5-8-2024

# A Clinical Practice Guideline on Dyslipidemia Screening in Children

Nadine Touayem Mbou
*Walden University*

# Walden University

College of Nursing

This is to certify that the doctoral study by

Nadine Mbou

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. Deborah Lewis, Committee Chairperson, Nursing Faculty
Dr. Elizabeth Diener, Committee Member, Nursing Faculty

Chief Academic Officer and Provost
Sue Subocz, Ph.D.

Walden University
2024

Abstract

A Clinical Practice Guideline on Dyslipidemia Screening in Children

by

Nadine Mbou

MS, Walden University, 2016

Project Submitted in Partial Fulfillment of

the Requirements for the Degree of

Doctor of Nursing Practice

Walden University

May 2024

Abstract

The burden of dyslipidemia among children has increased substantially, affecting approximately 7% of adolescents in the United States. Although pediatric dyslipidemia screening can promote early identification, a standardized clinical practice guideline (CPG) on pediatric dyslipidemia screening is lacking, which may contribute to minimal health care intervention and associated comorbidities in adult life. Guided by Watson's theory of human caring, this project was conducted to develop an evidence-based CPG on pediatric dyslipidemia screening that could be validated using the Appraisal of Guidelines for Research and Evaluation (AGREE) II instrument. A literature review revealed nine relevant and peer-reviewed articles that were appraised and used to develop the new CPG. The newly developed CPG was then submitted to content experts who evaluated it using the AGREE II instrument, resulting in individual domain scores of 100%. The content experts recommended the newly developed CPG for use in guiding pediatric dyslipidemia screening. The newly developed CPG will guide health care providers on early screening of dyslipidemia for all children aged 9 to 11 years old to prevent the burden of dyslipidemia comorbidities as the children reach adulthood. Pediatric dyslipidemia screening could contribute to positive social change by reducing the burden of disease in the pediatric population by promoting timely screening and treatment of children identified to have pediatric dyslipidemia. Notably, screening for dyslipidemia in the pediatric population could safeguard children from cardiovascular health outcomes and reduce the burden of atherosclerosis and cardiovascular disease in

adulthood.

A Clinical Practice Guideline on Dyslipidemia Screening in Children

by

Nadine Mbou

MS, Walden University, 2016

Project Submitted in Partial Fulfillment of

the Requirements for the Degree of

Doctor of Nursing Practice

Walden University

May 2024

Dedication

I dedicate this project firstly to God Almighty, my creator, my strong pillar, my source of inspiration and strength throughout this program, and I have soared on his wings. Secondly, I am dedicating this work to my beloved father, Touyem Jean, aka "Pa Macani," who has meant and continues to mean so much to me. Although he is no longer in this world, his memories continue to regulate my life. Thirdly, I dedicate my project to my family. A special gratitude to my husband, Dr. Guide Mbou Foffou, and my caring mother, Ngafor Magdaleine; their encouragement and push for tenacity ring in my ears. Thank you to my wonderful children for their unconditional love and support. Thank you to my sisters and brothers, who have never left my side and are very special. I also dedicate this project to my many friends who have supported me. I will always appreciate all you have done.

Special thank you to the committee who kept me on track, their constant prompt reactions in this process, and my academic advisor, who always ensured that things were going okay.

Table of Contents

List of Tables

Section 1: Nature of the Project

**Introduction**

According to Gujral and Gupta (2023), cardiovascular diseases are the primary cause of morbidity and mortality in the United States, resulting 1 out of every 3 deaths. Dyslipidemia is a term used to describe a group of lipoprotein abnormalities that include elevated levels of low-density lipoprotein-cholesterol (LDL-C), triglycerides, total cholesterol (TC), non-high-density lipoprotein cholesterol (HDL-C), and decreased levels of HDL-C (Gujral & Gupta, 2023). Previously, Constantin et al. (2023) noted that dyslipidemia was considered a concern primarily in adults and not pediatrics. In contemporary times, the prevalence of dyslipidemia in children has increased substantially, which raises concerns about cardiovascular health comorbidities and sequelae (Constantin et al., 2023). Schefelker and Peterson (2022) acknowledged that dyslipidemia causes an imbalance in lipid metabolism, leading to an increased risk of atherosclerosis and cardiovascular diseases in adult life.

The World Health Organization (2023) reported that high body cholesterol is a major cause of disease burden in both developing and developed countries and causes around 2.6 million deaths annually. Buterbaugh (2021) noted that changes in lifestyle, dietary habits, and a sedentary way of life have contributed to the rise of dyslipidemia among children. Genetic causes are also critical in determining an individual's lipid profile, whereby certain genes can predispose children to dyslipidemia from an early age

(Hamilton et al., 2021; Zhang et al., 2023). Chacra (2019) suggested that recognizing and addressing dyslipidemia in childhood is paramount and can serve as a preventive measure to reduce the burden of cardiovascular diseases in adulthood.

A holistic understanding of children's lipid profiles is crucial in guiding early identification and intervention, specifically concerning cardiovascular health (Koskinen et al.,2023). Cholesterol is a complex fatty substance that plays a role in various physiological functions, including cellular structure, hormone synthesis, and overall metabolism (Craig et al., 2023; Huff et al., 2023). When cholesterol levels become excessively elevated, specifically the LDL-C, commonly known as "bad" cholesterol, the balance of lipid metabolism becomes disrupted, increasing the risk of health complications, including dyslipidemia (Duan et al., 2022). Elevated levels of LDL-C contribute significantly to the atherosclerotic process, initiating the formation of arterial plaques that lead to an increased risk of cardiovascular diseases in the long term, which also impairs lipid metabolism (Borén et al., 2020). Thus, understanding the nuanced relationship between cholesterol and cardiovascular health in children is imperative to timely identification of at-risk children.

Dyslipidemia in children extends beyond elevated cholesterol levels and involves elevated triglyceride levels as a critical outcome of a dyslipidemia profile (Wilson et al., 2022). Triglycerides are a form of circulating fats, and when elevated, triglycerides increase the risks associated with dyslipidemia (Shah & Wilson, 2023). Elevated triglyceride levels often indicate impaired lipid metabolism and contribute to the atherosclerotic process, potentially exacerbating the development of atherosclerotic plaques. The association between cholesterol and triglycerides emphasizes the need for a

patient-centered approach to diagnosing and managing dyslipidemia in the pediatric population (Wilson et al., 2022).

Guirguis-Blake et al. (2023) stated that screening for dyslipidemia in children was a critical aspect of preventative pediatric health care. Screening aims to identify early signs of abnormal lipid profiles and prevent the development of long-term cardiovascular risks. The rationale behind screening lies in the increasing burden of dyslipidemia in the pediatric population. Studies have attributed the increasing dyslipidemia burden in children to modern lifestyles characterized by poor dietary choices, sedentary behaviors, and genetic predispositions (Maldonado et al., 2022).  Schefelker and Peterson (2022) noted that screening involves the measurement of lipid levels, including TC ($\geq$200 mg/dl), LDL-C ($\geq$130 mg/dl), HDL-C (<40 mg/dl), and triglycerides ($\geq$100mg/dl - $\geq$130mg/dl depending on age, 0–19 years old). The above lipid parameters collectively provide a comprehensive overview of a child's lipid profile and help identify potential dyslipidemia (Schefelker & Peterson, 2022). The American Academy of Pediatrics (AAP) and other relevant health organizations recommend lipid screening for children between the ages of 9 and 11, with a follow-up screening between 17 and 21 years of age
(Eichberger et al., 2022).

Yu et al. (2022) revealed that dyslipidemia in children is often asymptomatic, which supports the significance of routine screening as a preventive measure. Early identification allows health care providers to intervene promptly, implement strategies to modify lifestyle risk factors, and prevent cardiovascular outcomes (Yu et al., 2022).

Zawacki et al. (2020) posited that the clinical goal of regular and early dyslipidemia screening in children is to implement targeted interventions to address identified risk factors. Some lifestyle modifications include dietary changes, increased physical activity, and weight management, which form the cornerstone of dyslipidemia interventions (Giussani et al., 2022).

I conducted this doctor of nursing practice (DNP) project to develop a comprehensive and standardized clinical practice guideline (CPG) to screen for dyslipidemia in children to improve health care providers' understanding of dyslipidemia screening in the pediatric population. I developed the CPG to guide health care providers in accurate screenings and early implementation, reducing the likelihood of potential complications associated with dyslipidemia in children. The principal goal of this DNP project was to contribute to positive social change by reducing morbidity and alleviating the health care and financial burdens of dyslipidemia among patients and the health care system (see Gujral & Gupta, 2023). This project revealed my commitment to improving health care practice and outcomes for children, aligning with the broader objective of creating a healthier and more sustainable population.

## Problem Statement

Buterbaugh (2021) noted that the burden of dyslipidemia in children has been steadily increasing, affecting approximately 20% of children aged 6–19 years old globally. Such a high prevalence raises a significant public health concern due to its potential long-term effect on cardiovascular outcomes and population health. For instance, the Centers for Disease Control and Prevention (CDC; 2023) reported that 7%

of U.S. adolescents and children have high body cholesterol. Furthermore, according to CDC (2015), the prevalence of elevated TC levels in children and adolescents was 7.4% in 2015. The CDC data revealed variations based on age, with adolescents aged 16 to 19 exhibiting a higher prevalence of high TC at 8.9% compared to children aged 6 to 8 who had a prevalence of 6.0%. Additionally, high TC prevalence was lower in boys (5.9%) than in girls (8.9%). Ethnic and racial disparities were observed, indicating that the prevalence of high TC was more likely among non-Hispanic Black and non-Hispanic Asian children and adolescents; conversely, elevated TC was lower among non-Hispanic White and Hispanic children and adolescents (CDC, 2015). Weight status also played a role, with a higher prevalence of high TC noted in children and adolescents with obesity (11.6%) than those with normal weight (6.3%) or those who were overweight (6.9%; CDC, 2015).

Although timely identification and intervention are crucial in reducing the risks associated with dyslipidemia in the pediatric population, Berger et al. (2021) pointed out a lack of standardized CPGs tailored specifically to guide health care providers in dyslipidemia screenings in children. The lack of dyslipidemia screening CPGs may contribute to differences in dyslipidemia screening practices, leading to delayed identification of elevated lipid profiles and anticipated clinical interventions (Daniels, 2020). Such a gap in a lack of standardized CPGs may reduce the capacity of health care providers to implement consistent, evidence-based screening practices, thereby challenging early detection and management of dyslipidemia in children (Nantsupawat et al., 2019).

According to data from a review of the medical records at the project site clinic, from January to March 2019, 110 obese children were seen for a Well Child exam (WCE), and only 25 were screened for dyslipidemia (23%). The health care staff in the clinic includes two providers (one with a doctorate in nursing practice and the other with a master's), registered nurses, a medical assistant, and a receptionist. Providers primarily responsible for recommending screening to children have little or no evidence-based knowledge of screening for dyslipidemia in children. During patient encounters, providers must address the current reason for the clinical visit, health promotion, and disease prevention, which can make screening for family history for cardiovascular diseases challenging because of limited time for history taking (Elkins et, 2019).

