to high outdoor air pollution	Environmental Management Policies	I	5	A

68. American Lung Association (2022). *Strategy 4: Manage physical education & activity*. https://www.lung.org/lung-health-diseases/lung-disease-lookup/asthma/health-professionals-educators/asthma-friendly-schools-initiative/toolkit/strategy-4	To provide information about asthma and exercise	Guideline	S: Provides the school nurse with information to assist in the management of the student with exercise-induced asthma	F: 1) Provides recommendations for care of the student with exercise induced asthma; 2) Links to asthma action plans, tips for peak flow meter readings, and how to stay physically active; 3) Discusses premedication and quick relief medication	Asthma Action Plan Care Coordination Medication Administration	I	5	A
69. American Lung Association (2022). *Master planning*. https://www.lung.org/lung-health-diseases/lung-disease-lookup/asthma/health-professionals-educators/asthma-friendly-schools-initiative/toolkit/master-planning	To provide a brief summary of the Four Action Steps that support a sustainable, long-term asthma management plan	Guideline	S: Assists the school nurse in developing an asthma management program	F: Four action steps: Organize stakeholders; Conduct a needs assessment; Create a 5-year plan; Create a year one work plan R: Planning is important since there is no one-size-fits-all approach to establishing an asthma-friendly school	Community Partnerships Leadership/ Advocacy	I	5	A
70. American Lung Association (2022). *Why use the Asthma-Friendly Schools Initiative?* https://www.lung.org/lung-health-diseases/lung-disease-lookup/asthma/health-professionals-educators/asthma-friendly-schools-initiative/why-use-the-asthma-friendly	To provide an effective, comprehensive approach that aligns with the CDC Coordinated School Health model	Guideline	S: Provides the school nurse with rationales for program implementation	F: 1) Provides statistics about asthma burden for children in school; 2) describes the key components that help schools implement the Coordinated School Health Program from the CDC: Health and Mental Health Services, Asthma Education, Healthy Environments, Physical Education and Activity	Care Coordination Education/ Training Environmental Management Mental Health	I	5	A

71. American Lung Association (2022). *Asthma-Friendly Schools quiz*. https://www.lung.org/lung-health-diseases/lung-disease-lookup/asthma/health-professionals-educators/asthma-friendly-schools-initiative/asthma-friendly-schools-quiz	To provide a 5-question quiz that allows schools to evaluate how asthma-friendly they are	Guideline	S: Provides school nurses with an assessment tool to evaluate the school's asthma management	F: Assesses: 1) asthma action plans or asthma management plans 2) self-carry policies 3) staff education for asthma management 4) tobacco free policies 5) physical activity for children with asthma	Policies	I	5	A
72. American Lung Association (2023). *Back to school with asthma toolkit for schools*. https://www.lung.org/lung-health-diseases/lung-disease-lookup/asthma/health-professionals-educators/asthma-in-schools/back-to-school-with-asthma-toolkit	To provide helpful tips and resources for schools	Guideline	S: Provides the school nurse with tips and resources for the student with asthma	F: 1) Provides guidance for: vaccines, identifying those students at risk for asthma emergency, ensuring good IAQ, educating teachers, staff, parents and children about asthma, encouraging physical activity, ensuring tobacco free buildings and grounds; 2) Provides links for many resources that assist the school nurse in managing asthma	Care Coordination Education/ Training Environmental Management	I	5	A
73. American Lung Association (2023). *Open Airways for Schools*. https://www.lung.org/lung-health-diseases/lung-disease-lookup/asthma/health-professionals-educators/open-airways-for-schools	To provide a proven and effective evidence-based program to elementary children in the school and community	Guideline	S: Open Airways is a self-management program for children ages 8-11 years that is able to be implemented by school nurses or in collaboration with community partners	F: 1) Open Airways for Schools teaches children ages 8-11 years how to manage their asthma: symptom identification, trigger management, asthma management steps based on symptoms; 2) Open Airways is evidence-based and has been shown to be effective through research-based strategies	Education/ Training	I	5	A

74. American Lung Association. (2024). *Resources and tools*. https://www.lung.org/lung-health-diseases/lung-disease-lookup/asthma/health-professionals-educators/asthma-friendly-schools-initiative/toolkit/resources-and-tools	To provide tools that support program planning and implementation during the Master Planning phase of developing an asthma management program	Resources and Toolkit	S: Provides resources for school nurses	F: Provides organizational websites and administrative resources, links from the CDC, EPA, NASN, and the NHLBI NAEPP; additional links to asthma education, physical activity, asthma, air quality/tobacco free program, community organization, program planning, and advocacy resources	Asthma Action Plan Care Coordination Care Planning Education/ Training Emergency Medication Environmental Management Leadership/ Advocacy Policies	I	5	A
75. Centers for Disease Control and Prevention. (2015). *Strategies for addressing asthma within a coordinated school health program*. https://www.cdc.gov/healthyschools/asthma/strategies/asthmacsh.htm	To provide strategies for schools when addressing asthma within a coordinated school health program	Guideline	S: Easy to follow management strategies for schools to address asthma	F: Six strategies: 1. Establish management and support systems for asthma-friendly schools. 2. Provide appropriate school health and mental health services for students with asthma. 3. Provide asthma education and awareness programs for students and school staff. 4. Provide a safe and healthy school environment to reduce asthma triggers. 5. Provide safe, enjoyable physical education and activity opportunities for students with asthma. 6. Coordinate school, family, and community efforts to better manage asthma symptoms and reduce school absences among students with asthma	Care Coordination Care Planning Education/ Training Mental Health	I	4	B

