Individual QI projects from single institutions

OPEN

Improving Compliance with Dyslipidemia Screening Guidelines in a Single-center U.S. Outpatient Pediatric Cardiology Clinic

Sarah Pradhan, MD; Andrew L. Dodgen, MD; Christopher S. Snyder, MD, FACC, FAAP

Abstract

Introduction: The development of atherosclerotic cardiovascular disease begins in childhood. The American Academy of Pediatrics (AAP) endorsed guidelines recommending universal hyperlipidemia screening of children ages 9–11 and again at 17–21 years. An AAP Periodic Survey of Fellows demonstrated less than half of pediatricians report adherence to these guidelines. This quality improvement initiative's objective was to improve compliance with AAP hyperlipidemia guidelines in an outpatient pediatric cardiology clinic at a single academic center to 80% over a 2-month time frame. **Methods:** We report the results of an IRB-approved chart review at a single-center outpatient pediatric cardiology practice. We defined pediatric cardiologists' compliance as documented prior lipid screening, ordering a lipid panel, or documented recommendation for follow-up screening. Two plan-do-study-act (PDSA) cycles were undertaken. The first intervention included an informational session to provide pediatric cardiologists with AAP recommendations. The second intervention involved weekly email reminders and a statement for physicians in the electronic medical record. **Results:** We collected data from 600 individual charts of patients seen over 35 clinic days. We received charts before the first PDSA intervention. Baseline compliance with outpatient hyperlipidemia screening was 0%. After the first PDSA cycle, the average screening rate improved to 49%. After the second PDSA cycle, the average screening rate improved to 89%, and there was a centerline shift in the data, indicating improvement. **Conclusion:** We improved the pediatric cardiologists' compliance with the AAP-recommended hyperlipidemia screening guidelines from 0% to 89% through 2 intervention cycles. Further efforts may be required to sustain this change. *(Pediatr Qual Saf 2021;6:e401; doi: 10.1097/pq9.0000000000000401; Published online May 5, 2021.)*

INTRODUCTION

The development of atherosclerosis begins in childhood.[1] The Bogalusa Heart Study (1972) and Pathobiological Determinants of Atherosclerosis in Youth (1985) pioneered longitudinal autopsy studies demonstrating the presence of atherosclerosis in children's arteries who died of accidental causes.[1] These studies concluded that the pathologic subclinical atherosclerotic process begins early, and hyperlipidemia in childhood has implications for adult dyslipidemia progression. Thus, the early identification and modification of cardiovascular risk factors could impact clinical disease manifestation in adulthood. Despite this, screening rates among US pediatricians continue to be inconsistent.[2]

The American Academy of Pediatrics (AAP) recommendations for lipid screening in children in 2008 outlined selective screening of children with cardiovascular risk factors (smoking, hypertension, obesity, and diabetes) or family history of premature cardiovascular disease. In 2011, the AAP subsequently endorsed the National Heart Lung and Blood Institute Integrated Guidelines for Cardiovascular Risk Reduction in Childhood and Adolescence. This guideline recommends universal screening of children between the ages of 9 and 11 years and again between ages 17 and 21. This recommendation was later integrated into the AAP Bright Futures schedule for well-child care in 2014.[2] Notwithstanding these recommendations, a nationally representative screening survey performed by the AAP Periodic Survey of Fellows indicated that the US pediatricians screen and treat dyslipidemias less frequently than recommended by the current national guidelines. Only 30%–42% of surveyed pediatricians reported screening

From The Congenital Heart Collaborative, Rainbow Babies and Children's Hospital, Case Western Reserve University School of Medicine, Cleveland, Ohio

Presented at the American Academy of Pediatrics National Conference and Exhibition 2018, Orlando, FL.

**Corresponding author. Address: Sarah Pradhan, MD, The Congenital Heart Collaborative, Rainbow Babies and Children's Hospital, Case Western Reserve University School of Medicine, Cleveland, OH 44106*
PH: 513-636-4432; Fax: 513-636-3952
Email: sarah.pradhan6@gmail.com

Copyright © 2020 the Author(s). Published by Wolters Kluwer Health, Inc. This is an open-access article distributed under the terms of the Creative Commons Attribution-Non Commercial-No Derivatives License 4.0 (CCBY-NC-ND), where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially without permission from the journal.

