This paper highlights the development, implementation, and evaluation of the HealthFirst pediatric asthma program at St. Luke’s Health Care Center in San Francisco. The objective of this pilot program is to develop an alternative model of pediatric asthma self-management among economically disadvantaged, low-income, inner-city children using an integrated team-based approach with community health workers, licensed practitioners, and primary care physicians.
This three-year pilot program is funded by The Skirball Foundation and The Atlantic Philanthropies.

**Serious Health and Economic Consequences of Childhood Asthma**

Asthma is the most common chronic disease among children and the most frequent cause of childhood hospitalization. This chronic respiratory condition and inflammatory disease of the airways have recurring episodic symptoms of breathing difficulties - wheezing, shortness of breath, and coughing. Asthma is a serious, growing public health concern with major economic consequences. Severity of asthma symptoms have been associated with hospital admissions, mortality, as well as developmental, emotional, and behavioral problems. Many asthma comorbidities such as activity restriction, emergency visits, and missed school days are preventable with appropriate self-management strategies. Asthma can be controlled with minimal symptoms and few disruptions in usual daily activities.

**California Childhood Asthma**

Despite major advances in asthma control, many California children are at increased risk of this fatal disease (see Table 1). In fact, in California nearly one in five students have asthma.

**Children of Ethnically Diverse Populations Have the Highest Asthma Prevalence Rate**

Children from racial and ethnically diverse populations are at higher risk for asthma and related hospitalizations, and their asthma is more severe than White children. The prevalence of childhood asthma has increased in the last two decades in low-income, ethnically diverse, and children living in inner cities. African American students (26%) had the highest lifetime asthma prevalence among school-age children.

### Table 1: California Childhood Asthma Facts

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>California Asthma Facts in Children</th>
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<tbody>
<tr>
<td>Major Public Health Concern</td>
<td>Asthma is a serious chronic illness among 11.3 percent California’s children*</td>
</tr>
<tr>
<td>Most Frequent Cause of ED Visits</td>
<td>34% of children with daily and weekly asthma symptoms had at least one emergency department and urgent care visit in the previous year*</td>
</tr>
<tr>
<td>Most Frequent Cause of Childhood Hospitalization</td>
<td>In the Bay Area and California, asthma is the diagnosis most often cited for children’s hospital stays and accounts for roughly 9 percent of all statewide hospital discharges involving children in 2006**</td>
</tr>
<tr>
<td>Leading Cause of School Absenteeism in Children</td>
<td>Asthma is the main cause of school absences in California. About 28% of school-age children miss at least one week of school*</td>
</tr>
<tr>
<td>High Prevalence Among School-age Children</td>
<td>Despite advances in therapy, asthma remains a disease that is not optimally controlled in many Californians*</td>
</tr>
</tbody>
</table>

* Source: UCLA Center for Health Policy Research, California Health Interview Survey, 2005
** Source: California Breathing, Environmental Health Investigations Branch, California Department of Public Health, 10/16/07. Available at: [www.californiabreathing.org](http://www.californiabreathing.org)
prevalence rates, followed by Whites (20%), Native Americans (19%), Asian and Pacific Islanders (16%) and Latinos (14%). In 2003, the prevalence of California pediatric asthma ranged from 13% for Mexican American students to 23% among Puerto Rican and Cuban American Students, and between 11% among Korean American to 24% among Filipino American students. Also, one-third of students had at least one asthma symptom in the previous year. Lifetime asthma prevalence rates were higher among males than females.

Economic Burden of Asthma

The health and economic burden of asthma is significant since there are almost 500 asthma-related deaths, 36,000 hospital discharges, and 145,000 emergency department visits every year in California. In 2005, about 659,000 persons suffered from asthma symptoms every day or week, and more than 475,000 visited an urgent care center or emergency department because of asthma. In 2005, the average charge for an asthma hospitalization was $23,953 and the total costs of asthma hospitalizations were $763 million in California. In the US, the direct and indirect costs for health and lost of productivity due to asthma are estimated at $19.7 billion annually.