Against such a backdrop, there was a pressing need to develop and use a CPG on dyslipidemia screening in children to address this gap in pediatric health care. Such a CPG would serve as a comprehensive resource, offering evidence-based recommendations and protocols for health care providers to conduct timely and accurate screenings, interpret lipid profiles, and initiate appropriate interventions. Developing a standardized approach to dyslipidemia screening through a CPG could significantly reduce the morbidity associated with untreated dyslipidemia in children and alleviate the financial burdens on both patients and the health care system. The rate of dyslipidemia screening in children could also be increased in the project setting if there is a CPG to increase the clinic staff's knowledge of early dyslipidemia screening in children. Thus, it was important to develop an evidence-based CPG to guide providers on how to screen for dyslipidemia and decrease dyslipidemia prevalence in children (see Elkins et al., 2019).

**Purpose Statement**

In pediatric practice, the high prevalence of dyslipidemia in children is a pressing issue warranting intervention (Lischka et al., 2022). Several factors, such as unhealthy dietary habits, sedentary lifestyles, and genetic predispositions, contribute to a higher risk of dyslipidemia in the pediatric population (Enani et al., 2020; Mascarenhas et al., 2023). Daniels (2020) highlighted that while the existing body of evidence extensively discusses the association between dyslipidemia and cardiovascular health, there is a concerning lack of evidence-based CPGs tailored to guide health care providers in systematically screening for dyslipidemia among children. The existing body of research, represented by studies such as Berberich and Hegele (2022) and de Ferranti et al. (2019), has highlighted the importance of early identification and intervention in allaying the long-term cardiovascular risks associated with dyslipidemia in children. However, the absence of a standardized, evidence-based CPG limits the efficacy of current dyslipidemia screening interventions.

I developed this DNP project to address the identified practice gap by developing a comprehensive and evidence-based CPG for dyslipidemia screening in children. The goal of this project was to enhance health care providers' understanding of effective screening practices, guide them in conducting early and accurate screenings, and minimize potential complications associated with untreated dyslipidemia in the pediatric population (see Lim et al., 2022). Two practice-focused questions guided this CPG project:

1.  Does the existing literature support the development of a standardized guideline for dyslipidemia screening in children?

2.  Can an evidence-based CPG for dyslipidemia screening in children be developed and validated using established assessment tools such as the Appraisal of Guidelines for Research & Evaluation (AGREE) II instrument?

The first question supported the need for standardized guidelines aligning with the existing research emphasizing the significance of early dyslipidemia identification in children. Answering the second question could provide a robust, evidence-based guideline that health care providers can use to screen for dyslipidemia systematically, ultimately reducing long-term cardiovascular risks among the pediatric population.

**Nature of the Doctoral Project**

Guided by the Walden University CPG manual, I conducted this doctoral project to address dyslipidemia in children by developing a CPG on dyslipidemia screening. The identified practice problem revolved around the escalating rates of dyslipidemia in the pediatric population that is influenced by factors, such as changing dietary patterns, sedentary lifestyles, and genetic predispositions (Arvanitis & Lowenstein, 2023; Stein, Ferrari, & Scolari, 2019) The anticipated utility of the CPG extends to various health care settings where children are treated, including doctor and nurse practitioner clinics and emergency departments. The primary objective is to empower health care providers, including nurse practitioners, physicians, physician assistants, sociologists, and child psychologists, with a standardized tool that enhances their ability to recognize dyslipidemia in children, interpret lipid profiles, and implement effective interventions.

The development process of the CPG involved an extensive literature review to identify scientific evidence supporting the application of standardized guidelines in dyslipidemia screening. I used keywords, such as *prevalence* AND *dyslipidemia, screening* AND *children*, AND *pediatric population*, in searches of reputable medical databases and search engines, including Cochrane, BioMed Central, PubMed, CINAHL, Google Scholar, and ProQuest. I planned to critically appraise the retrieved articles based on a rating system using the Johns Hopkins Research Evidence Appraisal tool (see Dang et al., 2022) and organize them in a literature matrix. This evidence formed a solid foundation for developing a CPG on dyslipidemia screening in children. The finalized CPG was then presented to end users, comprising health care providers for children, for their evaluation of content and usability.

The findings from the reviewed studies contributed to developing a reliable dyslipidemia screening CPG that will equip healthcare providers with the knowledge and skills needed to recognize, assess, and manage dyslipidemia in children. The final goal was to positively impact pediatric health outcomes by preventing the long-term cardiovascular risks associated with untreated dyslipidemia. Thus, I expect that using the newly developed CPG to significantly contribute to dyslipidemia prevention and management in the pediatric population.

## Significance

The CPG on dyslipidemia screening in children could result in several implications for numerous stakeholders, including health care providers, children, families, communities, and the health care system, through reducing the ballooning

public health concern of dyslipidemia among children (see Constantin et al., 2023; Guirguis-Blake et al., 2023). For health care providers working with children, the use of the CPG could significantly improve early identification and management of dyslipidemia. Health care professionals would enhance their knowledge and skills in dyslipidemia screening by being provided with practical tools and an evidence-based CPG, leading to timely interventions (see Nasim et al., 2019).

The anticipated benefits for children are immense. Implementing the CPG is expected to reduce dyslipidemia-associated cardiovascular risks, foster better health outcomes, and improve overall quality of life. The CPG development aimed to prevent complications that could impede children's full, healthy lives by facilitating early screening and identification of dyslipidemia (see Smith et al., 2020). Additionally, disseminating information on healthy living and dietary practices could positively impact children's lifestyles and promote overall well-being. Community members also stand to benefit from improved adolescent health outcomes as a result of dyslipidemia prevention. I developed the CPG to prevent productivity losses due to the untimely mortality of a generation of children who would otherwise grow to pursue various careers. Thus, the CPG could contribute to the community's growth by reducing the prevalence of dyslipidemia in children (see Budreviciute et al., 2020). The anticipated decrease in health care costs associated with dyslipidemia-related complications aligns with the broader economic well-being of the community because comorbidities, such as CVD, in later adult life costs over $863 billion globally and that figure is expected to reach $1.04 trillion by 2030 (Ferrara et al., 2021).

From a health care system perspective, I expect the CPG to alleviate the financial burden of dyslipidemia. Reducing health care costs, as evidenced by data from Ferrara et al. (2021), could result in substantial savings for the government and health care institutions. The savings may fund other critical areas within the health care system, promoting overall health care system efficiency and sustainability. The CPG may also impact nursing practice by providing valuable insights for dyslipidemia prevention training programs. The CPG could become integral to training initiatives, enhancing nursing professionals' capacity to address dyslipidemia in children (see Thongtang et al., 2022).

I anticipate that implementing the CPG will contribute to the thriving of an adolescent generation, preventing untimely mortalities and promoting their engagement in productive activities. This ripple effect is expected to enhance growth in local communities and economies, reducing the strain on resources to address dyslipidemiarelated complications. Ultimately, I envision the CPG leading to a healthier and more prosperous future for children and communities, aligning with broader societal goals of improved well-being and longevity.

## Summary

I conducted this doctoral project to develop a CPG on dyslipidemia screening in children to address the increasing prevalence of dyslipidemia and its potential long-term impact on cardiovascular health. The project underscored the need for a comprehensive understanding of lipid profiles that considers factors, such as lifestyle changes and the asymptomatic nature of dyslipidemia in children. The evidence-based research and

rigorous development process used for developing the CPG, led to the development of an impactful CPG that should empower health care providers to children, improve the early identification and management of dyslipidemia, and contribute to positive social change by promoting preventive measures and reducing health care costs. The project's significance extends beyond health care providers to benefit children, families, communities, and the health care system. I anticipate that the CPG will promote improved pediatric health care outcomes and overall quality of life by reducing dyslipidemia-associated cardiovascular risks in children. Communities may experience enhanced adolescent health outcomes, potentially reducing health care costs and promoting economic well-being. From a broader perspective, I envision that the project will have positive impacts on nursing practice by influencing training programs and contributing to a healthier and more prosperous society.

## Section 2: Background and Context

### Introduction

In this project, I developed a CPG focused on the clinical problem of low dyslipidemia screening rates in pediatric patients at the practicum site that was consistent with evidence-based literature recommending dyslipidemia screening (see Barry et al., 2023). The CPG was developed to guide health care providers working with pediatric patients on dyslipidemia screening; therefore, the practice-focused questions guiding the project were:

1. Does the evidence-based literature support developing a standardized guideline for screening children with risk factors for dyslipidemia?

2. Can an evidence-based CPG be developed and validated using the AGREE II

     tool?

I conducted this project with the goals of improved screening and early interventions for pediatric patients at risk of dyslipidemia. Dyslipidemia screening advances nursing priorities by proactively managing and preventing child health concerns. In Section 2, I describe the design used in the project, the CPG's importance in nursing, a summary of the background of dyslipidemia in children, and my role as the

DNP student in improving dyslipidemia screening in children.

## Concepts, Models, and Theories

The AGREE II model and Watson's theory of caring informed this DNP project.

## AGREE II Model

In this project, I utilized the AGREE II model as a standard measure in appraising the CPG relating to dyslipidemia screening among pediatric patients. The AGREE II is crucial for evaluating evidence-based CPGs (Pena-Pereira et al., 2020). AGREE II was developed collaboratively by an international team of guideline development researchers to strengthen the validity and quality of CPGs (Brouwers et al., 2010a). AGREE II comprises six domains of quality assurance standards: scope and purpose, stakeholder involvement, rigor of development, clarity of presentation, applicability, and editorial independence (McGill et al., 2021). The individual domains are used to assess several key aspects of guideline quality, such as the guideline purpose, stakeholder involvement, methods used to review evidence, presenting recommendations, issues related to guideline implementation, and managing conflicts of interest.

The reliability and validity of this tool across different health care fields have been demonstrated (Hoffmann-Eßer et al., 2018). The model improves CPG reliability by ensuring consistent evaluations even when several appraisers are involved. Many studies have also confirmed the validity of AGREE II, thus supporting its importance in evaluating the quality of guidelines (Zuberbier et al., 2022). The tool is well-recognized internationally and has been used to validate several CPGs (Bargeri et al., 2021; Brouwers et al., 2016; Mc Allister et al., 2023). The AGREE II tool helps ensure the soundness, transparency, and clinical relevance of newly developed CPGs Moreover, using AGREE II to validate the developed CPG would further strengthen its credibility and reliability in clinical practice, which aligns with advanced nursing practice that is focused on utilizing evidence-based interventions for improving health care and managing health issues (see Connor et al., 2023). Therefore, I used the AGREE II tool to evaluate the newly developed CPG on dyslipidemia screening in pediatrics in this project.

**Watson's Theory of Human Caring**

The main goals of Watson's theory of human caring are to return humanism to health care; encourage healing via loving interactions; and recognize the interconnection of mind, body, and spirit in caregiving (Wei et al., 2019). Interpersonal ties, compassion, and comprehensive treatment are stressed in this approach, and it aims to integrate nursing practice with a deeper sense of humanity, elevating care from technical processes to empathic, compassionate, and holistic care. In Watson's theory of human caring, true caregiver-patient connections are emphasized to build trust, promote treatment, and improve health.

Transpersonal caring relationships are crucial to Watson's theory of human caring, and these exchanges highlight nurses' genuine, reciprocal, and human-to-human connections with patients. In the theory, the importance of real connections and comprehensive care, including body, mind, social relationships, and spirit are recognized (Bagher et al., 2023). The theory highlights the purposefulness behind caring acts and emphasizes healing, growth, and respect (Strickland, 2019). In Watson's theory of human caring, caring moments when nurses show empathy, active listening, and understanding to meet patients' needs are emphasized. In Watson's theory, the importance of caring healing methods, ethnic diversity, and alternative medicines in health care are stressed (Bagher et al., 2023). Watson's theory of human caring relies on several assumptions, including the assumption that nursing requires care to promote health and healing beyond the physical (Constantinides, 2019). The theory holds that people can heal themselves and that nurses should help patients acquire this ability through caregiving and that compassionate, recovery-friendly environments improve patient well-being (Wei & Watson, 2019).