To cite: Pradhan S, Dodgen AL, Snyder CS. Improving Compliance with Dyslipidemia Screening Guidelines in a Single-center U.S. Outpatient Pediatric Cardiology Clinic. Pediatr Qual Saf 2021;6:e401.

Received for publication April 1, 2020; Accepted October 29, 2020.

Published online 5 May, 2021

DOI: 10.1097/pq9.0000000000000401

healthy patients according to the 2011 National Heart Lung and Blood Institute expert panel guidelines.[2] The authors found that selective lipid screening based on family history, obesity, or high-risk conditions was relatively common. Identified barriers to screening included knowledge deficit, performing risk versus age-based screening, uncertainty regarding treatment initiation, and conflicts among national guidelines.[2]

This quality improvement initiative aimed to improve compliance with AAP hyperlipidemia guidelines in an outpatient pediatric cardiology clinic at a single academic center to 80% over a 2-month time frame.

METHODS

An IRB-approved retrospective review was performed at an outpatient pediatric cardiology practice at a single-center academic free-standing children's hospital to obtain baseline screening practices before the interventions. The 11 attending physicians in the Division of Pediatric Cardiology saw 6,236 patients in 10 outpatient clinics in 2018. If a patient's lipid screening was abnormal, they were counseled and managed by a pediatric cardiologist. The medical team at the outpatient pediatric cardiology practice is typically comprised a pediatric cardiologist, a pediatric cardiology fellow, a clinic nurse, and a medical assistant. Pediatric residents rotate through the cardiology clinic when they are on elective. However, they rotate through multiple cardiology subspecialties and are thus not consistently present in the clinic. Nurse practitioners were not present in general cardiology clinics. Clinics occurred on average twice weekly, at 10 locations, 9 being satellite clinics. Clinic days where less than 10 patients were seen were excluded from data collection.

We performed 2 plan-do-study-act (PDSA) cycles, with the preintervention phase of data collection spanning 6 weeks and postintervention phases averaging 4 weeks. The initial data collection phase spanned 6 weeks with no interventions. We defined physician compliance as documenting prior screening, ordering a lipid panel, or documenting follow-up screening recommendations. Our primary strategy for implementing change was through educational interventions. The first PDSA cycle lasted for 3 weeks. The intervention consisted of conducting a 15-minute informational session for the clinical staff and faculty physicians of the Division of Pediatric Cardiology, outlining current hyperlipidemia guidelines endorsed by the AAP. The second PDSA cycle lasted for 5 weeks. It involved weekly email reminders sent to all clinical staff emphasizing screening guidelines and the importance of adherence and the inclusion of a phrase about lipid screening in the patients' electronic medical records (EMRs).

This quality improvement initiative was discussed at a Division of Pediatric Cardiology faculty meeting, which allowed for open-ended feedback about the project. This discussion invited unbiased consideration of the study's strengths, weaknesses, and the potential implications for integrating cholesterol screening into each pediatric cardiologist's clinic visit.

RESULTS

This QI initiative evaluated data from 652 outpatient charts totaling 35 clinic days (average 13 patients/d) at 8 clinic locations staffed by 8 pediatric cardiologists.

Baseline compliance with outpatient hyperlipidemia screening was 0%. After the initial intervention, including implementing the educational sessions for clinical staff, the average screening rate improved to 49% after 3 weeks, which may be due to random chance alone. Strategies to implement change evolved to the increasing frequency of reminders to physicians to change clinical practice effectively. We re-educated and re-emphasized the importance of reliable screening. Following the second PDSA cycle, the average screening rate improved to 89%, and we observed a positive shift in the data indicative of improvement (Fig. 1).

DISCUSSION

Cardiovascular risk factors relate to the extent of atherosclerosis in children. Primary prevention in childhood is imperative to modify atherosclerosis's natural history, prevent adverse outcomes, and disease persistence into adulthood.