Childhood Asthma is a Leading Cause of School Absenteeism and Physical Inactivity

In 2005, asthma was responsible for about 1.9 million missed days of school. On average, California children with asthma missed 2.6 days of school yearly due to their asthma. Also, one out of every three children had an episode of asthma or an attack in the previous year, 60% could not do physical activity sometime in the previous year because of their asthma, and 62% did not receive an asthma management plan from their healthcare provider. In addition, 28% of those with daily or weekly symptoms, did not take daily asthma medications.

In spite of the high prevalence and the negative health and economic consequences of asthma, most of the morbidity associated with asthma is preventable and can be controlled through self-management programs like HealthFirst.

Lack of Primary Care Access Among San Francisco Inner-city Children

The city of San Francisco is experiencing continued growth in the portion of the pediatric population who are uninsured. The lack of access to primary care that lead pediatric patients to have poor asthma control and more frequent respiratory complications creates a burden on San Francisco’s public health system and leads to over-utilization of the city’s emergency rooms (ED). Among the 58 California counties, San Francisco ranks 4th highest in pediatric asthma hospitalizations, highest for Asian children, and second for Latino children.

Need for New Primary Care Delivery Models To Increase Access in San Francisco

In order to expand eligibility and improve access for the uninsured and under-insured pediatric population, new primary care delivery models that enhance access are essential to cost-effectively manage asthma patients. In San Francisco, the overall asthma prevalence rate among children 0 to 14 years old is 11.8% with African American, low-income, uninsured children showing the highest prevalence rates.

A recent study of 230 hospitalized children who were admitted for asthma showed that most were poor, non-white, and had public or no health insurance. In addition, lack of continuing primary care for asthma is associated with increased levels of morbidity in low-income children including immigrant children. African American and Latino children are more likely to receive episodic asthma treatment that does not follow guidelines for care.

An additional challenge to provide effective pediatric asthma care is the high healthcare costs contrasted with low reimbursement rates. For example, pediatric visits to emergency departments are high – nationally, one in every four ED visits is a pediatric visit which means approximately 30 million ED pediatric visits annually. This high ED visit rate is very concerning due to low reimbursement. While charges for pediatric ED visits rise over time, payments do not keep pace. A study comparing charges and payments for outpatient pediatric emergency visits across payer groups in San Francisco showed that reimbursements for outpatient ED visits
in the pediatric population have decreased from the period of 1996 to 2003 in all payer groups: private, public such as MediCal/State Children Insurance Program (SCHIP), and the uninsured. MediCal/SCHIP has consistently paid less per visit than the privately insured and the uninsured. Thus, there is an urgent need to implement comprehensive and cost-effective primary care delivery solutions to improve healthcare access and provide effective pediatric asthma management care.

St. Luke’s Health Care Center

In January, 2007, St. Luke’s Hospital became the fourth campus of California Pacific Medical Center (CPMC), which is a Sutter Health affiliate. St. Luke’s has a 134-year history of serving those in need of health care in the Mission and South of Market Districts in San Francisco, CA. It has experienced a dramatic shift in the payer mix from insured to MediCal. St. Luke’s has a keen interest in exploring innovative practices for caring for the pediatric uninsured and underinsured population with asthma. Asthma is a preventable condition, therefore St. Luke’s HealthFirst team is committed to improve asthma primary care services and to reduce ED visits among low-income children by implementing an integrated team-approach intervention that provides continuity of care, cultural competent care, and parental self-management.

HealthFirst Enhances Access to Pediatric Primary Care Services

In November 2006, CPMC launched HealthFirst at the St. Luke’s Health Care Center to expand eligibility and improve access to the Mission and South of Market area of San Francisco mostly for the underinsured MediCal patient population. St. Luke’s patients represent a wide racial, ethnic, and linguistic diversity. According to Census 2005 data, 46% of the residents within the communities served by the HealthFirst can be categorized as having limited English proficiency (LEP) and speak languages other than English at home; 42% are Hispanics, 16% are Asians, 16% are Blacks, 23% Whites, and 3% Other. About 11% are below the federal poverty level.