Watson's theory of human caring was crucial in guiding the development of the CPG on pediatric dyslipidemia screening in this project. Notably, I incorporated empathy, compassion, and a holistic viewpoint, which are crucial concepts of the theory, into developing and implementing dyslipidemia screening recommendations for pediatric patients (see Constantinides, 2019). To bridge the gap between evidence-based treatments and the humanistic side of nursing care, Watson's theory of human caring emphasizes caring connections and patient-centered ways, which informed the development of the CPG to improve dyslipidemia screening and early detection of at-risk children in this project.

Watson's theory of human caring also aligned with the project's goal of improving care and promoting a more comprehensive and inclusive pediatric health care delivery intervention.

**Relevance to Nursing Practice**

The frequency of dyslipidemia in children and the lack of standardized screening methods make dyslipidemia screening in pediatric care a major nursing concern. Research has shown that dyslipidemia is frequent in children, especially those with CVD risk factors such as diabetes, obesity, hypertension, and other lipid-related illnesses (Daniels, 2020). This is especially true for youngsters at risk of cardiovascular disease. Untreated dyslipidemia in childhood usually persists into adulthood, with subsequent increases in cardiovascular and other medical complications (Constantin et al., 2023). The lack of uniform standards for screening dyslipidemia in children is surprising, considering the strong evidence supporting comprehensive screening (Barry et al., 2023). Due to this gap, early intervention and avoiding long-term health repercussions from untreated dyslipidemia are compromised.

Current nursing practice indicates differences between evidence-based guidelines and pediatric dyslipidemia screening approaches. Healthy People 2020 follows the advice of renowned organizations, like the National Heart, Lung, and Blood Institute (NHLBI) and the American Family Physicians, and promotes lifetime sickness screening (Borén et al., 2020; Vitta & Ghany, 2019). This includes dyslipidemia screening in at-risk individuals. Standardized dyslipidemia screening in pediatric health care settings varies despite the above recommendations (Borén et al., 2020; Vitta & Ghany, 2019). Nurses and other health

care providers often face barriers during routine visits, which challenge dyslipidemia tests (Daniels, 2019).

Well-child visits and illness screening/preventive care mainly facilitate dyslipidemia screening in children (Stipelman et al., 2017). These approaches have provided a basis for the provision of pediatric care in the health appraisal of children. Nonetheless, many difficulties have impeded the implementation of these methods in solving the screening gap for pediatric dyslipidemia. Health care providers generally struggle to complete thorough dyslipidemia screens because of a lack of uniform screening methodologies, significant competition with other health care priorities, and limited consultation time (Daniels, 2020). Health care providers are generally ignorant about universal pediatric dyslipidemia screening (de Ferranti et al., 2017). Therefore, health care professionals should appreciate the need for screening for dyslipidemia early in children and how that relates to managing cardiovascular risk.

Another problem is time constraints in clinical consultations (Wilson et al., 2022). Nurses and other health care providers could lack time to screen patients for dyslipidemia. As much as dyslipidemia screening is necessary, prioritizing it becomes extremely hard due to the need to address many issues regarding a child's health in a short time. The lack of standardized guidelines for dyslipidemia screening in children further complicates these problems (Khoury et al., 2020). Screening procedures are not uniform in many health care facilities because there are no clear evidence-based protocols, and this lack of uniform guidelines undermines screening for dyslipidemia, with different practices among health care providers.

Such complex challenges require solutions that create a better understanding of the problem, enhance education quality, and develop clear guidelines; therefore, health care professionals needed a CPG for screening for pediatric dyslipidemia that includes early detection, risk factors, and dyslipidemia risks on cardiovascular health. I conducted the current doctoral project to close this gap on dyslipidemia screening among pediatric patients. The project's main goal was to develop a standardized CPG with evidence-based literature that was evaluated based on the AGREE II tool. Meeting this goal would help to fill dyslipidemia screening gaps that could transform pediatric care.

I anticipated that a standardized guideline would improve clarity and concordance with evidence-based recommendations for nurses and health providers (see Rychik et al., 2019). The CPG could provide a consistent and validated clinical pathway to dyslipidemia screening and assure screening uniformity and validity, which would address the present ambiguous practices of dyslipidemia screening at the project site. The project has far-reaching effects beyond those of just CPG development. Evidence-based child health management should be a cornerstone of proactive child health management. Health care providers, especially nurses, will use the comprehensive and well-defined CPG to implement practice change within facilities that provide health care to pediatric populations.

**Local Background and Context**

Recommendations on cholesterol screening span several decades in the United States. As early as 1992, the National Cholesterol Education Program called for cholesterol screening, and 6 years later, the World Health Organization revealed that

hypercholesterolemia was a worldwide public health priority (Wilson et al., 2022). With the above calls to action to improve cholesterol screening notwithstanding, minimal progress was made. The earliest clinical guideline on cholesterol screening in children was developed in 2011 in the United States and recommended screening for children as early as 2 years old and universal screening for all children aged 9 to 11 (Eichberger et al., 2022). The guideline also suggested a repeat screen at ages 17 to 21. The recommendations were initially unsupported, but several professional bodies approved the clinical guidelines in the last decade, including the AAP, the American College of Cardiology/American Heart Association, and the National Lipid Association (Wilson et al., 2022).

Currently, pediatric dyslipidemia is a concerning issue in the United States, especially among overweight or obese children (Rosenthal et al., 2022). The results of the National Health and Nutrition Examination Survey 2017–2021 were concerning (Stierman et al., 2021). Specifically, 7.8% of children aged 8–17 and 7.4% of adolescents aged 12–19 had increased TC ($\geq$ 200 mg/dL) and LDL ($\geq$ 130 mg/dL) values (United States Preventive Taskforce, 2016). Due to these issues, early screening and treatment of dyslipidemia are needed to alleviate cardiovascular risks. Consistent with the above outcomes is the clinical picture of dyslipidemia in the project site. The DNP project site is a family health clinic in a dynamic south central U.S. metropolis. The clinic provides evidence-based care to all ages, but pediatric patients comprise 1,632 of the clinic's overall population (Kertész et al., 2021). Three hundred ninety-one youngsters at the clinic are overweight or obese, making them susceptible to dyslipidemia; however, only 23% of 110

WCEs on overweight or obese children over 3 months at the start of 2019 included hyperlipidemia screening, an alarming trend. The large gap between dyslipidemia screening rates and WCEs suggests a severe problem with clinic usage of guideline-recommended diagnostics.

I anticipated that the newly developed CPG would to resolve the clinic disparity, improving preventive care and early dyslipidemia detection in overweight or obese children. Aligning the professional recommendations to the clinical setting and working with the latest clinical evidence could accomplish this goal. The project site lacked evidence-based dyslipidemia screening procedures and did not follow current standards for screening pediatric dyslipidemia.

## Definitions

The definitions of locally used terms or operational processes relevant to this project included:

BMI standards for children aged 2–18 are:

- A child is "underweight if their BMI is below the 5th percentile.

- Children with BMIs between the 5th and 84th percentiles are considered "healthy weight."

- Children with BMIs between the 85th and 94th percentiles are considered "overweight."

- A BMI above the 95th percentile for children is considered "obesity" (CDC, 2023).

CPGs: Statements that optimize patient care based on data analysis and assessing the pros and cons of different care alternatives (Beauchemin et al., 2019).

*Education*: The knowledge and development an individual obtains from engaging in an educational process or program (Merriam-Webster, n.d.).

NHLBI: An organization mandated to provide healthcare providers with dyslipidemia identification, treatment, and control guidelines, as well as tools and resources from the National Institutes of Health (NHLBI, 2019). The NHLBI's Expert Panel on Integrated Guidelines for Cardiovascular Health and Risk Reduction in Children and Adolescents provides childhood-specific evidence-based recommendations. Early detection and intervention for dyslipidemia are stressed in this recommendation. Data analysis, public health initiatives, and education from the CDC (2023) also raise awareness on controlling and preventing dyslipidemia. Thus, the above federal bodies and state departments support surveillance systems monitoring risk factors, illness trends, and prevalence of dyslipidemia and their information is used to inform public health policy and activities. Several health agencies, including NHLBI and the American Academy of Pediatricians, are operating dyslipidemia programs, and these departments often work with healthcare providers, community organizations, and schools to encourage healthy habits and screenings (Sleeth et al., 2020; NHLBI, 2019). Some states require cholesterol screening for children over a certain age or who satisfy risk factors like obesity or a family history of heart disease (Guirguis-Blake et al., 2023). Many states offer wellness exams, including cholesterol testing, for school-aged children.

*Nurse practitioner*: An advanced practice registered nurse who diagnoses and treats acute and chronic diseases to promote and maintain health (Merriam-Webster, n.d.).

Pediatric age range: The ages 0–18 (i.e., birth to 18 years of age) (Stancil et al., 2022).

## Role of the DNP Student

As a DNP student, I screen children for dyslipidemia. My clinical practice as a pediatric nurse is crucial to my career. I work with children and teens with obesity and others who need health care interventions. I understand the necessity of early management and prevention, especially for dyslipidemia, which is commonly missed during pediatric exams. Poor dyslipidemia screening rates in children are a major issue in the project site clinic; therefore, I implemented the DNP project to address the above issue. Barry et al. (2023) provided strong evidence supporting dyslipidemia screening in children, yet the project site clinic still failed to use standardized guidelines.

In this project, I created an evidence-based CPG to guide health care providers on dyslipidemia screening in children. I wanted to close the practice gap because I know the long-term effects of untreated dyslipidemia in children, including higher risk of cardiovascular outcomes, such as atherosclerotic cardiovascular disease in later adult life (see Constantin et al., 2023; de Feranti et al.,2020). Closing the gap would also aid in preventing and managing child health disorders, which aligned with the nursing values of early intervention and preventative care. I accepted that biases may have impaired the methodology used in this project. Confirmation bias occurs when prior beliefs influence judgment. I consulted content experts and reviewed considerable literature while

formulating the CPG to address the practice problem, which ensured that the CPG's development was evidence-based and reliable. The above approaches were undertaken to reduce biases and ensure that the CPG offered a complete view of dyslipidemia screening in the pediatric population. The CPG helps meet the crucial requirement for proactive child health management and connects with the nursing aims of preventive care and holistic health outcomes for pediatric populations.

## Summary

Improving dyslipidemia screening was the impetus for the development of a standardized and evidence-based CPG in this project. Even though available data supports screening for dyslipidemia, the project site, a family health care clinic, was not screening pediatric patients for dyslipidemia (see Barry et al., 2023). Such a gap in practice necessitated efforts to increase dyslipidemia screening among the pediatric population. Guided by Watson's theory of human caring to improve health care delivery to pediatric patients, this DNP project involved the development of a CPG guided by a body of evidence on dyslipidemia screening in children. The AGREE II model was used to evaluate and appraise the newly developed CPG. The AGREE II is a standardized tool for assessing the reliability and quality of the CPG in pediatric dyslipidemia screening (Sephien et al., 2023) The CPG developed in this project could contribute to reducing the burden of dyslipidemia in children and improve health care delivery to children at risk of dyslipidemia through early detection and intervention.