Initial compliance with screening guidelines was deficient, but we improved physician compliance with the AAP-recommended hyperlipidemia screening guidelines through interventions. This quality improvement initiative showed that compliance could improve with low-cost educational interventions and EMR optimization. This study demonstrated the known difference as outlined by the Institute for Healthcare Improvement in the reliability principles of educational versus email interventions and their effectiveness in enacting change.[3] Level 1 strategies focus on the prevention of error by providing standardization of process or guidelines. Level 2 strategies focus on identifying instances to prevent human error, such as reminders, affordances, or differentiation.[3] The first intervention cycle used education, a Level 1 reliability strategy, and the second intervention cycle used Level 2 strategies such as email reminders and abbreviated EMR phrases. Ultimately, utilizing memory aids such as email reminders was the most effective intervention for increasing adherence to screening guidelines.

There remains a lack of quality improvement initiatives that have aimed to improve universal lipid screening in primary care pediatric practices, and there are currently no initiatives to date in pediatric cardiologist practices. A similar initiative performed by Stipelman et al[4] in well-child visits used monthly chart review and feedback, provider education, and EMR cues and ultimately achieved a sustained 44% improvement. Their interventions were similar to those we used. They confirm that these types of

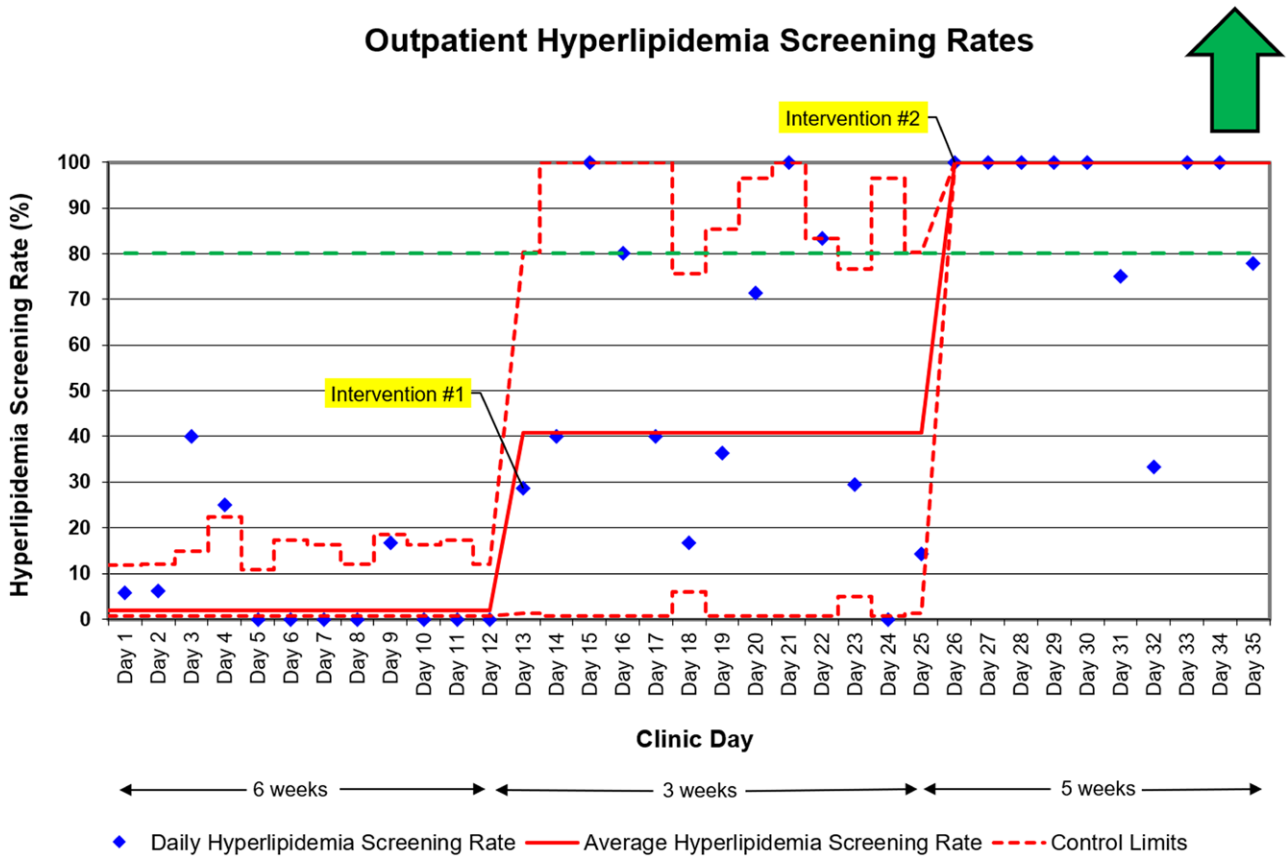

Fig. 1. Control chart demonstrating outpatient hyperlipidemia screening rates over sequential clinic days during the preintervention and subsequent 2 intervention cycles.