Integrated Team-Based Approach

The Integrated Team-Based Approach pilot program aims at improving how primary care is delivered in a more cost-efficient manner to manage patients with chronic diseases by providing timely access to a primary care physician, appropriate utilization of emergency room, improved physician-patient communication, enhanced patient education, better coordination of healthcare services, and increased healthcare access by providing culturally and linguistically appropriate healthcare services.

The HealthFirst pilot program involves moving from a Provider-Focused Care Model into an Integrated Team-Based Approach. The key reason to adopt this strategy is explained by a HealthFirst consultant Dr. Bodenheimer “As the 21st century unfolds, primary care is endangered. Strain is evident among primary care physicians. Primary care in the United States is showing increasing signs of strain because of heightened expectations for performance and shifting demographic and health care trends. Effectively responding to these problems will require fundamental redesign of systems for de-

The HealthFirst multilingual, multicultural team includes primary care physicians working closely with a nurse practitioner, a licensed respiratory therapist, a social worker, a program evaluator, administrators, and community health workers trained as asthma educators.
delivering primary care."21 This integrated teamlet approach expands the limited 15-minutes physician visit using the support of community health workers who act as health coaches and provide regular follow-up.21

The core of St. Luke’s HealthFirst approach includes:

1. System-Level Pediatric Primary Care Redesign

   To provide quality pediatric services, HealthFirst is implementing organizational changes at multiple levels:

   - **Re-design Pediatric Primary Care Practices.**
     Pediatric practices have been re-designed to increase capacity. Two pediatric practices have been consolidated into one. Improvements have been made in patient flow, scheduling, and patient referrals.

   - **Build Capacity and Improve Resources.**
     Improvements in decision support to provide quality of care and to manage the patient population have been made.

   - **Establish Efficient Service Delivery Systems.**
     HealthFirst has made improvements on patients’ access to services at the time when it is necessary. Community health workers liberate physician time to do what they do best.

   - **Adopt New Physicians, Midlevel Educator, Community Health Workers, and Patients Roles.**
     Physicians work on teams. Community health workers and licensed non-physician clinical staff monitor clinical outcomes and empower patients with self-management skills. Patients learn problem-solving skills to take better control of their disease.

   - **Incorporate Clinical Outcome Measurements to Evaluate Progress.**
     Closely monitoring patient progress.

2. Culturally Tailored Intervention and Team Interdependency.

   The HealthFirst multilingual, multicultural team includes primary care physicians working closely with a nurse practitioner, a licensed respiratory therapist, a social worker, a program evaluator, and community health workers trained as asthma educators. The team delivers a culturally tailored intervention to improve both patients’ self-management and caregivers’ management of their children asthma symptoms and quality of life. The pediatrician initially introduces the team-based care approach to the patient during an initial asthma visit and recommends a medical plan, which includes follow-up with the HealthFirst team. Community health workers develop and foster a trusting relationship with the patient and his family. After a comprehensive evaluation, which includes environment assessment, psychosocial assessment, and lung function assessment, the community health workers and the respiratory therapist work with the patient to develop an action plan to care for his or her asthma. Education on asthma and use of medical devices are often reinforced at every visit. All team members have access to the patients’ medical records to work with the patient on a treatment plan, with the nurse practitioner available to ensure clinical quality and make any adjustments to the medications. The social worker provides referral and counseling on psychosocial issues. Community health workers conduct patient follow-up by telephone and in-person visits.21 The community health worker is the bridge between all members of the team and facilitates communication among the providers and patient’s family. The intensity of follow-up varies by patient’s needs.