				R: 1) Implementation of the strategies will require a team effort that involves all school administrators, faculty, and staff, as well as students and parents; 2) Schools and districts should focus their asthma programs on students with poorly managed, moderate-to-severe persistent asthma as demonstrated by frequent school absences, school health office visits, emergency department visits, or hospitalizations				
76. Centers for Disease Control and Prevention. (2018). *School Health Index: A self-assessment and planning guide*. https://www.cdc.gov/healthyschools/professional_development/e-learning/shi.html	To provide a self-assessment and planning guide to: 1) identify strengths and weaknesses of school policies and programs for promoting health and safety; 2) develop an action plan for improving student health and safety; 3) involve teachers, parents, students, and the community in improving school policies, programs, and services	Self-Assessment and Planning Guide	S: Teams from the school can conduct a self-assessment process and create a plan for improvement based on policies and practices recommended by the CDC and other leading health and education agencies L: This guide is designed for use at the school level so needs to be adapted for use at the district level in the event there are only a few schools with similar policies and practices within the district.	F: 1) The self-assessment allows schools to identify what is already being done to promote good health and to identify strengths and weaknesses, and assess the extent to which schools implement policies and practices recommended by the CDC and other leading health and education agencies; 2) The planning for improvement process identifies recommended actions schools can take to improve performance in areas that received low scores and assist with prioritizing recommendations; 3) the School Health Improvement Plan lists steps to take to implement the necessary actions; 4) Areas addressed: 1. written policies for carry and self-administration of quick-relief meds	Care Coordination Care Planning Education/ Training Leadership/ Advocacy Policies	I	5	A

				2. professional development for all staff members on chronic health conditions basics and emergency response 3. health education curriculum addresses essential topics for asthma awareness 4. health emergency response plans for severe asthma episodes 5. care coordination for the child with poorly controlled asthma 6. offer asthma management education				
77. Centers for Disease Control and Prevention. (2024). *Self-care for asthma-Using your inhaler* https://www.cdc.gov/asthma/caring/?CDC_AAref_Val=https://www.cdc.gov/asthma/inhaler_video/default.htm	To instruct the proper use of metered dose inhalers with and without spacer	Video	S: Available in both English and Spanish. Easy to watch video. Step by step instructions provided. Content updated periodically to assure still accurate L: Dependent on internet access	S: Provides easy to watch video and written step by step instructions for proper medication administration using a metered dose inhaler with and without a spacer	Education/ Training	I	5	B
78. Centers for Disease Control and Prevention. (2022). *Controlling asthma in schools: Successes of CDC's National Asthma Control Program*. https://stacks.cdc.gov/view/cdc/142116	Describes strategies that have been implemented through the National Asthma Control Program (NACP) to create asthma-friendly schools with state-wide examples	Fact sheet	S: Provides the school nurse with evidence-based strategies to control asthma in the school setting	F: The National Asthma Control Program (NACP) has the following goals: • Strengthen school health services and school-based programs to manage chronic diseases like asthma • Use evidence-based strategies to promote comprehensive asthma control • Encourage collaboration between the public health and health care sectors • Identify schools with high health-risk students who may benefit from asthma management programs	Education/ Training Policies	I	5	A

				R: Provide asthma education for students, school staff and caregivers. Improve indoor air quality and reduce asthma triggers. Link students to medical care. Create asthma-friendly schools. Allow students to carry medicine and have schools stock albuterol.				
79. Environmental Protection Agency. (2018). *Asthma and outdoor air pollution*. https://www.airnow.gov/sites/default/files/2018-03/asthma-flyer.pdf		Guideline/ Fact sheet	S: Concise information with color coded categories of air quality indexes	F: 1) Provides information on ozone and particulate pollution; 2) provides information on Enviroflash, which is an electronic system that send emails about daily air quality; 3) explains the Air Quality Index; 4) provides an air quality guide for ozone and particulate pollution, including air quality index, who needs to be concerned and actions to take	Environmental Management	I	5	A
80. Lowe, A. A., Onge, I. S., & Trivedi, M. (2023). Updates in school-based asthma management. *Current Opinion in Allergy and Clinical Immunology, 23*(2), 119–131. https://doi.org/10.1097/ACI.0000000000000883	To highlight relevant environmental and school-based asthma management interventions and policies over the past 2 years	Literature Review	S: Highlights school nurse and classroom-based strategies for effective asthma management for children with asthma L: Search strategies were not discussed	F: 1) school-based asthma management is a powerful approach for reaching high-risk children with asthma; 2) school-based strategies increase access to guideline-based asthma care, ensure access to asthma reliever medications, and improve asthma outcomes; 3) novel approaches to asthma management: environmental mitigation, telehealth/ telemedicine and supervised asthma therapies; 4) partnerships between community and academic partners can facilitate adoption of evidence-based asthma care in schools	Care Coordination Community Partnerships Education/ Training Emergency Medication Telehealth/ Telemedicine	II	4	B