Section 3: Collection and Analysis of Evidence

## Introduction

The clinical practice problem that was addressed in this DNP project entailed the lack of a CPG on dyslipidemia screening in children visiting the project site for health care. This problem has led to low screening rates for dyslipidemia in pediatric patients at the facility. Promoting an awareness of the effects of dyslipidemia in children and the importance of using recommended guidelines to screen for pediatric dyslipidemia was crucial to this project. In this project, I developed a CPG on dyslipidemia screening in children to increase the clinic staff's knowledge and utilization of evidence-based CPGs to mitigate delays in diagnosing and treating dyslipidemia in children in the clinic. The results of this project were anticipated to also be useful for patients in other pediatric health care settings (see Elkins et al., 2019). In this section, I present the practice-focused questions; discuss the sources of evidence; describe the data participants, procedures, and protections; and provide analysis and synthesis of the evidence collected.

## Practice-Focused Questions

The problem addressed in this DNP project was the low screening rates for dyslipidemia among pediatric patients at the project site. Previous studies have established dyslipidemia as a concerning issue in the pediatric population, necessitating interventions including screening for dyslipidemia (Constantin et al., 2023; GuirguisBlake et al., 2023). However, the project site lacked a standardized guideline on screening for dyslipidemia in the pediatric population. Knowledge of this gap in practice led me to address the

practice problem by developing an evidence-based CPG on pediatric dyslipidemia screening. The practice-focused questions guiding this DNP project were:

1. Does the evidence-based literature support developing a standardized guideline for screening children with risk factors for dyslipidemia?

2. Can an evidence-based CPG be developed and validated using the AGREE II tool?

Developing the CPG should be impactful among health care providers working with pediatric patients by equipping them with the necessary knowledge on the risk factors of dyslipidemia, screening processes, and outcome interpretation. Knowledge of dyslipidemia screening and use of the newly developed CPG could enhance the dyslipidemia screening rate, reducing missed opportunities for screening and improving the overall health care delivered to pediatric patients at risk of dyslipidemia. The CPG should, therefore, fill the existing gap in practice regarding the lack of a CPG on dyslipidemia screening in pediatric patients.

**Sources of Evidence**

Development of the CPG in this project was guided by the published peerreviewed studies from the literature review described in Section 1. The literature review yielded several pertinent, peer-reviewed studies published in English in the past 5 years. I arranged the studies in a literature matrix and graded them using the John Hopkins Research Evidence Appraisal tool (see Dang et al., 2022). The literature review and appraisal were consistent with developing a CPG since the appraised studies provided crucial information on the clinical underpinnings and procedures involved in screening

for dyslipidemia in the pediatric population. The procedures used in this project, including a thorough literature search to develop a CPG, aligned with the American Academy of Family Physicians' (2023) professional standards of CPG development.

**Evidence Generated for the Project**

In this project, I completed the development of a new CPG on dyslipidemia screening among pediatric patients. The guideline development process comprised several steps, including the completion of several sections: an abstract, introduction, guideline purpose, the healthcare burden, method, guideline key action statements, implementation considerations, research needs, disclaimer, acknowledgments, and author information (see Rosenfeld & Shiffman, 2009). After completing the draft guideline, I asked my DNP project committee to conduct a preliminary review of it. After receiving feedback from my committee, I revised the guidelines based on their recommendations and then submitted the newly developed CPG to a panel of four content experts along with individual copies of the AGREE II tool. The content experts used the AGREE II tool to review the newly developed CPG for methodological rigor and quality. I collect the panel's completed copies of the AGREE II tool and analyzed their scores. Following the analysis, I made the required revisions to develop a refined copy of the CPG.

**Participants**

The participants involved in the CPG development included the DNP project committee members and the content experts. Expert reviewers are crucial to CPG development because their expertise and experience help strengthen guideline development and implementation (McCaul et al., 2021). Therefore, I had an expert panel

of four professionals review the newly developed CPG in this project. Factors, such as knowledge of the AGREE II tool, clinical experience with pediatric patients, and expertise and experience with dyslipidemia, guided the expert panel selection. The content experts were health care providers working with pediatric patients who had at least 10 years of experience providing health care to the pediatric population with dyslipidemia and knowledge of the AGREE II tool. The years of clinical experience with the pediatric population positioned the content experts as professionals who were suitable for evaluating the CPG for validity using the AGREE II tool.

**Procedures**

The CPG development involved several procedures. Notably, after completing the CPG development and a formative review by the DNP project committee of the draft guideline, I provided the content experts with an introduction letter, the disclosure for anonymous questionnaires, the AGREE II scoring sheet and instructions, and the newly developed CPG. The content experts took 2 weeks to review the newly developed CPG using the AGREE II tool. The AGREE II tool is validated and reliable for evaluating CPGs (Brouwers et al., 2010a; Brouwers et al., 2010b). The review process included six quality domains and 23 items as outlined in the AGREE II tool. The six domains are scope and purpose, stakeholder involvement, the rigor of development, clarity of presentation, applicability, and editorial independence. I received the content experts' scores and completed the data analysis by following the AGREE II manual on scoring guidelines. The content experts' review formed the summative evaluation used to answer the second research question.

**Protections**

I obtained ethical approval for the DNP project from the Walden University Institutional Review Board committee (# is 02-02-24-0423686) to ensure the project met all ethical requirements. The CPG development process posed no significant risk to participants. I collected and analyzed the content experts' data guided by the AGREE II scoring guidelines. Expert reviewers' data were coded to facilitate confidentiality, whereby pseudonyms, such as RV1 and RV2, were used instead of the reviewers' names to ensure the expert panelists' confidentiality. I provided a Disclosure to Expert Panelist form and a letter introducing the CPG to all the expert panelists before reviewing the CPG. Paper copies of the collected data were scanned into electronic files that will be maintained on a password-protected computer, exclusively accessible to me, for 5 years following the project's completion. Subsequently, these electronic copies will be permanently deleted.

## Analysis and Synthesis

I used a literature review matrix to summarize the research articles used in developing the CPG. The newly developed CPG was submitted to content experts for appraisal using the AGREE II tool. I collected the participants' individual AGREE II scores through email and averaged the tool's domain scores for an overall assessment. The data analysis process helped me view and evaluate each domain's percentage scores and establish any limitations. I used the outcomes of the content expert CPG review to guide me in making the necessary changes and revise the newly developed CPG as needed to improve its usability.

**Summary**

Developing the new CPG could improve health care delivery by filling a practice gap involving a lack of standardized guidelines on dyslipidemia screening in children. The new CPG could enhance the competency of health care providers concerning dyslipidemia and dyslipidemia screening in children. I submitted the draft CPG to my DNP committee members for review, and they provided a formative assessment. After that, the newly developed CPG was evaluated for validity by four content experts who reviewed it using the AGREE II tool. I collected and analyzed the content experts' data following the AGREE II guidelines, and the outcomes guided me in revising the newly developed CPG.

Section 4: Findings and Recommendations

**Introduction**

The problem guiding this project was a lack of a CPG on dyslipidemia screening in children (see Berger et al., 2021). This gap in practice contributes to minimal dyslipidemia screening in children, leading to minimal intervention and a high risk of development of dyslipidemia comorbidities due to untimely detection and intervention. Therefore, I developed a CPG on dyslipidemia screening to guide health care providers working with children. The practice-focused questions used to address the nursing practice gap were:

1. Does the evidence-based literature support developing a standardized guideline for screening children with risk factors for dyslipidemia?

2. Can an evidence-based CPG be developed and validated using the AGREE II tool?

The purpose of developing the pediatric dyslipidemia CPG was to equip health care providers with clinical guidelines for screening dyslipidemia in children. With the growing burden of pediatric dyslipidemia in the United States, especially among overweight or obese children (Rosenthal et al., 2022), the newly developed CPG could fill the gap in practice on minimal pediatric dyslipidemia screening, leading to improved preventive care and early dyslipidemia detection in overweight or obese children. The newly developed CPG could also contribute to clarity and adherence with evidence-based recommendations for nurses and health providers providing health care to children who may have dyslipidemia (Rychik et al., 2019).

To develop the CPG, I used evidence-based, peer-reviewed, and current scholarly articles that provided the best evidence on pediatric dyslipidemia screening. The retrieved studies were appraised based on a rating system from the Johns Hopkins Research Evidence Appraisal tool (see Dang et al., 2022) and used to develop the CPG, which was later evaluated by content experts using the AGREE II tool for validity. In this section I describe the outcomes of the CPG development and the evaluations from the content experts as well as present the implications of the project and my recommendations. The section also includes a discussion of the project's strengths and limitations.

**Findings and Implications**

Through conducting the literature review, I retrieved nine relevant articles that were used to develop the new CPG. The articles included systematic and integrative reviews, professional recommendations and guidelines from expert panels, crosssectional studies, and a cohort study. The newly developed CPG was evaluated by four content experts using the AGREE II tool, and they indicated that the CPG is well developed. The scores for the individual domains were as follows: 100% for Domain 1 (i.e., scope and purpose), 100% for Domain 2 (i.e., stakeholder involvement), 100% for Domain 3 (i.e., rigor of development), 100% for Domain 4 (i.e., clarity of presentation), 100% for Domain 5 (i.e., applicability), and 100% for Domain 6 (i.e., editorial independence). Table 1 provides a detailed breakdown of the feedback received from these reviewers using the AGREE II tool (see Brouwers et al., 2010a).

**Table 1**

*Summary Table of AGREE II Scores for the Clinical Practice Guideline (Domains 1-6)*

| Item | Expert 1 | Expert 2 | Expert 3 | Expert 4 | M |
|------|----------|----------|----------|----------|---|
| **Domain 1: Scope and purpose** | | | | | |
| 1. The overall objective(s) of the guideline is (are) specifically described. | 7 | 7 | 7 | 7 | 7 |
| 2. The health question(s) covered by the guideline is (are) specifically described. | 7 | 7 | 7 | 7 | 7 |
| 3. The population (patients, public, etc.) to whom the guideline is meant to apply is specifically described. | 7 | 7 | 7 | 7 | 7 |
| **Domain 2: Stakeholder involvement** | 7 | 7 | 7 | 7 | 7 |
| 4. The guideline development group includes individuals from all the relevant professional groups. | | | | | |
| 5. The views and preferences of the target population (patients, public, etc.) have been sought. | 7 | 7 | 7 | 7 | 7 |
| 6. The target users of the guideline are clearly defined. | 7 | 7 | 7 | 7 | 7 |
| **Domain 3: Rigor of development** | | | | | |
| 7. Systematic methods were used to search for evidence. | 7 | 7 | 7 | 7 | 7 |
| 8. The criteria for selecting the evidence are clearly described. | 7 | 7 | 7 | 7 | 7 |
| 9. The strengths and limitations of the body of evidence are clearly described. | 7 | 7 | 7 | 7 | 7 |
| 10. The methods for formulating the recommendations are clearly described. | 7 | 7 | 7 | 7 | 7 |
| 11. The health benefits, side effects, and risks have been considered in formulating the recommendations. | 7 | 7 | 7 | 7 | 7 |
| 12. There is an explicit link between the recommendations and the supporting evidence. | 7 | 7 | 7 | 7 | 7 |
| 13. The guideline has been externally reviewed by experts prior to its publication. | 7 | 7 | 7 | 7 | 7 |
| 14. A procedure for updating the guideline is provided. | 7 | 7 | 7 | 7 | 7 |
| **Domain 4: Clarity of presentation** | | | | | |

| Item | Expert 1 | Expert 2 | Expert 3 | Expert 4 | M |
|---|---|---|---|---|---|
| 15. The recommendations are specific and unambiguous. | 7 | 7 | 7 | 7 | 7 |
| 16. The different options for management of the condition or health issue are clearly presented. | 7 | 7 | 7 | 7 | 7 |
| 17. Key recommendations are easily identifiable. | 7 | 7 | 7 | 7 | 7 |
| Domain 5: Applicability | | | | | |
| 18. The guideline describes facilitators and barriers to its application. | 7 | 7 | 7 | 7 | 7 |
| 19. The guideline provides advice and/or tools on how the recommendations can be put into practice. | 7 | 7 | 7 | 7 | 7 |
| 20. The potential resource implications of applying the recommendations have been considered. | 7 | 7 | 7 | 7 | 7 |
| 21. The guideline presents monitoring and/ or auditing criteria. | 7 | 7 | 7 | 7 | 7 |
| Domain 6: Editorial independence | | | | | |
| 22. The views of the funding body have not influenced the content of the guideline. | 7 | 7 | 7 | 7 | 7 |
| 23. Competing interests of guideline development group members have been recorded and addressed. | 7 | 7 | 7 | 7 | 7 |
| Overall Assessment | | | | | |
| Rate the overall quality of the guideline. | 7 | 7 | 7 | 7 | 7 |
| I would recommend the use of the guideline. | Yes | Yes | Yes | Yes | 100% |