   A similar team-approach model was used successfully with 7 community clinics with approximately 3,000 low-income children. At 24 months follow-up in the longitudinal sample, fewer patients reported acute visits, emergency department visits, hospitalizations, frequent daytime and nighttime asthma symptoms compared with baseline.22

3. Self-Management Support Services

   HealthFirst pilot program is based on the assumption that teaching patients and caregivers to self-manage their chronic condition improves their clinical and functional outcomes, satisfaction with care, and reduce hospitalizations and visits to the emergency department.23-26

   Table 2 shows key concepts incorporated in the HealthFirst self-management program.
HealthFirst Community

Health Workers Role on Self-Management Support

HealthFirst community health workers aim to gain patients’ trust and use a self-management approach to empower the child and caregiver to control the asthma symptoms. During the HealthFirst visits, the community health worker works collaboratively with the caregiver to set the agenda; “close the loop” to verify the patient and parents understanding of clinician advice; encourage parents to make decisions about environmental control; use of devices and medications; and set goals to assist with lifestyle changes.

Community health workers have an important and unique role in teaching parental self-management when working in close collaboration with pediatricians and other clinicians. They also serve to unify the team through the facilitation of communication within the team, which includes the patient and his/her caregiver. At HealthFirst, community health workers improve patients’ activation and confidence to manage their chronic condition. In turn, more activated patients have better health outcomes and are more satisfied with services. This important role requires intensive training to develop new competencies including knowledge of asthma clinical protocols, medication reconciliation, asthma devices and patient self-management techniques.

Self-management education complements traditional patient education in supporting patients to live the best possible quality of life with their chronic condition. Whereas traditional patient education offers information

<table>
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<th>Table 2: Definition and Characteristics of Self-Management Support</th>
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<tr>
<td><strong>Self-Management Definition</strong></td>
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<tr>
<td>Self-Management Support is what health providers do to assist patients and their caregivers to become active participants in their own care. It is a patient-centered approach to empower the patients and their caregivers to have a central role in managing their own chronic illness.</td>
</tr>
<tr>
<td><strong>Self-Management Characteristics</strong></td>
</tr>
<tr>
<td>Support patients and their caregivers to set realistic goals, define specific actions, and reach a mutual agreement in the steps to be taken to reach their goals</td>
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<tr>
<td>Train patients and caregivers intensively in specific disease skills</td>
</tr>
<tr>
<td>Provide informational, emotional support, and problem-solving skills to increase self-confidence, self-efficacy, and self-esteem to manage their chronic illness</td>
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<tr>
<td>Interact with patients and their families in a positive, respectful, and linguistically and culturally appropriate manner</td>
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<tr>
<td>Provide ongoing follow-up</td>
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<tr>
<td>Encourage healthy behavior change</td>
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<tr>
<td>Assist patients and caregivers with psychosocial issues</td>
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HealthFirst community health workers facilitate communication and coordination among care team members, and empower patients and caregivers with problem-solving, asthma self-management skills. In their expanded role, they liberate physician time to do what they do best.
and technical skills, self-management education teaches problem-solving skills to improve patient and caregiver’s confidence. Evidence from a meta-analyses of controlled clinical trials suggests that: (1) Programs teaching self-management skills are more effective than information-only patient education in improving clinical outcomes; (2) Educational programs for the self-management of asthma in children and adolescents reduce absenteeism from school, number of days with restricted activities, number of visits to the emergency department and possible number of disturbed nights. Using these principles, HealthFirst focused on assisting low-income patients in self-managing their condition using community health workers who teach problem-solving and self-efficacy skills (see Table 3).

**HealthFirst Pediatric Asthma Program Components**

The HealthFirst Integrated-Care Model has several interrelated components:

1. **Patient Referral and Needs Assessment.** Two primary care pediatricians and two mid-level providers refer patients to HealthFirst. The multidisciplinary team conducts a comprehensive initial and quarterly assessment of individual patients. The assessment includes educational, psychosocial and clinical factors; access barriers; social support; co-morbid conditions, and needed referrals.

2. **Action Plan and Goal Setting.** The community health workers and the respiratory therapist work with patients and caregivers to facilitate goal settings and implement an action plan after every visit. Both “close the loop” teaching patients and caregivers how to use medicines and devices properly, how to improve environmental conditions and work on an action plan. The caregiver and patient learn what control of asthma symptoms is. They learn that it is not normal to have the child coughing all the time and to wake-up at night. When caregivers and patients see peak flow changes after using the medication correctly, they feel more confident to manage the symptoms.