81. Maine Department of Environmental Protection. (n.d.). *EnviroFlash air quality notifications*. https://www.maine.gov/dep/air/ozone/enviroflash.html	Automated electronic system that notifies people about air quality in their area in Maine	Government publication	S: Provides school nurses with information about air quality which can impact students with asthma, allowing for modification of outdoor activities	F: Provides information about an automated electronic system that notifies people about air quality in their area. This is for the State of Maine R: It is recommended that school nurses subscribe	Care Planning Environmental Management	II	5	A
82. McCabe, E. M., Kaskoun, J. R., Murphy, E. L., Polkinghorn, M., & Elkind, J. A. (2021). An evidence-based framework for implementation of a school-community partnership. *NASN School Nurse, 36*(3), 164–169. https://doi.org/10.1177/1942602X20964765	1) To highlight how school-community partnerships (SCPs) are mutually beneficial to the school and community; 2) Additionally, strategies for stakeholders, including school nurses, to establish a SCP will be addressed	Case study / Literature review of school-community based partnerships	S: Highlights the benefits of school-community partnerships L: Limited examples	F: 1) Provides examples of school-community partnerships effective in improving asthma outcomes; 2) provides a framework for developing and implementing this partnership for children with asthma R: Develop school-community partnerships	Community Partnerships	II	5	A
83. National Association of School Nurses. (2018). *Food allergies and anaphylaxis: Sample checklist for the development of school district policies and protocols*. https://learn.nasn.org/courses/25694/sections/28759/documents/33705	To provide a sample checklist for the development of school district policies and protocols	Model Policy	S: Provides the school nurse with a template for the development of policies and protocols for managing food allergies and anaphylaxis	F: Examples of what the checklist addresses are school personnel education/training, student health education on food allergies and anaphylaxis, emergency preparedness, prevention of allergen exposure, and bullying and discrimination prevention	Care Coordination Care Planning Education/ Training Emergency Medication Policies	II	5	B

84. National Association of School Nurses. (2024). *Transition planning for students with healthcare needs* [Position Statement]. Author. https://www.nasn.org/nasn-resources/professional-practice-documents/position-statements/ps-transition	Policy statement that provides guidance for transition planning for students with healthcare needs	Position Statement	S: Provides guidance in assisting with student transition from high school	F: 1) For students with Individual Education Program (IEP) plans, support strategies for transitioning beyond high school planning must be in place by the time the student is 16 years old; 2) students who qualify under Section 504 of the Rehabilitation Act (1973) for accommodations to support their academic achievement may benefit from transition planning; 3) school nurses should a) facilitate communication and information sharing across systems and among key stakeholders; b) interpret medical orders and incorporate them into a student's IHP and other accommodation plans; c) facilitate the implementation of a student's IHP and/or accommodation plans across transitions; d) monitor and assess the impact of the transition plan on the identified student health and academic outcomes; e) connect families with resources to meet existing or emerging student needs	Care Coordination Care Planning	I	5	A
85. National Association of School Nurses. (2020). *Advocating for evidence-based school health policy*. https://learn.nasn.org/courses/25694/sections/28759/documents/33704	To assist the school nurse in advocating for evidence-based policy change	Guideline	S: Emphasized the need for evidence-based practice	F: 1) provides websites for development of policies; 2) recommendations: a) Check state laws and existing guidelines b) collaborate with school district's medical advisor to discuss and review standards of care c) collaborate with school	Policies	I	5	A

				nurses in neighboring school districts to assess their school nursing practices and standards and to develop evidence-based policies d) collaborate with Colleges/ Schools of Nursing and academics who specialize in pediatric nursing, public health and/or school nursing to review the recommended guidelines to ensure they are evidence-based and provide support e) engage key stakeholders				
86. National Association of School Nurses. (2020). *Model policy: Administering emergency medications to students*. https://learn.nasn.org/courses/25694/sections/28759/documents/33702	To provide a model policy that serves as a tool for drafting policies that address administering emergency medications to students	Model Policy	S: Provides the school nurse with a template for developing a policy for administration of emergency medications in the school setting	F: 1) Written instructions from prescribing prescriber must include name, dose, route, timing, indication and contraindications; 2) written authorization from the parent/legal guardian authorizing permission to administer and hand delivering the med when possible; 3) non-school nurse personnel can administer meds if willing and trained; 4) record keeping must be maintained, and any errors must be recorded; 5) nurses must review all med orders and receive yearly training; 6) nurses must make sure students who can self-administer have the ability to do this; 7) Albuterol and epinephrine need to be stock medication that can be administered by authorized staff. Instructions provided for field trips	Care Planning Emergency Medication Medication Administration Policies			