The individual scores for all the domains were 100%, indicating high quality (see

Brouwers et al., 2010a). Therefore, no revisions were needed on the newly developed CPG.

In the overall assessment section of the newly developed CPG, the content experts

evaluated the overall quality of the guideline and whether they could recommend its use.

The four content experts highlighted the fact that the newly developed CPG had the highest

possible rating for quality (i.e., 7), and all four of themes recommended the newly developed CPG for use.

The newly developed CPG highlighted a key action statement that health care providers should implement universal pediatric dyslipidemia screening for children aged 9 to 11 years old (see Buterbaugh et al., 2021; Elkins et al., 2019; Herrington et al., 2019; Schefelker & Paterson, 2021). Among the children at the highest risk of developing pediatric dyslipidemia are children with overweight/obese BMI, hypertension, parental dyslipidemia, and who use tobacco (Herrington et al., 2019). The main laboratory outcomes for pediatric dyslipidemia screening were levels of LDL-C, triglycerides, TC), non-HDL-C, HDL-C, and apolipoprotein B and A-1(Gujral & Gupta, 2023). A slight deviation from the acceptable range supports borderline pediatric dyslipidemia, while a significant deviation supports high levels of pediatric dyslipidemia.

Implementing the newly developed CPG may result in additional laboratory costs to cover the screening test procedures and additional workload for facility staff; however, implementing the newly developed CPG may contribute to identifying and diagnosing children aged 9 to 11 with dyslipidemia who would otherwise go unidentified (see Eichberger et al., 2022). Early diagnosis and treatment can prevent or delay the onset of cardiovascular disease and improve the quality and length of life of children at risk (Koskinen et al.,2023). Furthermore, sustained exposure to high levels of atherogenic lipoproteins significantly increases the risk of atherosclerosis beginning at a young age and contributing to untimely morbidities in later adulthood (Wilson, 2022). Therefore, the

newly developed CPG highlighted that timely and early screening and intervention for pediatric dyslipidemia are important.

Some crucial implementation considerations were brought to light in the newly developed CPG, including the controversies in the literature concerning universal pediatric dyslipidemia screening. The U.S. Preventive Services Task Force reported that there was insufficient evidence for or against universal pediatric dyslipidemia screening (Guirguis-Blake et al., 2023). However, several professional organizations have voiced strong support for pediatric dyslipidemia screening for children aged 9 to 11, including the AAP, National Lipid Association, American College of Cardiology/American Heart Association, Pediatric Endocrine Society, and American Association of Clinical Endocrinologists (Buterbaugh et al., 2021). Wilson (2022) also addressed the controversy, stating that exposure to atherogenic lipoproteins significantly increases the risk of atherosclerosis and obesity starting from a young age, supporting the need for pediatric dyslipidemia screening. The controversy over pediatric dyslipidemia screening reflects the uncertainty and complexity of the evidence and preferences of the stakeholders involved, which often stifles the development of uniform recommendations for pediatric dyslipidemia screening (Buterbaugh et al., 2021; Schefelker & Paterson, 2021; Wilson, 2022). There is a need for more high-quality research to address the gaps in knowledge and inform the best practices for screening, diagnosis, and treatment of dyslipidemia in children and adolescents. However, health care providers and parents should engage in shared decision making that considers the potential benefits and harms

of screening, the individual and family risk factors, and the patient's values and preferences.

**Implications of the Findings**

The newly developed CPG could have positive implications for children, communities, institutions, and systems. The implications for children include preventing the development of dyslipidemia comorbidities and complications that are associated with undetected and poorly managed dyslipidemia. For instance, untreated pediatric dyslipidemia usually persists into adulthood, which increases the risk of cardiovascular and other health complications (Constantin et al., 2023). Therefore, early screening interventions should reduce the risk of undetected dyslipidemia and associated complications, leading to better health outcomes. Using the newly developed CPG can also help identify children with dyslipidemia, leading to referral to appropriate health care levels and implementing health promotion interventions, such as lifestyle modifications to decrease lipid levels, thereby leading to cardiovascular risk.

The newly developed CPG will improve the pediatric population's health outcomes by promoting improved health outcomes relating to dyslipidemia. For instance, screening for dyslipidemia in the pediatric population could safeguard the cardiovascular health outcomes of children and reduce the burden of atherosclerosis and cardiovascular disease in adulthood, which further contributes to the improved health and well-being of future generations (Schefelker & Peterson, 2022). The intervention could also save communities from productivity losses stemming from disease and disability due to

dyslipidemia, thereby safeguarding a generation of young adults who could fill career gaps left by the retiring class of older adults across various fields and layers of society.

Institutions providing health care to the pediatric population could benefit from this CPG through reduced health care spending on managing dyslipidemia complications and comorbidities. Furthermore, there may also be reduced admissions and emergency visits associated with patients with dyslipidemia, which may save available health care resources. The health care system will benefit from improved health care delivery as more health care providers working with children adopt the pediatric dyslipidemia CPG, leading to early screening and improved awareness of the need to screen for pediatric dyslipidemia. There could also be long-term financial savings because more children with dyslipidemia would be identified early and provided with health care interventions, thereby reducing the burden of chronic disease outcomes associated with untreated dyslipidemia.

**Social Change**

The implementation of the newly developed CPG could result in positive social change in multiple ways. Notably, there is a growing prevalence of pediatric dyslipidemia within the pediatric population in the United States (CDC, 2023; Constantin et al., 2023). Therefore, preventive and health promotion interventions are needed to facilitate health within the pediatric population. I anticipate that implementing the newly developed CPG on pediatric dyslipidemia screening will contribute to reducing the burden of disease in the pediatric population by promoting the timely screening and treatment of children identified to have pediatric dyslipidemia. Health care resources allocated to pediatric dyslipidemia management could be saved as more children are screened and managed early, thereby

reducing the costly implications associated with untreated and prolonged dyslipidemia, including emergency visits. The newly developed CPG targets the pediatric population, which will also contribute to safeguarding the health of the next generation of adults.

## Recommendations

Universal screening for pediatric dyslipidemia could be impactful in the assessment of and early intervention for children aged 9 to 11 with dyslipidemia. Therefore, I recommend incorporating the newly developed CPG as part of the routine pediatric assessments and WCEs to facilitate pediatric dyslipidemia screening. The newly developed CPG highlights the need for universal screening for pediatric dyslipidemia; therefore, health care providers working with children should ensure completing the pediatric dyslipidemia screening for all children aged 9 to 11. I also recommend educating health care providers on the newly developed CPG to facilitate their knowledge of the CPG and the need to implement pediatric dyslipidemia screening. Pediatric health care providers and policymakers should also support the need to implement pediatric dyslipidemia screening, which could help raise awareness of the problem and promote targeted interventions to improve pediatric dyslipidemia screening.

The screening intervention involves various laboratory tests; therefore, I recommend that pediatric dyslipidemia screening be included as part of insurance reimbursements to facilities providing the above services. The support of policymakers and key stakeholders may also contribute to funding pediatric dyslipidemia awareness forums and discussions within professional conferences, which will increase awareness of the need to screen. Therefore, I also recommend that local authorities and key stakeholders within

the project site support the above measures to promote increased awareness of pediatric dyslipidemia screening using the newly developed CPG.

**Strengths and Limitations of the Project**

I developed the CPG project in several steps, giving it significant reliability and validity. I appraised and graded the peer-reviewed, scholarly articles comprising systematic and integrative reviews, professional recommendations and guidelines from expert panels, cross-sectional studies, and a cohort study that provided key evidence guiding the development of the CPG. The newly developed CPG was also evaluated by content experts using the AGREE II tool, and the domain scores revealed the high quality of the CPG and that no revisions were needed. The content expert panel also recommended the CPG for use, highlighting that it could be an impactful tool for guiding pediatric dyslipidemia screening within health care settings. Using the newly developed CPG could contribute to diversity and inclusivity because the CPG supports universal screening of all children aged 9 to 11, promoting health across all children regardless of race, social status, ethnicity, and gender.

The limitations of the newly developed CPG involve differences in published literature and professional statements on pediatric dyslipidemia screening. The U.S. Preventive Services Task Force alone held that insufficient evidence exists for or against screening for pediatric dyslipidemia in children (Guirguis-Blake et al., 2023). However, there is a preponderance of evidence from several professional organizations, such as the NHLBI, AAP, and American Association of Clinical Endocrinologists, that support the need for screening (Buterbaugh et al., 2021). While these viewpoints may reflect

differences in stakeholder preferences and complexity with evidence, the foreseeable benefits of screening, including early interventions for affected children leading to improved health outcomes, could be achieved by implementing the newly developed CPG. It is also important to consider that children are vulnerable, and implementing double-blind and placebo-randomized control trials to generate high-quality evidence on screening efficacy among the pediatric population may be considered unethical and improbable (Wilson et al., 2022).

Future research needs to address the ongoing challenges caused by the controversy concerning evidence on pediatric dyslipidemia screening, which has pitted several professional bodies in the United States against each other. The lack of a common position stifles the development of uniform recommendations for pediatric dyslipidemia screening (Buterbaugh et al., 2021). Therefore, more research should explore the benefits of pediatric dyslipidemia screening, such as financial impacts on the health care system, to generate more evidence to support the intervention. The research could also clear up the controversy so a common position could be agreed on by providing more evidence of the risks and benefits of universal pediatric dyslipidemia screening.

In the next section, I present the dissemination plan of the project's findings, a self-analysis as the DNP student, and a summary of the project.

Section 5: Dissemination Plan

Pediatric dyslipidemia is a significant health challenge that results in several health outcomes, including an increase in the risk for cardiovascular diseases, increases in healthcare costs, and a reduction in the quality of life (Constantin et al., 2023). Early

screening and detection among children could be essential in determining individuals at risk and taking effective measures; however, the lack of a standardized CPG to guide pediatric screening for dyslipidemia makes it challenging to manage the problem (Berger et al., 2021). In this DNP project, I developed a CPG for pediatric screening for dyslipidemia. Aptly disseminating the findings will be crucial to reaching all pertinent stakeholders and empowering practitioners caring for children with a standardized methodology for early dyslipidemia detection.