3. **Patient Follow-up.** To monitor patient improvement, community health workers meet with caregivers and patients as needed and conduct follow-up phone calls. The number of follow-up phone calls varies by patient needs. Patients are seen every three months for follow-up. Patients with co-morbid conditions are seen more frequently.

4. **Inter-Collaborative Program to Improve Access.** HealthFirst works in partnership with other St. Luke’s programs and services such as Respiratory Therapy, Social Work, and the Diabetes Center. As HealthFirst enrolls more patients, it is expected that the St. Luke’s Health Care Center will improve access for other patients needing to schedule visits.

5. **Program Evaluation.** The team uses evidence-based clinical performance measures collected at every visit and utilization indicators to monitor patients’ progress through a registry.

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**Table 3. HealthFirst Community Health Worker Expanded Competencies**

<table>
<thead>
<tr>
<th>Expanded Role for HealthFirst Community Health Workers</th>
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<tbody>
<tr>
<td>Work with physician and other certified clinical staff as a team member</td>
<td>Communicate with patient in a culturally competent way</td>
</tr>
<tr>
<td>In depth knowledge of chronic disease management and treatment</td>
<td>Work with patient as partner on setting the agenda at each encounter</td>
</tr>
<tr>
<td>Use motivational interviewing techniques to empower patient to change</td>
<td>Knowledge of learning principles and techniques to work with patient on action plans</td>
</tr>
<tr>
<td>Use “closing the loop” technique to verify patients and parents understanding of treatment plan</td>
<td>Monitor patient progress using registries or a database</td>
</tr>
<tr>
<td>Adapting information, educational materials to patient literacy level</td>
<td>Attitude change from educating to teaching patients’ new skills to improve confidence</td>
</tr>
<tr>
<td>Teach problem-solving asthma specific skills</td>
<td>Support self-confidence and self-efficacy in asthma management</td>
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</table>
HealthFirst has a research component to assess the impact of the new primary care model on patients’ clinical and utilization outcomes.

6. Expansion to Other Health Care Center Practices. St. Luke’s Health Care Center is building on HealthFirst’s first year evaluation findings to continue implementing an integrated team-based approach beyond pediatrics to improve the quality of healthcare delivery at reduced costs. This process involves not only managing patients with asthma and other chronic diseases, but requires a re-design of the St. Luke’s Health Care Center organization.

Methods

Sample

These preliminary results are based on 85 pediatric asthma patients (Age range: 0 - 16 years old, average age: 7 years old) enrolled in HealthFirst between January and November 2007. Sixty-five percent the pediatric asthma patients are Spanish-speaking compared to 35% who are English-speaking. Exposure to second-hand smoke and limited control of environmental asthma triggers is critical risk factors among HealthFirst pediatric patients.

Cohort Baseline—Follow-up Comparison

We compared the clinical outcomes and patient activation scores at baseline with follow-up. Analyses include comparison of proportions and averages of clinical measures over time. These analyses are based on data from two measure periods: Baseline Period - January to April 2007 and Follow-up Period - September to November 2007. Statistical analyses were performed using the SPSS statistical program.

Clinical Outcomes

Two clinical indicators to measure improvement among the HealthFirst pediatric asthma patients were number of nights awakened in last four weeks (night-time coughing and wheezing) and daytime symptoms in the last week (daytime coughing, wheezing, shortness of breath, and chest tightness).

Self-Management Outcome

A Patient Activation Measure (PAM) is used to measure caregivers’ degree of confidence and skills to manage their children asthma conditions. PAM was adapted from the measure developed by Judith Hibbard and colleagues at the University of Oregon. The Patient Activation Measure (PAM) assesses people’s knowledge, confidence and skills for self-management. The short version of the measure has 13 items pertaining to four domains:

1. Believing the patient role is important;
2. Having the confidence and knowledge necessary to take action;
3. Taking action to maintain, and
4. Improving one’s health staying the course even under stress.