87. National Association of School Nurses. (2020). *Model policy: Student possession and self-administration of emergency medications.* https://learn.nasn.org/courses/25694/sections/28759/documents/33701	To provide examples that may serve as a tool for those responsible for drafting policies that meet the needs of a local school or district	Model Policy	S: Provides a template for school nurses to use to enhance care for the student with asthma L: Should refer to federal, state, and local law and seek legal advice when adopting new policies	F: 1) Self-administration of medication must be authorized and renewed each school year; 2) asthma reliever medication, requested from the parent/guardian, will be kept at a school location where the student has immediate access during school hours; 3) authorization to possess and self-administer albuterol for asthma may be limited or revoked if the student demonstrates an inability to responsibly possess and self-administer the medication	Emergency Medication Policies	I	5	A
88. National Association of School Nurses. (2020). *Use of individualized healthcare plans to support school health services* [Position Statement]. Author. https://www.nasn.org/nasn-resources/professional-practice-documents/position-statements/ps-ihps	To provide a position statement regarding the rationale for school nurses to initiate and develop Individualized Healthcare Plans (IHP) for students whose healthcare needs require more complex school nursing services	Position Statement	S: Provides rationale and content needed for IHPs	F: 1) The school nurse should initiate and develop an Individualized Healthcare Plan (IHP) for students whose healthcare needs require more complex school nursing services; 2) It is the responsibility of the school nurse to update the plan annually and as needed to reflect changes in the student's healthcare needs and address nursing interventions and/or student healthcare outcomes; 3) The purpose of the IHP is to : a) Facilitate evidence-based management of the health condition b) Outline relevant knowledge and actions needed by school personnel to support the student's access to a free and appropriate education c) Prepare for prompt responses to medical	Care Coordination Care Planning	I	5	A

				emergencies d) Support the health components of education plans for the student e) Provide the school's multidisciplinary team with a systematic, organized approach to meeting specific health needs f) Guide care coordination for the student g) Provide an effective vehicle for documentation of nursing delegation when permitted by state nurse practice act and state law				
89. National Association of School Nurses. (2020). *The school health services team: Supporting student outcomes* [Position Statement]. Author. https://www.nasn.org/nasn-resources/professional-practice-documents/position-statements/ps-team	To provide a policy statement regarding the school health team and provision of care for students	Position Statement	S: Provides rationale for school nurses to lead school health services team	F: 1) The School Nurse should collaborate to lead the school health services team in identification and intervention for health-related barriers to improve student learning; 2) school nurses bridge healthcare and education through provision of care coordination and collaboration; 3) the team includes LPNs/LVNs, UAPs/UPs. school physician and Specialized Instructional Support Personnel (SSIP)	Care Coordination Leadership/ Advocacy	I	5	A
90. National Association of School Nurses. (2020). *Reviewing common legal requirements*. https://learn.nasn.org/courses/25694/sections/28759/documents/33703	To provide considerations regarding common legal requirements that may impact the school nurse practice and/or the administration of medications in school	Guideline	S: Provides information about current laws and regulations that impact the student with asthma in the school setting for emergency administration of medications	F: 1) No federal laws specifically address emergency medication in schools; 2) ADA and 504 imply the need as a reasonable accommodation; 3) States may provide guidance; 4) The Good Samaritan Law may protect nurses when meds administered in an emergency; 5) nurses need to be aware of their Nurse Practice Act and the policies of their school district	Emergency Medication Policies	I	5	A

91. National Association of School Nurses. (2020). *Emergency medication administration: Policy and procedure considerations*. https://learn.nasn.org/courses/25694/sections/28759/documents/33700	To outline the steps the school nurse takes to seek out and review the limits and requirements of practice in their state, district and school for emergency medication administration policies and procedures	Policy	S: Outlines the steps the school nurse takes to seek out and review the limits and requirements of practice in their state, district and school for emergency medication administration policies and procedures L: Policy is limited by federal, state and local law, and their Nurse Practice Act	F: 1) Educate administrators about need for policy, establish evidence-based protocols and include revisions as indicated by new research; 2) make sure policy consistent with all laws, practice acts, and school district policies; 3) establish processes for communication with parents concerning life-threatening illness, information about 504, IHP, privacy and confidentiality. Contact EMS for emergency response planning; 4) meet with local EMS to develop protocols for emergency preparedness; 5) establish authorization to emergency medication; 6) establishing processes for education and training; 7) establish policies for delegation; 8) policies for medication storage, administration, school field trips and school bus; 9) protocols for mitigation and prevention of allergen exposure	Care Coordination Care Planning Environmental Management Policies	I	5	A
92. National Association of School Nurses. (2020). *School nurse workload: Staffing for safe care.* [Position Statement]. Author. https://www.nasn.org/nasn-resources/professional-practice-documents/position-statements/ps-workload	To discuss the need to determine school nurse workloads based on health and safety needs of school communities	Position Statement	S: Supports the need for adequate workload allocation for school nurses L: Little data exists on validated tools to determine school nurse staffing	F: 1) School nursing services must be determined at levels sufficient to provide the range of health care necessary to meet the needs of school populations; 2) all students need access to a school nurse every day; 3) in addition to the number of students covered, staffing for school nursing coverage must include	Care Coordination	I	5	A