The first line for dissemination will be the facility where I conducted the project. I will begin by having a conference with the facility's management to impart the need for pediatric screening for dyslipidemia. Project site data show that only 23% of children who visit the facility are screened, so obtaining managerial and executive support will be crucial to improving this percentage. I will share the efficacy of the CPG with the management team and seek to garner the necessary support for policy change to enhance pediatric screening using the developed CPG. After garnering support from the facility's management, I will begin educating the providers at the site on the importance of dyslipidemia screening among children. The providers at the facility have little or no evidence-based knowledge of pediatric screening for dyslipidemia, making it challenging for them to effectively detect the problem early. I will show them how to follow the CPG to achieve optimal early screening results, ensuring timely interventions are taken.

I also intend to broaden the dissemination plan to encompass institutions and caregivers serving children in my community. Through attending seminars and conferences within the community, I will advocate the implementation of the CPG within my

community. The leaders in these institutions will also be presented with the grim statistics regarding low screening rates for dyslipidemia among children and the negative consequences that result if the condition is not detected and treated early. Additionally, I will educate practitioners on the need for early screening and how to use the CPG to achieve the desired goal. I also plan to expand the dissemination of my findings to the state and national levels to ensure all caregivers and facilities in the country can utilize the CPG. Platforms offered by professional bodies, such as the American Nurses Association and AAP, will be used to widen my reach. These bodies organize conferences where research findings can be shared with other professionals, and I will take part in advancing the adoption of the CPG. Using this wide reach, I intend to create interest in the CPG and consequently improve its adoption.

Besides conferences, I will publish advocacy statements on these platforms to ensure that more pediatric and nursing professionals access the CPG. In addition to practitioners and health facilities, scholars are another audience I hope to reach with dissemination of the CPG. The American Nurses Association, AAP, and nursing learning institutions will be instrumental in reaching students and researchers. Including students in the dissemination plan will ensure that they gain the requisite skills and knowledge to conduct pediatric screening for dyslipidemia and use the CPG. Researchers will also be critical because they will use this project to advance future studies, improve the CPG, and develop a more comprehensive and effective tool. Publishing my work in health care journals will facilitate reaching scholars, health care providers working with children, and researchers in the pediatric field and of dyslipidemia. I intend to have the project

published in the form of peer-reviewed articles in nursing and pediatric journals to allow access to the CPG by all stakeholders. Furthermore, I anticipate the peer reviewing, publication, and other dissemination efforts to elicit discussions in the nursing and pediatric fraternity. These discussions will help to shed more light on the efficacy of the CPG, how to use it appropriately, and clear up any ambiguity. With this dissemination plan, I hope to increase the screening rates for dyslipidemia among children using the CPG, ultimately resulting in improved health outcomes.

**Analysis of Self**

The completion of this project has been instrumental in my development as a practitioner, scholar, and project manager. Nursing practitioners should provide the best care to improve patient outcomes and quality of life; however, nursing practitioners must also identify gaps in practice and undertake research projects to fill these gaps. I identified the lack of standardized CPG in dyslipidemia screening among children, the low screening rates, the lack of sufficient knowledge, and consequent adverse outcomes; consequently, I conducted this project to develop a standardized CPG to address this issue. Over the course of this project, I have become more self-aware as a practitioner, scholar, and project manager.

**Practitioner**

As a nurse practitioner, I know my duty is to provide the best possible care to my patients, and I believe that my sense of duty aligns with the nursing profession's goal. However, I identified that the profession was not sufficiently providing quality care to children with dyslipidemia. Most practitioners do not have the knowledge or skills for early

screening, implying that the condition is mostly undetected and untreated (Elkins et al., 2019). Dyslipidemia predisposes children to cardiovascular diseases, morbidity, and mortality, and the condition further imposes severe financial burdens on individuals and households, ultimately lowering quality of life (Constantin et al., 2023; Ferrara et al., 2021). As a practitioner, I realized this condition conflicted with my goal of providing quality care, so I identified the lack of a standardized CPG as the root cause of the problem and sought to bridge the gap in practice. Most health care facilities and providers lack a standardized CPG, making screening pediatric dyslipidemia and providing relevant care challenging (Berger et al., 2021)

Working on the project unearthed my deep commitment to improving the health of my patients and alleviating their suffering. I was highly motivated to devise a solution that would enable effective screening and, thus, intervention for dyslipidemia among children. I worked with other nursing stakeholders who acknowledged the problem and the need for a standardized CPG to improve pediatric care. I also reaffirmed my longterm commitment to providing quality care as a practitioner. Adopting the CPG will improve the screening for dyslipidemia among children and enable me and other nursing practitioners to take the requisite steps to improve health outcomes.

**Scholar**

A DNP scholar plays a pivotal role in the advancement of evidence-based knowledge. I identified the lack of a standardized CPG for dyslipidemia screening among children as a clinical problem and sought to use my knowledge and experience as a DNP scholar to fill the gap in practice. I had to properly assess the problem to establish that it

was clinically significant and needed an intervention. A strong purpose statement needed to be formulated to show what I sought to achieve and the necessary research methodology needed to be implemented. A review of the literature showed that there was no standardized CPG, and the screening rates for dyslipidemia among children were low, resulting in dire health repercussions. I had to properly research the current problem and literature to ensure the validity and accuracy of my project. I realized the importance of utilizing tools, such as AGREE II, to ensure the project is viable and applicable. I also appreciated the need for collaboration because my committee of experts and practitioners at the project site facility were pivotal in developing the CPG.

The process of developing the CPG as my DNP project was enlightening. I realized the apparent lack of knowledge and commitment to pediatric screening for dyslipidemia. Understaffing and time constraints were significant barriers to effective screening; therefore, I will continue to play my role as a scholar and establish how these factors will influence the implementation of the CPG. Adoption of the CPG is expected to improve the rates of dyslipidemia screening and, thus, health outcomes, but it is essential to study and understand factors that will influence the CPG's efficiency. I will continue to study the CPG's implementation and seek evidence-based means to optimize its functionality.

**Project Manager**

Completing this project required me to harness my skills as a project manager and provide insights into successful project management. I appreciated the significance of proper planning and organization and had to plan and organize my work accordingly, assign

resources, and create a project schedule. Timelines had to be set and good time management had to be practiced to meet all my deadlines. I established goals that needed to be achieved within a given period to ensure the work was completed on time. Likewise, I had to practice good leadership skills by sharing the goals with my team members, supervising their work, and motivating the team to execute the tasks as required. The work was carefully and appropriately shared among the people I engaged throughout the project to ensure they collaborated efficiently. This was, at times, challenging due to various factors, such as time constraints, but I had to be flexible enough to accommodate everyone. I also made sure to follow up on every task assigned to ensure it was done to satisfaction. As a project manager, I realized I needed to position and promote my product to enhance adoption rates. My dissemination plan seeks to address this by ensuring nursing practitioners and facilities are aware of the CPG and its efficacy in pediatric screening for dyslipidemia. Furthermore, I will have to keep tracking the new CPG, its rate of use, and the resultant outcome. This follow-up will enable me to revise the project and make the necessary adjustments to the CPG.

**Challenges, Solutions, and Insights Gained**

Time constraints were a significant challenge in this project. I experienced delays in getting data from the health facility where I conducted the research and getting the help of the practitioners working at the project site. The staff were busy and sometimes unavailable to assist me in the project, significantly slowing my progress. I offered to be flexible and available at their convenience, sometimes on short notice, to ensure I got the cooperation and help I needed. My proposed schedule for completing the project needed to

be adjusted to accommodate for the lost time. I also experienced challenges with the panel of experts because they differed on the mode of application for the CPG and had differing opinions on whether to screen all children or to focus on overweight and obese children. We spent much time considering factors, such as lifestyle changes and the increase in cardiovascular diseases among children, concluding that all children between 9 and 11 years old should be screened to ensure early detection and treatment to avert the inevitable comorbidity of cardiovascular diseases.

Another challenge regarding implementation of the CPG could be the children's treatment time and health requirements, with screening taking up more time for hospital visits and some patients not requiring the services. This could be solved by highlighting the need for screening and the increase in the prevalence of dyslipidemia among children. The time taken for screening, even for those not seeking the service, was deemed incomparable to the risks.

Lack of skills and knowledge was another significant challenge identified. Most health care providers neither appreciate the need for pediatric screening for dyslipidemia nor possess the skills required for screening (Elkins et al., 2019). Advocacy and education were established as plausible means to empower nurses and pediatric caregivers to effectively use the CPG for optimal results.

**Summary**

Dyslipidemia is a significant health challenge due to the risk of cardiovascular diseases. Recently, the problem has become increasingly prevalent among children due to poor diet and sedentary lifestyles (Buterbaugh (2021). Determining the lipid profile of

children is crucial to establishing children at risk and taking the necessary intervention;
however, the screening rates for dyslipidemia among children remain low, predisposing
individuals to the associated health risks (Elkins et al., 2019; Koskinen et al.,2023). The
low screening rates may emanate from a lack of a standardized CPG to guide the process
and a lack of knowledge and skills among caregivers. Hence, I conducted this project to
fill the gap in practice by developing a standardized CPG to streamline pediatric screening
for dyslipidemia. The validity of the CPG was ensured by having a panel of experts evaluate
it using the AGREE II tool. I will disseminate the CPG through presentations and seminars
to stakeholders on the need for screening and how to use the

CPG. The CPG will be crucial in enhancing the screening of children's lipid profiles for
early detection and treatment of dyslipidemia among children, which will reduce the risk
of developing cardiovascular diseases. Use of the CPG will also reduce high health care
costs, disability, and mortality and increase the quality of life. The CPG will become a
vital tool for improving health outcomes with the expected increase in dyslipidemia
screening among children.