The PAM scale has been extensively tested and shown to be a valid, highly reliable instrument with good psychometric properties. It was translated to Spanish and pretested with the Latino, low-literacy patient population. The measure produces activation scores ranging from 0 to 100 (less activation to more activation). The PAM measure was applied in-person by a community health worker. The scale consists of a series of statements with five possible response categories: Strongly agree, Agree, Disagree, Strongly disagree, Not applicable.

Results

After the first year of operation, the HealthFirst program shows an encouraging impact on the clinical outcomes of a cohort of 85 pediatric patients who were seen between January and November 2007. These patients decreased the daytime and nighttime asthma symptoms, and their caregivers reported improvement in the degree of self-confidence to control their children’ asthma symptoms.

1. Nights Awakened in the Previous Four Weeks Decreased.

Figure 1 shows the effectiveness of HealthFirst to control the number of nights awakened in the previous 4 weeks. Overall, the average number of nights awakened decreased significantly from baseline 5.60 to follow-up 2.22 (t=3.18, df: 84, p<.002).

2. Daytime Asthma Symptoms in the Previous Week Decreased.

Figure 2 shows the results of the ef-
fectiveness of the HealthFirst program to control daytime asthma symptoms. Overall, pediatric asthma patients decreased the number of daytime asthma symptoms from uncontrolled (e.g., “all the time or three times a week”) to controlled (e.g., “no daytime symptoms or one or twice a week”).

The proportion of pediatric asthma patients with well-controlled daytime asthma symptoms increased from baseline to follow-up. About 60.5% had daily asthma symptoms under control at first measurement period and increased to 84.7% at follow-up.

3. Self-Management of Asthma Symptoms

The perception of caregivers about their children’s control of asthma symptoms measured by a Patient Activation scale improved from baseline to follow-up. As Figure 3 shows the average Patient Activation score (PAM) improved slightly from moderate control (PAM=51.8) at baseline to more active control (PAM=64.4) at follow-up.

Discussion

The St. Luke’s HealthFirst team-based approach is improving Latino, African American, and White low-income children daytime and nighttime asthma symptoms as well as their caregivers’ degree of confidence and skills to manage their children asthma conditions. These results provide support for the application of an integrated team-based intervention approach in inner-city primary care settings. These findings also support the need of working with community health workers on an expanded role—collaborating as a team member with other non-medical providers to improve caregiver and patient’s confidence and skills to control their home environmental triggers, adhere to medications, and use correctly their medication devices with the objective to decrease emergency department utilization and reduce healthcare costs.

Asthma is a preventable chronic care condition that requires a very close partnership between the child, caregiver, and their health providers. To achieve this objective, HealthFirst provides continuity of care and self-management skill training through periodic visits in which patients and caregivers obtain feedback about their adherence to a realistic action plan to control their asthma symptoms. When a patient and his or her caregiver use effective self-management skills understanding their disease and role in taking control of their condition, they report improved patient satisfaction, activation, and have better patient no-show rates (e.g. about 15% vs. about 30% for referrals to the St. Luke’s Respiratory Department).

In contrast, before HealthFirst was implemented, under the provider-focused approach, a pediatrician was expected to fulfill multiple roles and could not provide frequent check-ups. The time of the respiratory therapist was divided among all asthma patients at the hospital. There was no staff to help with scheduling or documentation and the respiratory therapist was solely responsible for follow-up. Patients did not understand the chronic nature of the disease. Therefore, asthma symptoms could not be treated promptly, patients got worse and ended up utilizing the Emergency Room to be seen promptly.
Non-show rates were about 30% since follow-up was very sporadic which made patients feel frustrated because the limited access to appointments when they needed. As HealthFirst continues, it is expected to improve access to follow-up appointments and to enroll more patients in need.