				acuity, social needs of students, community/ school infrastructure, and characteristics of nursing staff; 4) current best practice for staffing involves analyzing complex factors including number of students, social determinants, acuity levels, other responsibilities, barriers to care, current use of technology, and health care to adequately meet the health and safety needs of the children whose care is entrusted to schools R: Ongoing research to develop evidence-based health assessment and other tools that consider multiple factors for the development of staffing and workload models				
93. National Association of School Nurses. (2020). *Emergency medication administration: Field trip preparation checklist*. https://learn.nasn.org/courses/25694/sections/28762/documents/33779	To provide a checklist for practice and medication management considerations for emergency medication administration for field trips	Checklist	S: Provides guidance for the school nurse for the child with asthma participating in a field trip	F: Includes: 1) mitigation and prevention of medical emergencies; 2) nursing practice concerns; 3) emergency preparedness 4) medication storage; 5) medication administration	Emergency Medication	I	5	A

94. National Association of School Nurses. (2020). *Asthma/ wheezing/breathing difficulty: Algorithm, for management of medical emergencies*. https://learn.nasn.org/courses/25694/sections/28761/documents/33773	To provide an algorithm for management of medical emergencies	Guideline	S Color coded pathway provided for management of breathing difficulties due to asthma/wheezing	Algorithm	Care Coordination Care Planning Emergency Medication	I	5	A
95. National Association of School Nurses. (2020). *Model protocol: Inhaler with a spacer or valved holding chamber*. https://learn.nasn.org/courses/25694/sections/28760/documents/33760	To provide a protocol about using an inhaler with a spacer or a valved holding chamber	Model Protocol	S: Provides guidance for use and care of spacers and valved-holding chambers L: These examples are not authoritarian, nor should they be viewed as complying with any requirements specific or unique to any school or district	F: Provides needed supplies, the procedure for using an inhaler with a spacer or valved-holding chamber, cleaning the spacer, and cleaning the inhaler	Medication Administration	I	5	A
96. National Association of School Nurses. (2021). *School nursing evidence-based clinical practice guidelines: Medication administration in schools*. https://learn.nasn.org/courses/33787	The purpose of the CPG is to give the school nurse evidence-based recommendations for the safe care of Pre-K–12 grade students who receive medications during the school day	Clinical Practice Guideline	S: 1) Translation of evidence into practice L: 1) Only 7 references were acceptable with no concerns; 2) highest level of evidence at the moderate level; 3) only 1 RCT; 4) no systematic reviews reported	F: 1) This Guideline is intended as a decision-making tool to guide professional school nurses in implementing the most recent, evidence-based practice recommendations as of the date of publication: 2) school district medication policies and translation into practice recommendations. R: Review literature to determine if higher levels of evidence are available	Medication Administration	II	4	B

97. National Association of School Nurses. (2021). *A model for school nurse-led case management [manual]*. https://learn.nasn.org/courses/33713	To guide school nurses in case management for students with chronic disease	Guideline	S: Includes resources for the school nurse, including the NASN's Toolkit "Improving Care Coordination for Students with Chronic Health Conditions"	F: 1) Describes the process of school nurse-led case management: nursing assessment to determine need for case management; developing a student-centered plan of care, developing nursing diagnoses and establishing goals and outcomes; 2) interventions need to be evidence-based; 3) evaluation to assess progress toward goals; 4) process is based on Donabedian Model (Structure/process/ outcome).	Care Coordination Care Planning	I	5	A
98. National Association of School Nurses. (2015). *School nurse asthma care checklist*. https://higherlogicdownload.s3.amazonaws.com/NASN/3870c72d-fff9-4ed7-833f-215de278d256/UploadedImages/PDFs/Practice%20Topic%20Resources/2015_asthma_care_checklist.pdf	To provide actions to complete for individual students with a current diagnosis of asthma, undiagnosed students, and asthma-friendly schools	Guideline	S: Provides guidance in implementing care for children with asthma and those with undiagnosed asthma, as well as steps for creating an Asthma-Friendly School	F: 1) Includes assessment, diagnosis, outcomes, planning, implementation, and evaluation for students with a current diagnosis of asthma and for asthma-friendly schools; 2) Provides assessment actions for the undiagnosed student	Care Planning	I	5	A
99. National Heart, Lung, and Blood Institute (2013) *How asthma friendly is your school?* https://www.nhlbi.nih.gov/resources/how-asthma-friendly-your-school	Screening checklist to determine if schools are safe for children with asthma to maintain good asthma control	Checklist	S: Assesses areas for improvement that may impact the student with asthma Limitations: does not provide recommendations to remediate those areas with "no" responses	F: Assesses areas that have been identified to facilitate asthma control for the student with asthma: environmental tobacco smoke exposure; medication self-carry policies and access to asthma medications; written emergency plan; standing orders for	Care Planning Policies	II	5	B

