

Cost Benefit of Comprehensive Primary and Preventive School-Based Health Care

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Introduction: The Rales Health Center is a comprehensive school-based health center at an urban elementary/middle school. Rales Health Center provides a full range of pediatric services using an enriched staffing model consisting of pediatrician, nurse practitioner, registered nurses, and medical office assistant. This staffing model provides greater care but costs more than traditional school-based health centers staffed by part-time nurses. The objective was to analyze the cost benefit of Rales Health Center enhanced staffing model compared with a traditional school-based health center (standard care), focusing on asthma care, which is among the most prevalent chronic conditions of childhood.

Methods: In 2016, cost-benefit analysis using a decision tree determined the net social benefit of Rales Health Center compared with standard care from the U.S. societal perspective based on the 2015–2016 academic year. It was assumed that Rales Health Center could handle greater patient throughput related to asthma, decreased prescription costs, reduced parental resources in terms of missed work time, and improved student attendance. Univariate and multivariate probabilistic sensitivity analyses were conducted.

Results: The expected cost to operate Rales Health Center was \$409,120, compared with standard care cost of \$172,643. Total monetized incremental benefits of Rales Health Center were estimated to be \$993,414. The expected net social benefit for Rales Health Center was \$756,937, which demonstrated substantial societal benefit at a return of \$4.20 for every dollar invested. This net social benefit estimate was robust to sensitivity analyses.

Conclusions: Despite the greater cost associated with the Rales Health Center's enhanced staffing model, the results of this analysis highlight the cost benefit of providing comprehensive, high-quality pediatric care in schools, particularly schools with a large proportion of underserved students.

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INTRODUCTION

With spending on pediatric patients rising more rapidly than adults, there is a need for transformation in how children utilize health services.¹ Providing health care in schools removes many access barriers, and naturally aligns health care, public health, and education sectors. In low-income schools, school-based health centers (SBHCs) are commonly operated by public health agencies as safety net providers.^{2,3} The American Academy of Pediatrics Council

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on School Health advocates for SBHCs to provide care for uninsured and underinsured children as well as those who face healthcare access barriers.² In 2016, the U.S. Community Preventive Services Task Force recommended SBHCs to effectively improve health and health equity, and long-term educational outcomes for children.^{4,5}

SBHCs improve student healthcare access by integrating health services into school environments.⁶ There are more than 2,300 SBHCs in 49 states.⁶ SBHCs provide many services to students and communities, including (1) treatment for acute illness or injury, (2) medication administration and management, (3) preventive care, (4) chronic disease management, and (5) mental and behavioral health services. School-based care reduces direct medical costs for seeking outside health care and alleviates indirect costs attributable to parent caregiving and student time out of school.^{2,7,8} Furthermore, existing evidence demonstrates that SBHCs are an economical use of resources that improve student health and educational outcomes.^{2,9} Nonetheless, there is variability in the scope of services offered and staffing models across SBHCs, even within school districts. One common model consists of a part-time nurse practitioner (NP) working alongside a school nurse (RN) or medical office assistant or both. In the urban school district of Baltimore City, for example, several schools' SBHCs often share part-time RNs, part-time medical office assistants, and part-time NPs.

The Rales Health Center (RHC) is an example of a comprehensive SBHC model. In August 2015, RHC opened in two Baltimore City public charter schools that share one building. Together, the two elementary and middle schools serve more than 1,500 children from kindergarten to eighth grade, most of whom come from low-income communities. The RHC provides comprehensive pediatric care staffed by a pediatrician, NP, two RNs, and a medical office assistant. The ability to meet a wider range of student health needs comes with greater costs, but also potentially greater monetary benefits to the community, assuming RHC plays an important role in reducing direct and indirect medical costs of asthma care, prescription management, and non-asthma emergency department visits, while also yielding monetized benefits of parental time saved because of enhanced access to care and additional behavioral health services provided (e.g., management of pediatric attention deficit hyperactivity disorder).

The societal costs of pediatric asthma are well documented. The U.S. Centers for Disease Control and Prevention reports asthma is a leading cause of student school absenteeism.¹⁰ A typical asthmatic child misses 4 days of school annually because of asthma; additionally,

the disease creates a tremendous burden on the U.S. health system with 2009 annual costs for asthma care estimated at \$56 billion.¹⁰ In 2009, Baltimore City's hospitalization rate for children with asthma was 50.7%, at a cost of \$820 per emergency room visit and \$7,506 per inpatient admission.¹¹ These costs for asthma-related pediatric hospital admissions and emergency department visits in Baltimore City totaled \$5.9 million and \$4.5 million, respectively.¹¹ Nonetheless, these costs do not fully reflect the broader social burden of pediatric asthma. In 2005, the cost of parents' reduced productivity because of asthma-related school absence days for children aged 5–17 years was \$719.1 million.¹¹

To date, few studies have analyzed the cost benefit of highly staffed SBHCs. Although SBHCs have shown to be cost effective, prior literature has not used thorough economic models to replicate highly staffed SBHCs within a kindergarten to eighth grade school environment. Thus, this study's objectives are to investigate the net social benefit (NSB) and return on investment (ROI) of a comprehensive SBHC model (the RHC) using cost-benefit analysis. It is hypothesized that despite a relatively large and expensive SBHC staffing model, the RHC model provides comparatively larger NSB relative to a typical SBHC model with lower staffing levels, and that the benefits outweigh the costs in less than 1 year.

METHODS

Using a decision tree, the authors compared the cost benefit of RHC versus a common SBHC staffing model according to Guo and colleagues¹² ("standard care") from a U.S. societal perspective for the 2015–2016 academic year. The primary outcome measures were NSB after 1 year and benefit-to-cost ratio, which are standard measures to express "cost benefit." The 1-year time horizon was chosen to reflect a school year and the common budgetary outlook for school administrators. The model's structure was informed by Guo and colleague's analysis of the cost benefit of SBHCs relative to healthcare disparities.¹²

Study Population

The school in which the project was located serves >1,500 students in two schools (kindergarten to fourth grade and fifth to eighth grades) that share one building. More than 99% of students are African American, approximately 83% qualify for free or reduced-price lunch, and 80% receive Medicaid. Students are enrolled from across Baltimore City by lottery.

Guo et al.'s typical SBHC model was used as a reference for standard care, which was characterized by the following full-time equivalent (FTE) weights: an RN (0.5 FTE), a medical office assistant (0.6 FTE), and an NP (0.6 FTE).¹² Standard care SBHCs are generally staffed separately from the typical school nurse's office. The two centers may jointly share time of RNs and administrators within the school, or the nurse's time may be shared between schools, limiting total staffing time in the SBHC. An NP or physician assistant generally provides somatic care—SBHCs and

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