## References

American Academy of Family Physicians. (2023). *Clinical practice guideline manual.*
https://www.aafp.org/family-physician/patient-care/clinicalrecommendations/cpg-manual.html

Arvanitis, M., & Lowenstein, C. J. (2023). Dyslipidemia. *Annals of Internal Medicine*, *176*(6), ITC81–ITC96. https://doi.org/10.7326/AITC202306200

Bagheri, S., Zarshenas, L., Rakhshan, M., Sharif, F., Sarani, E. M., Shirazi, Z. H., & Sitzman, K. (2023). Impact of Watson's human caring-based health promotion program on caregivers of individuals with schizophrenia. *BMC Health Services Research*, *23*(711), 1-12. https://doi.org/10.1186/s12913-023-09725-9

Bargeri, S., Iannicelli, V., Castellini, G., Cinquini, M., & Gianola, S. (2021). AGREE II appraisals of clinical practice guidelines in rehabilitation showed poor reporting and moderate variability in quality ratings when users apply different cuff-offs: A methodological study. *Journal of Clinical Epidemiology*, *139*, 222–231. https://doi.org/10.1016/j.jclinepi.2021.08.021

Barry, M. J., Nicholson, W. K., Silverstein, M., Chelmow, D., Coker, T. R., Davis, E. M., Donahue, K. E., Jaén, C. R., Li, L., Ogedegbe, G., Rao, G., Ruiz, J. M., Stevermer, J., Tsevat, J., & Underwood, S. M., & U.S. Preventive Services Task Force. (2023). Screening for lipid disorders in children and adolescents: US Preventive Services Task Force recommendation statement. *Journal of the American Medical Association*, *330*(3), 253-260. https://jamanetwork.com/journals/jama/fullarticle/2807280

Beauchemin, M., Cohn, E., & Shelton, R. C. (2019). Implementation of clinical practice guidelines in the healthcare setting: A concept analysis. *Advances in Nursing Science*, *42*(4), 307. https://doi.org/10.1097/ANS.0000000000000263

Berberich, A. J., & Hegele, R. A. (2022). A modern approach to dyslipidemia. *Endocrine Reviews*, *43*(4), 611-653. https://doi.org/10.1210/endrev/bnab037

Berger, J. H., Chen, F., Faerber, J. A., O'Byrne, M. L., & Brothers, J. A. (2021). Adherence with lipid screening guidelines in standard-and high-risk children and adolescents. *American Heart Journal*, *232*, 39-46. https://doi.org/10.1016/j.ahj.2020.10.058

Borén, J., Chapman, M. J., Krauss, R. M., Packard, C. J., Bentzon, J. F., Binder, C. J., Daemen, M. J., Demer, L. L., Hegele, R. A., Nicholls, S. J., Nordestgaard, B. G., Watts, G. F., Bruckert, E., Fazio, S., Ference, B. A., Graham, I., Horton, J. D., Landmesser, U., Laufs, U.,… Ginsberg, H. N. (2020). Low-density lipoproteins cause atherosclerotic cardiovascular disease: Pathophysiological, genetic, and therapeutic insights: A consensus statement from the European Atherosclerosis Society Consensus Panel. *European Heart Journal*, *41*(24), 2313–2330. https://doi.org/10.1093/eurheartj/ehz962

Brouwers, M. C., Kerkvliet, K., Spithoff, K., & AGREE Next Steps Consortium (2016). The AGREE reporting checklist: A tool to improve reporting of clinical practice guidelines. *British Medical Journal*, *352*, i1152. https://doi.org/10.1136/bmj.i1152

Brouwers, M. C., Kho, M. E., Browman, G. P., Burgers, J. S., Cluzeau, F., Feder, G., Fervers, B., Graham, I. D., Hanna, S. E., & Makarski, J. (2010a). Development of the AGREE II, Part 1: Performance, usefulness, and areas for improvement. *Canadian Medical Association Journal*, *182*(10), 1045-1052. https://doi.org/10.1503/cmaj.091714

Brouwers, M. C., Kho, M. E., Browman, G. P., Burgers, J. S., Cluzeau, F., Feder, G.,

Graham, I. D., Hanna, S. E., & Makarski, J. (2010b). Development of the AGREE II, Part 2: Assessment of validity of items and tools to support application. *Canadian Medical Association Journal*, *182*(10), E472-E478. https://doi.org/10.1503/cmaj.091716

Budreviciute, A., Damiati, S., Sabir, D. K., Onder, K., Schuller-Goetzburg, P., Plakys, G., & Kodzius, R. (2020). Management and prevention strategies for noncommunicable diseases (NCDs) and their risk factors. *Frontiers in Public Health*, *8*, 788. https://doi.org/10.3389/fpubh.2020.574111

Buterbaugh, J. S. (2021). Pediatric dyslipidemia and screening recommendations. *The Journal for Nurse Practitioners*, *17*(10), 1178-1182. https://doi.org/10.1016/j.nurpra.2021.08.009

Centers for Disease Control and Prevention. (2015). *Abnormal cholesterol among children and adolescents in the United States, 2011–2014.* https://www.cdc.gov/nchs/products/databriefs/db228.htm

Centers for Disease Control and Prevention. (2023). *Defining child BMI categories.* https://www.cdc.gov/obesity/basics/childhood-defining.html

Centers for Disease Control and Prevention. (2023). *High cholesterol facts.* https://www.cdc.gov/cholesterol/facts.htm

Chacra, A. P. M. (2019). The importance of identifying risk factors in childhood and adolescence. *Arquivos Brasileiros de Cardiologia*, *112*, 152-153. https://doi.org/10.5935/abc.20190016

Connor, L., Dean, J., McNett, M., Tydings, D. M., Shrout, A., Gorsuch, P. F., Hole, A., Moore, L., Brown, R., Melnyk, B. M., & Gallagher-Ford, L. (2023). Evidencebased practice improves patient outcomes and healthcare system return on investment: Findings from a scoping review. *Worldviews on Evidence-Based Nursing*, *20*(1), 6-15. https://doi.org/10.1111/wvn.12621

Constantin, A. T., Delia, C., Tudor, L. M., Rosca, I., Irimie, A. D., Năstase, L., & Gherghina, I. (2023). Dyslipidemia in pediatric patients: A cross-sectional study. *Medicina*, *59*(8), 1434. https://doi.org/10.3390/medicina59081434

Constantinides, S. M. (2019). Compassionate knowing: Building a concept grounded in Watson's theory of caring science. *Nursing Science Quarterly*, *32*(3), 219-225. https://doi.org/10.1177/0894318419845386

Craig, M., Yarrarapu, S. N. S., & Dimri, M. (2023). *Biochemistry, cholesterol.* StatPearls Publishing.

Dang, D., Dearholt, S., Bissett, K., Ascenzi, J., & Whalen, M. (2022). *Johns Hopkins evidence-based practice for nurses and healthcare professionals: Model and* guidelines (4th ed.). Sigma Theta Tau International https://www.hopkinsmedicine.org/evidence-based-practice/ijhn_2017_ebp.html

Daniels, S. R. (2020). Guidelines for screening, prevention, diagnosis and treatment of dyslipidemia in children and adolescents. In K. R. Feingold (Ed.),, *Endotext*.

MDText.com, Inc.  de Ferranti, S. D., & Newburger, J. W. (2020). *Dyslipidemia in children and adolescents: Definition, screening, and diagnosis.*

https://www.uptodate.com/contents/dyslipidemia-in-children-andadolescents-definition-screening-and-diagnosis

De Ferranti, S. D., Steinberger, J., Ameduri, R., Baker, A., Gooding, H., Kelly, A. S., & Zaidi, A. N. (2019). Cardiovascular risk reduction in high-risk pediatric patients: A scientific statement from the American heart association. *Circulation*, *139*(13), e603-e634. https://doi.org/10.1161/CIR.0000000000000618

Duan, Y., Gong, K., Xu, S., Zhang, F., Meng, X., & Han, J. (2022). Regulation of cholesterol homeostasis in health and diseases: From mechanisms to targeted therapeutics. *Signal Transduction and Targeted Therapy*, *7*(1), 265. https://doi.org/10.1038/s41392-022-01125-5

Dybiec, J., Baran, W., Dąbek, B., Fularski, P., Młynarska, E., Radzioch, E., & Franczyk, B. (2023). Advances in treatment of dyslipidemia. *International Journal of Molecular Sciences*, *24*(17), 13288. https://www.mdpi.com/1422-0067/24/17/13288

Eichberger, L., Kern, L., Wang, H., Crow, J., & Rhee, K. E. (2022). Universal lipid screening among 9- to 11-year-old children: Screening results and physician management. *Clinical Pediatrics*, 61(3), 280–288.

https://doi.org/10.1177/00099228221075409

Enani, S., Bahijri, S., Malibary, M., Jambi, H., Eldakhakhny, B., Al-Ahmadi, J., Al Raddadi, R., Ajabnoor, G., Boraie, A., & Tuomilehto, J. (2020). The association

between dyslipidemia, dietary habits and other lifestyle indicators among nondiabetic attendees of primary health care centers in Jeddah, Saudi Arabia. *Nutrients*, *12*(8), 2441. https://doi.org/10.3390/nu12082441

Ferrara, P., Di Laura, D., Cortesi, P. A., & Mantovani, L. G. (2021). The economic impact of hypercholesterolemia and mixed dyslipidemia: A systematic review of cost of illness studies. *Plos One*, 16(7), e0254631. https://doi.org/10.1371/journal.pone.0254631

Fineout-Overholt, E., Melnyk, B. M., Stillwell, S. B., & Williamson, K. M. (2010). Evidence-based practice step by step: Critical appraisal of the evidence: Part I. *American Journal of Nursing*, *110*(7), 47-52. https://doi.org/10.1097/01.naj.0000383935.22721.9c

Giussani, M., Orlando, A., Tassistro, E., Lieti, G., Patti, I., Antolini, L., & Genovesi, S. (2022). Impact of lifestyle modifications on alterations in lipid and glycemic profiles and uric acid values in a pediatric population. *Nutrients*, *14*(5), 1034. https://doi.org/10.3390/nu14051034

Guirguis-Blake, J. M., Evans, C. V., Coppola, E. L., Redmond, N., & Perdue, L. A. (2023). Screening for lipid disorders in children and adolescents: Updated evidence report and systematic review for the US Preventive Services Task Force. *JAMA*, *330*(3), 261–274. https://doi.org/10.1001/jama.2023.8867

Guirguis-Blake, J. M., Evans, C. V., Coppola, E. L., Redmond, N., & Perdue, L. A. (2023). Screening for lipid disorders in children and adolescents: Updated evidence report and systematic review for the US Preventive Services Task

Force. *Jama*, *330*(3), 261-274. https://doi.org/10.1001/jama.2023.8867

Gujral, J., & Gupta, J. (2023). *Pediatric dyslipidemia.* StatPearls Publishing.

Hamilton, L., Brautbar, A., & Wilson, D. P. (2021). Principles of genetic testing for dyslipidemia in children. In K. R. Feingold (Eds.) et. al., *Endotext*. MDText.com, Inc. https://pubmed.ncbi.nlm.nih.gov/33528965/

Hoffmann-Eßer, W., Siering, U., Neugebauer, E. A., Brockhaus, A. C., Lampert, U., & Eikermann, M. (2017). Guideline appraisal with AGREE II: Systematic review of the current evidence on how users handle the 2 overall assessments. *PloS One*, *12*(3), e0174831. https://doi.org/10.1371/journal.pone.0174831

Hoffmann-Eßer, W., Siering, U., Neugebauer, E. A., Brockhaus, A. C., McGauran, N., & Eikermann, M. (2018). Guideline appraisal with AGREE II: Online survey of the potential influence of AGREE II items on overall assessment of guideline quality and recommendation for use. *BMC Health Services Research*, *18*(1), 1-9. https://doi.org/10.1186/s12913-018-2954-8

Huff, T., Boyd, B., & Jialal, I. (2023). *Physiology, cholesterol.* StatPearls Publishing.

Kertész, H., Beyer, T., London, K., Saleh, H., Chung, D., Rausch, I., Cal-Gonzalez, J., Kitsos, T., & Kench, P. L. (2021). Reducing radiation exposure to paediatric patients undergoing [18F]FDG-PET/CT imaging. *Molecular Imaging and Biology*, *23*(5), 775–786. https://doi.org/10.1007/s11307-021-01601-4

Khoury, M., Rodday, A. M., Mackie, A. S., Gill, P., McLaughlin, T., Harris, K. C., Wong, P., McCrindle, B. W., Birken, C. S., & De Ferranti, S. D. (2020). Pediatric lipid screening and treatment in Canada: Practices, attitudes, and barriers.