				quick-relief medications in case of emergency; updated asthma action plans; presence of school nurse or health staff able to assess and monitor asthma, assist with medications and help them participate in physical activity; presence of asthma education expert to teach all school staff about asthma; asthma information incorporated into curriculum; access to quick relief medications nearby before, during, or after PE; reduction of asthma allergen and irritants inside and outside; indoor air quality; collaboration with asthma expert in community				
100. National Heart Lung Blood Institution. (2020). *Asthma action plan*. https://www.nhlbi.nih.gov/resources/asthma-action-plan-2020	Provides asthma management interventions based on level of control	Action Plan	S: The asthma action plan provides a quick summary for individuals, parents, and providers and recommendations that can prevent asthma from getting worse. L: No area for indication for the child's ability to self-carry their medication.	F: Provides a description of symptoms based on level of asthma control with associated interventions that should be implemented. Also provides common allergens and irritants and how to control these	Asthma Action Plan	I	5	B

101. Permaul, P., & Phipatanakul, W. (2018). School environmental intervention programs. *Journal of Allergy and Clinical Immunology: In Practice, 6*(1), 22–29. https://doi.org/10.1016/j.jaip.2017.10.002	To discuss common exposures encountered in schools, especially in urban areas where asthma morbidity and mortality is highest among children; to review the association between school environmental exposures and pediatric asthma morbidity	Literature Review	S: 1) Highlights the need for environmental management for asthma control; 2) emphasizes the need for a community partnership and home environment management L: Paucity of research to base conclusions	F: 1) provides evidence to reduce exposure to indoor environmental asthma triggers at home and in school: indoor allergens, mold, endotoxins (from rodents); 2) discusses indoor air quality; 3) recommends school-based asthma programs; 4) provides strategies for schools for environmental control R: Future research should further examine the relationship between allergen exposure in schools and resulting health effects, in order to develop an accurate exposure-risk model specific to the school environment	Community Partnerships Education/ Training Environmental Management	II	4	B
102. Russell, A. F., Nanda, A., & Bingemann, T. A. (2022). The vital role of the school nurse in managing asthma. *NASN School Nurse, 37*(1), 8–12. https://doi.org/10.1177/1942602X211037260	To present the school nurse as the leader in directing the management of a student's chronic health condition at school	Literature review and Resources	S: identifies the pivotal role school nurses contribute to asthma management in the school setting	F: 1) provides a table of resources; 2) discusses aspects of asthma management, including utilization of the student's asthma action plan, student-specific school accommodation needs, the importance of developing individualized healthcare plans, providing education to school staff related to asthma management and determining of the family and student knowledge level; 3) provides strategies to minimize exacerbations; 4) explores school nurse opportunity to advocate for emergency asthma medication access as a part of emergency preparedness	Asthma Action Plan Community Partnerships Education/ Training Emergency Medication Leadership/ Advocacy	I	5	A

103. Voleman, A., Lowe, A. A., Pappalardo, A. A., Anderson, C. M. C., Blake, K. V., Bryant-Stephens, T., Carr, T., Carter, H., Cicutto, L., Gerald, J. K., Miller, T., Moore, N., Phan, H., Sadreameli, S. C., Tanner, A., Winders, T. A., & Gerald, L. B. (2021). Ensuring access to albuterol in schools: From policy to implementation. An official ATS/AANMA/ALA/NASN policy statement. *American Journal of Respiratory and Critical Care Medicine, 204*(5), 508–522. https://doi.org/10.1164/rccm.202106-1550ST	To provide policy recommendations and outline steps for passing and implementing stock albuterol laws	Policy Development Guideline	S: Provides roadmap for school nurses to assist in policy development and implementation for stock albuterol L: 1) School nurses need to be able to access and mobilize key stakeholders; 2) time barriers	R: Recommendations for crafting state legislation and facilitating program implementation: 1) Create a coalition of stakeholders to champion legislation and implement stock albuterol programs: school administrators, school nurses and health personnel, parents, or caregivers of children with asthma, pediatric primary care and subspecialty providers (e.g., pulmonologists/allergists), pharmacists, health department staff, and local/regional/national advocacy organizations; 2) Legislative components critical for effective implementation of stock albuterol programs: specify that medication can be administered in good faith to any child in respiratory distress, establishing training requirements for school staff, providing immunity from civil liability for staff and prescribers, ensuring pharmacy laws allow prescriptions to be dispensed to schools, and suggesting inhalers with valved holding chambers/spacers for administration; 3) Select an experienced and committed legislator from the major party who serves on the health or education committee to sponsor legislation and guide revisions as needed during passage and implementation;	Policies	I	5	A