educational interventions can be useful in implementing change in the short term. Long-term, level 3 systematic interventions are needed to sustain change. These changes may include: (1) outpatient clinic nurses building a hyperlipidemia screening status assessment into the standard report given to the cardiologist and (2) integrating hyperlipidemia status in the pediatric cardiologist's recommendations along with exercise restrictions and need for endocarditis prophylaxis after each clinic visit.

Although universal cholesterol screening by general pediatricians is recommended, it is not routinely performed, as evidenced by a national survey of practicing AAP pediatricians.[2] This failure to screen high-risk patients such as those with congenital heart disease is where subspecialists can improve practice. Patients referred to subspecialists such as pediatric cardiologists can consider screening patients and refer as needed to hyperlipidemia clinics. Additionally, patients with congenital heart disease have structural and functional defects, which may cause them to be more vulnerable to the adverse sequelae of atherosclerotic disease, as well as coronary artery anomalies (congenital or surgically acquired, such as transposition of the great arteries post arterial switch operation) or coronary artery aneurysms which can predispose to premature cardiovascular disease.[5,6] de Ferranti et al[6] suggest that patients with congenital heart disease are at increased risk of developing atherosclerosis, with a median estimated lifetime risk of ~36%. Therefore, it is essential to consider the implications of improving screening practices in this vulnerable population. This quality improvement initiative has demonstrated that nonintrusive interventions can improve screening compliance in healthy patients seen by pediatric cardiologists in outpatient clinics. This study should be expanded to other subspecialists who care for patients with high-risk medical diagnoses such as chronic kidney disease or chronic inflammatory diseases to improve early detection of hypercholesterolemia and reduce cardiovascular risk.

The study's limitations include daily variability of pediatric cardiology faculty, an inability to determine if prior screening was performed for patients who saw providers outside of our hospital network, and fluctuating clinic volumes resulting in a discontinuous assessment of compliance based on small clinic numbers. Fluctuations in screening rates may have also been reflective of individual physician screening practices. Although clinics occurred on average twice weekly during the postintervention phases, ongoing improvement efforts are needed to sustain this change. The expansion of this initiative with longer postintervention phases would be necessary to confirm further that change in practice has been sustained. Given the increased effectiveness seen with email

interventions, other level 2 strategies such as altering the EMR to provide notifications for patients due for lipid screening and a "commonly ordered" laboratory set that includes lipid panels should be considered.

CONCLUSIONS

This quality improvement initiative successfully improved compliance with current nationally recommended hyperlipidemia screening guidelines in a pediatric cardiology outpatient setting.

DISCLOSURE

The authors have no financial interest to declare in relation to the content of this article.

REFERENCES

1. Daniels SR, Greer FR; Committee on Nutrition. Lipid screening and cardiovascular health in childhood. *Pediatrics*. 2008;122:198–208.
2. de Ferranti SD, Rodday AM, Parsons SK, et al. Cholesterol screening and treatment practices and preferences: a survey of United States pediatricians. *J Pediatr*. 2017;185:99–105.e2.
3. Nolan T, Resar , R, Harden , C, Griffin , FA et al. *Improving the Reliability of Health Care*. Institute for Healthcare Improvement: Innovation Series. 2004.
4. Stipelman CH, Stoddard GJ, Smith ER, et al. Quality Improvement Intervention for universal lipid screening in children aged 9 to 11 Years. *Clin Pediatr (Phila)*. 2019;58:1528–1533.
5. Chowdhury D, Gurvitz M, Marelli A, et al; American College of Cardiology's Adult Congenital and Pediatric Cardiology Section's Ambulatory Pediatric Cardiology Quality Metrics Working Group. Development of quality metrics in ambulatory pediatric cardiology. *J Am Coll Cardiol*. 2017;69:541–555.
6. de Ferranti SD, Steinberger J, Ameduri R, et al. Cardiovascular risk reduction in high-risk pediatric patients: a scientific statement from the American Heart Association. *Circulation*. 2019;139:e603–e634.