*Canadian Journal of Cardiology*, *36*(9), 1545-1549.

https://doi.org/10.1016/j.cjca.2020.05.035

Koskinen, J. S., Kytö, V., Juonala, M., Viikari, J. S., Nevalainen, J., Kähönen, M., & Raitakari, O. T. (2023). Childhood dyslipidemia and carotid atherosclerotic plaque in adulthood: The cardiovascular risk in young Finns study. *Journal of the American Heart Association*, *12*(7), e027586. https://doi.org/10.1161/JAHA.122.027586

Lim, J. S., Kim, E. Y., Kim, J. H., Yoo, J. H., Yi, K. H., Chae, H. W., & Hwang, I. T. (2020). 2017 Clinical practice guidelines for dyslipidemia of Korean children and adolescents. *Annals of Pediatric Endocrinology & Metabolism*, *25*(4), 199. https://doi.org/10.3345/cep.2020.01340

Lischka, J., Arbeiter, K., de Gier, C., Willfort-Ehringer, A., Walleczek, N. K., Gellai, R., & Greber-Platzer, S. (2022). Vascular access for lipid apheresis: A challenge in young children with homozygous familial hypercholesterolemia. *BMC Pediatrics*, *22*(1), 1-8. https://doi.org/10.1186/s12887-022-03192-7

Maldonado, V., Weeks, B., Cho, M., Turpin, D., & Arevalo, A. (2022). Pediatric dyslipidemia. *Progress in Pediatric Cardiology*, *65*, 101518. https://doi.org/10.1016/j.ppedcard.2022.101518

Mascarenhas, P., Furtado, J. M., Almeida, S. M., Ferraz, M. E., Ferraz, F. P., & Oliveira, P. (2023). Pediatric overweight, fatness and risk for dyslipidemia are related to diet: A cross-sectional study in 9-year-old children. *Nutrients*, *15*(2), 329. https://doi.org/10.3390/nu15020329

Mc Allister, M., Florez, I. D., Stoker, S., & McCaul, M. (2023). Advancing guideline quality through country-wide and regional quality assessment of CPGs using AGREE: A scoping review. *BMC Medical Research Methodology*, *23*(1), 283. https://doi.org/10.1186/s12874-023-02101-5

McCaul, M., Young, T., & Clarke, M. (2021). Strengthening prehospital clinical practice guideline development in South Africa: Reflections from guideline experts. *African Journal of Emergency Medicine*, *11*(1), 132-139. https://doi.org/10.1016/j.afjem.2020.09.010

McGill, E., Er, V., Penney, T., Egan, M., White, M., Meier, P., Whitehead, M., Lock, K., Anderson de Cuevas, R., Smith, R., Savona, N., Rutter, H., Marks, D., de Vocht, F., Cummins, S., Popay, J., & Petticrew, M. (2021). Evaluation of public health interventions from a complex systems perspective: A research method review. *Social Science & Medicine*, *272*, 113697. https://doi.org/10.1016/j.socscimed.2021.113697

Mortensen, M. B., Dzaye, O., Bøtker, H. E., Jensen, J. M., Maeng, M., Bentzon, J. F., & Nørgaard, B. L. (2023). Low-density lipoprotein cholesterol is predominantly associated with atherosclerotic cardiovascular disease events in patients with evidence of coronary atherosclerosis: The Western Denmark Heart Registry. *Circulation*, *147*(14), 1053-1063. https://doi.org/10.1161/CIRCULATIONAHA.122.061010

Nantsupawat, N., Booncharoen, A., Wisetborisut, A., Jiraporncharoen, W.,

Pinyopornpanish, K., Chutarattanakul, L., & Angkurawaranon, C. (2019). Appropriate total cholesterol cut-offs for detection of abnormal LDL cholesterol and non-HDL cholesterol among low cardiovascular risk population. *Lipids in Health and Disease*, *18*(1), 1-8. https://doi.org/10.1186/s12944-019-0975-x

Nasim, M., Aldamry, M., Omair, A., & AlBuhairan, F. (2019). Identifying obesity/overweight status in children and adolescents; A cross-sectional medical record review of physicians' weight screening practice in outpatient clinics, Saudi Arabia. *PloS One*, *14*(4), e0215697. https://doi.org/10.1371/journal.pone.0215697

National Heart, Lung, and Blood Institute. (2019). *Home: National Heart, Lung, and Blood Institute (NHLBI)*. https://www.nhlbi.nih.gov/

Pena-Pereira, F., Wojnowski, W., & Tobiszewski, M. (2020). AGREE—Analytical GREEnness metric approach and software. *Analytical Chemistry*, *92*(14), 10076-10082. https://doi.org/10.1021/acs.analchem.0c01887

Rosenfeld, R. M., & Shiffman, R. N. (2009). Clinical practice guideline development manual: A quality-driven approach for translating evidence into action. *Otolaryngology--head and neck surgery*, *140*(6 Suppl 1), S1–S43. https://doi.org/10.1016/j.otohns.2009.04.015

Rosenthal, T., Touyz, R. M., & Oparil, S. (2022). Migrating populations and health: Risk factors for cardiovascular disease and metabolic syndrome. *Current Hypertension Reports*, *24*(9), 325-340.

Rychik, J., Atz, A. M., Celermajer, D. S., Deal, B. J., Gatzoulis, M. A., Gewillig, M. H., & American Heart Association Council on Cardiovascular Disease in the Young and

Council on Cardiovascular and Stroke Nursing. (2019). Evaluation and management of the child and adult with Fontan circulation: A scientific statement from the American Heart Association. *Circulation*, *140*(6), e234-e284. http://doi/full/10.1161/CIR.0000000000000696

Schefelker, J. M., & Peterson, A. L. (2022). Screening and management of dyslipidemia in children and adolescents. *Journal of Clinical Medicine*, *11*(21), 6479. https://doi.org/10.3390/jcm11216479

Sephien, A., Dayto, D. C., Reljic, T., Blonski, W., Nerella, N., Prida, X., & Kumar, A. (2023). A Systematic Critical Appraisal of Clinical Practice Guidelines in Heart Failure Using the AGREE II Tool. *The American Journal of Cardiology*, *202*, 192–198. https://doi.org/10.1016/j.amjcard.2023.06.052

Shah, A. S., & Wilson, D. P. (2023). Genetic disorders causing hypertriglyceridemia in children and adolescents. In K. R. Feingold (Eds.) et. al., *Endotext*. MDText.com, Inc. https://pubmed.ncbi.nlm.nih.gov/27809432/

Sleeth, C. M., Peterson, A. L., & Hokanson, J. (2020). Pediatric dyslipidemia screening by pediatricians and family medicine physicians: Current practices and future directions. *Pediatrics*, *146*(1_MeetingAbstract), 636-637. https://doi.org/10.1542/peds.146.1MA7.636

Smith, J. D., Fu, E., & Kobayashi, M. A. (2020). Prevention and management of childhood obesity and its psychological and health comorbidities. *Annual Review of Clinical Psychology,* 16, 351–378. https://doi.org/10.1146/annurev-clinpsy-100219-060201

Stancil, S. L., Nolte, W., Pearce, R. E., Staggs, V. S., & Leeder, J. S. (2022). The impact of age and genetics on naltrexone biotransformation. *Drug Metabolism and Disposition: The Biological Fate of Chemicals*, *50*(2), 168–173. https://doi.org/10.1124/dmd.121.000646

Stein, R., Ferrari, F., & Scolari, F. (2019). Genetics, dyslipidemia, and cardiovascular disease: New insights. *Current Cardiology Reports*, *21*(68), 1-12. https://doi.org/10.1007/s11886-019-1161-5

Stierman, B., Afful, J., Carroll, M. D., Chen, T. C., Davy, O., Fink, S., Cheryl, D., Qiuping, G., Craig, M., Jeffery, P., Yechiam, O., Renee, J., Storandt, M., & Akinbami, L. J. (2021). National health and nutrition examination survey 2017–March 2020 prepandemic data files development of files and prevalence estimates for selected health outcomes. https://doi.org/10.15620/cdc:106273

Stipelman, C., Young, P. C., Hemond, J., Brown, L. L., & Mihalopoulos, N. L. (2017). Dyslipidemia screening of 9- to 11-year-olds at well-child visits by Utah pediatricians. *Clinical Pediatrics*, *56*(14), 1286–1290. https://doi.org/10.1177/0009922816684601

Strickland, E. (2019). IBM Watson, heal thyself: How IBM overpromised and underdelivered on AI health care. *IEEE Spectrum*, *56*(4), 24-31. https://doi.org/ 10.1109/MSPEC.2019.8678513

Thongtang, N., Sukmawan, R., Llanes, E. J. B., & Lee, Z. V. (2022). Dyslipidemia management for primary prevention of cardiovascular events: Best in-clinic

practices. *Preventive Medicine Reports*, 27, 101819. https://doi.org/10.1016/j.pmedr.2022.101819

U.S. Preventive Services Taskforce (2016). Screening for lipid disorders in children and adolescents: Recommendation statement. *American Family Physician, 94*(12), 1004A-1004E. https://www.aafp.org/afp/2016/1215/od1.pdf.

Wei, H., & Watson, J. (2019). Healthcare interprofessional team members' perspectives on human caring: A directed content analysis study. *International Journal of Nursing Sciences*, *6*(1), 17–23. https://doi.org/10.1016/j.ijnss.2018.12.001

Wilson D. P. (2022). Improving cholesterol screening in children-is educating primary care providers enough? *The Journal of Pediatrics*, *249*, 92–96. https://doi.org/10.1016/j.jpeds.2022.06.006

Wilson, D. P., Williams, L., & Kavey, R. E. W. (2022). Hypertriglyceridemia in youth. *The Journal of Pediatrics*, *243*, 200-207. https://doi.org/10.1016/j.jpeds.2021.12.017

World Health Organization. (2023). *Raised cholesterol.* https://www.who.int/data/gho/indicator-metadata-registry/imr-details/3236

Yu, C. H., Lai, J. C. Y., & Lin, C. H. (2022). School-based universal screening for hypercholesterolemia in children. *Pediatrics & Neonatology*, *63*(4), 355-360. https://doi.org/10.1016/j.pedneo.2021.12.013

Zawacki, A. W., Enright, C., Harris, R. E., Dodge, A., & Peterson, A. L. (2020). Clinician responses to pediatric lipid screens suggestive of severe dyslipidemia. *The Journal of Pediatrics: X*, *4*, 100037.

https://doi.org/10.1016/j.ympdx.2020.100037

Zhang, Q., Chang, G., Tang, Y., Gu, S., Ding, Y., Chen, Y., & Wang, X. (2023). Genotypic and phenotypic features of dyslipidemia in a sample of pediatric patients in China. *BMC Pediatrics*, *23*(1), 138. https://doi.org/10.1186/s12887-023-03952-z

Zuberbier, T., Abdul Latiff, A. H., Abuzakouk, M., Aquilina, S., Asero, R., Baker, D., Ballmer-Weber, B., Bangert, C., Ben-Shoshan, M., Bernstein, J. A., BindslevJensen, C., Brockow, K., Brzoza, Z., Chong Neto, H. J., Church, M. K., Criado, P. R., Danilycheva, I. V., Dressler, C., Ensina, L. F., … Maurer, M. (2022). The international EAACI/GA²LEN/EuroGuiDerm/APAAACI guideline for the definition, classification, diagnosis, and management of urticaria. *Allergy*, *77*(3), 734–766. https://doi.org/10.1111/all.15090