				4) Develop plans to disseminate legislation and regulations/policies to affected groups: school administrators, school nurses, pharmacists, emergency responders, and primary/subspecialty clinicians; 5) Periodically evaluate implementation effectiveness and need for adjustment				
104. Wittwer, L. H., Walters, E., & Jordan, K. (2023). Improving pediatric asthma care through asthma apps: A narrative review. *The Journal for Nurse Practitioners, 19*(5), 104500. https://doi.org/10.1016/j.nurpra.2022.11.010	(1) to establish telemedicine and other telehealth tools as appropriate and efficacious means of providing evidence-based, high-quality care to pediatric patients with asthma, and (2) to determine whether smartphone asthma apps contribute to improved patient outcomes	Literature Review	S: Asthma apps are an efficient tool for improving patient outcomes	F: 1) Telehealth interventions provide compelling data and information to improve and enhance pediatric asthma outcomes; 2) Asthma apps have documented potential to improve asthma control and medication adherence and reduce the frequency of asthma exacerbations in the pediatric population; 3) asthma apps are likely to be a cost-effective intervention if free asthma apps are used; 4) asthma apps have potential to decrease health disparities among minority populations. R: 1) The National Heart, Lung, and Blood Institute's asthma CPGs recommend using computer- and internet-based interventions as a standard part of pediatric asthma education; 2) providers should recommend asthma apps to pediatric patients with asthma	Telehealth/ Telemedicine	I	3	A

APPENDIX D

Implementation of Asthma CPG/Toolkit: 3S Model

The 3S Model provides a visual representation of key school health data utilizing three components Student, School Nurse, and School Community (Wolfe et al., 2019). The following logic model provides guidance on how to identify key data points and areas of assessment needed to implement the CPG recommendations and Toolkit resources into school nursing practice. This logic model provides a visual framework to clarify and identify the characteristics of each population (3S), general steps in the implementation process, and outcomes identification for evaluation of the implementing evidence-based practice (EBP). EBP involves the integration of three components, the best external evidence (CPG recommendations), individual clinical expertise (SN), and patient values and expectations (Student and School Community) (Melnyk et al., 2009).

Table D1: ***3S Model for Implementation of Asthma Clinical Practice Guidelines***

	Structure	Process (SN interventions)	Outcomes
School nurse (SN)	▪ Model of care/SN assignment ▪ Knowledge of asthma management ▪ Experience with identifying asthma and providing emergency asthma management ▪ Knowledge of school & district policies-procedures/state laws	▪ Continuing education on asthma management ▪ Review of CPG recommendations and toolkit templates/ resources ▪ Review school & district asthma and medication policy-procedures/state laws ▪ Review health services protocols, including trainings and forms ▪ Identify any changes to current practice that need to be considered ▪ Identify barriers and facilitators to your local environment for practice/policy/procedure change ▪ Identify current resources ▪ Identify gaps in resources ▪ Make plan for implementing changes and gaps in resources, as needed ▪ Review current data collection/documentation method/ processes ▪ Identify data points and collection method/processes to track implementation ▪ ***Implement evidence-based asthma management plan/CPG recommendations*** ▪ Evaluate implementation, successes, and areas for improvement utilizing identifies data points (see outcomes)	▪ Increase SN knowledge in providing evidence-based asthma care management ▪ Increase in evidence-based care (evaluated by CPG measures—see data points) ▪ Increased SN knowledge of school & district polices-procedures/state laws
Student	▪ Students with asthma (symptoms, triggers) ▪ Attendance ▪ Academic outcomes ▪ Access to healthcare ▪ Access to asthma reliever medication ▪ Self-care abilities ▪ Risk for injury ▪ Sense of safety/social isolation/ mental health ▪ Family/social supports ▪ Age, cognitive level, transition planning ▪ Co-morbidities		▪ Reduce incidence of asthma symptoms ▪ Reduce risk of injury at school ▪ Increase recognition of asthma symptoms by school staff ▪ Increase school attendance and learning time/school activities ▪ Increase health outcomes (evaluated by CPG measures—see data points) ▪ Increase access to healthcare ▪ Increase access to asthma reliever medication and trained staff ▪ Increase sense of safety/social isolation/mental health ▪ Increase collaboration with family/ family support ▪ Increase collaboration to promote a smooth and coordinated transition from pediatric to adult care

School community	■ General student population (number, general demographics, SDOH) ■ Chronic absenteeism ■ Student population with healthcare needs/acuity ■ Staffing (availability/training) ■ Resources available in community/school ■ Sense of safety/social isolation/ mental health/school climate ■ School & district policies-procedures/state laws		■ Increase awareness of student needs/ acuity ■ Increase in community resources, access to/utilization of resources ■ Increase school attendance and learning time/school activities ■ Increase safety measures, access to trained staff ■ Increase preparedness of school community ■ Policies/procedures aligned with best practice (evaluated by CPG measures—see data points) ■ Increase sense of safety/social isolation/ mental health/school climate ■ Increase alignment of school & district policy-procedures/state laws with best practice

Structure represents the characteristics of each population that the school nurse must assess and identify any impacts they have on the implementation of the best practice recommendations. These characteristics are specific to each school nurse, each student, and each school community and illustrate the individualized nature of evidence-based practice implementation. These individualized factors are utilized by the school nurse to determine the best way to implement a practice to a setting and population based upon their current and potential needs.

Process, or school nurse interventions are the steps the school nurse considers in implementing best practice recommendations and strategies as outlined in the CPG and Toolkit. These interventions are general guidance that serve as the bridge between the CPG/Toolkit and individual practice. The specifics of each process step will be unique to each school nurse and school community based upon the student needs. Each of these process steps can be broken down into many action steps to create a more specific action plan for implementation with objectives, time frame, accountable staff, resources, and evaluation for each step.

Outcomes represent areas of school health data the school nurse can utilize for evaluation purposes. Each of these outcomes can be measured in a variety of ways, but the data points identified in the evaluation section of the CPG can be helpful. The outcomes also provide a measure of effectiveness of the process. If the outcomes (data) are not reflecting what was anticipated or expected, it provides the school nurse with the opportunity to take a closer look at the process steps to identify areas for improvement, also known as quality improvement (QI).

For example, when measuring sense of safety, preparedness level, and access to resources, measurements may include qualitative responses of students, parents, staff, and administrators, the school nurse evaluation of school simulation exercises, assessment of data related to type of treatment provided (what kind, by whom, disposition) to students, components of school climate surveys, and changes in policy/training practices. Additional examples are noted below (Table D2), though not exhaustive. It can be helpful to identify baseline levels of the outcome measure data points prior to CPG implementation. This provides the school nurse with the opportunity to identify current data collected, access and ability to retrieve data, and an overall view of current practices in relation to CPG recommendations. These are the action steps that are individualized to each school nurse and practice setting during the process or SN interventions.

Table D2: ***Sample CPG Data Points to Measure Outcomes***

<table>
<tr><th>Population (3S)</th><th>Outcomes</th><th>Sample Data Points for Outcome Measurement</th></tr>
<tr><td>School nurse (SN)</td><td>Increase SN knowledge in evidence-based asthma management
Increase in evidence-based care (evaluated by CPG measures—see data points)
Increased SN knowledge of school & district polices-procedures/state laws</td><td rowspan="3">Number of students with HCP verified diagnosis for asthma
Number of these students who are chronically absent
Number of students with AAP/EAP/ECP
Number of students with IHP
Number of students with 504 receiving asthma accommodations
Number of students with IEP with asthma accommodations
Number of students who self-carry asthma reliever medication
Results of self-carry spot checks (total number, medication present, exp. date, skills review)
Number of students with asthma reliever medications at school
Number of students by type of asthma reliever medication at school (inhaler, nebulizer)
Number of stock MDI administered (can stratify by provider administering)
Number of staff trainings by type and topic (general, mock drills)
Number of staff trained (type of staff, frequency)
Staff experiences reported during debriefing post-asthma response
Student report of mental health, somatic symptoms (clinic visits/time out of classroom), participation in activities, attendance rate
Number of reports of bullying, resolution
Number of communications with family/reachability
Family/caregiver satisfaction w SN care coordination
Number of students with asthma symptoms during the school day
Type of treatments required for asthma at school
Number of asthma reliever medications administered by (student, staff, RN, etc.)
Number of doses administered by incident/student and total school year
Disposition of students treated for asthma (RTC, home, 911)
Number and type of injuries during asthma symptoms
Follow-up care (type/needs/school changes)
Number and type of school changes (policy/procedure/signage)
Number of transition planning meetings
Outcome of transition planning meetings
Parent/student satisfaction
School climate survey (engagement, satisfaction, safety, mental health)
Number of reports shared with administrators (impact—increased awareness, action through policy, staffing changes, etc.)
SN completion of identified NCPD, confidence
SN compliance/application of school/district/state policy and laws (examples/number changes needed/number successful changes, barriers to changes)
Yearly policy/procedure audit for alignment with best practices
Number of school/community resources (identified, partnerships, referrals, resources)
Number of asthma triggers identified in school
Number of triggers mitigated in the school</td></tr>
<tr><td>Student</td><td>Reduce incidence of asthma symptoms during the school day
Increase school attendance and learning time/school activities
Increase health outcomes (evaluated by CPG measures—see data points)
Increase access to healthcare
Increase access to asthma reliever medication and trained staff
Increase sense of safety/social isolation/mental health
Increase collaboration with family/family support
Increase collaboration to promote a smooth and coordinated transition from pediatric to adult care</td></tr>
<tr><td>School community</td><td>Increase awareness of student needs/acuity
Increase in community resources, access to/utilization of resources
Increase school attendance and learning time/school activities
Increase safety measures, access to trained staff
Increase preparedness
Policies/procedures aligned with best practice (evaluated by CPG measures—see data points)
Increase sense of safety/social isolation/mental health/school climate
Increase alignment of school & district policy-procedures/state laws with best practice</td></tr>
</table>