Lessons Learned
We learned key lessons during the first year of implementing the HealthFirst self-management program for low-income pediatric patients and their caregivers:

Support for Goal Setting and Action Planning. Self-management action plans are a critical element in asthma care.28 HealthFirst’s care team provides extra support to establish a very simple action plan. Patients and their caregivers focus on specific activities to follow (e.g., what, how much, when, how often) and their level of confidence to implement the desired activity. Community health workers used motivational interviewing strategies to help patients and caregivers to set goals and choose activities to reach their goals. Focus on improving self-efficacy on disease-specific skills and providing timely follow-up is central to goal settings and action plans. Similar findings were observed in a study that produced major improvements in asthma-related care processes and clinical outcomes after the implementation of regular asthma action plan review along with assessment of quality of care and confidence in self-management, and documentation of guideline-based asthma quality indicators.29 Parents’ unique asthma concerns need to be integrated in refining the child’s asthma action plan.30 Similarly, HealthFirst results are in the same direction of another study that found that after the introduction of an asthma action plan, daytime and nighttime symptoms decreased while caregivers reported positive attitudes about the usefulness of the action plan knowing what to do about it.31

Integrated Team-based Approach With Efficient Asthma Care Processes. A central feature of the HealthFirst self-management program is the expansion of roles among the care team using a collaborative care model.32, 33 An interdependent team composed of primary care physicians, a nurse practitioner, licensed respiratory therapist, a social worker, and community health workers focus on conducting an assessment and treatment plan customized to the child and family needs.31 This new care team partnership require that patients and caregivers have an active role in managing their own disease and are encouraged to set obtainable goals and follow a specific treatment action plan.34 The results of an integrated team-based approach produce better care coordination, increased communication, better patient/family satisfaction, and reduction of asthma symptoms. Also, as found in other studies, having a continuing primary care for asthma has been associated with lower levels of morbidity in low-income minority children.35 In addition, as other studies also found, using community health workers and a team-based approach along with effective redesign of pediatric asthma processes, have produced major improvements in asthma-related health outcomes among low-income, multiethnic children.31

Tailored Linguistically, Culturally, and Health Literacy Intervention to Improve Asthma Health Services Access. A central feature of the HealthFirst self-management program is the improvement of access to linguistically and culturally appropriate asthma services. Bicultural and bilingual care team members explain condition-specific information in plain language, using concrete examples, and providing culturally appropriate tools and educational materials customized to the patient and caregiver literacy level.32, 33

Community Health Workers Expand Physicians Time and Quality of Care. Community health workers advocate for patients and their caregivers and facilitate communication between the primary care provider and other care team members. Since many patients and their caregivers do not fully understand how to control their asthma and what treatments are available to them,36 community health workers teach disease-specific self-management skills as well as motivate patients to improve their problem-solving skills.37 Community health workers conduct patient follow-up by telephone and in-person visits using the “closing-the-loop” technique to check for understanding of action plans and treatment options. HealthFirst is committed to train community health workers to work independently under the supervi-
sion of a physician assistant to provide support, health education, and case management services to patients and their families using an empowerment approach in coordination with health care providers and systems.

**Monitoring Performance Measures**

**Provide Guidance for Improvement of Patient Self-Management.** Data collection and analysis are major challenges in busy primary care clinics since these activities often demand extra time, effort, and precision. HealthFirst has designed an electronic tracking system to collect and monitor asthma quality indicators including a patient activation measure. The close monitoring of quality indicators via an electronic population management system allows team members to follow-up patients closely and better manage resources. Since data entry and database maintenance are critical components of obtaining valid data, careful selection of efficient quality measures and staff training in documentation and data entry is highly recommended.

HealthFirst is one of the few examples nationally of a healthcare facility entirely focused on assisting patients in self-managing their chronic conditions and conducting research under “real world” conditions to assess the impact of the new primary care model on patients’ clinical and utilization outcome. Comparable demonstration self-management asthma multifaceted programs which have used community healthcare workers, quality improvement clinical process redesign, and asthma action plans reviews, have documented improvements in confidence in asthma self-management, better quality of life, and reduction in emergency department visits and hospitalizations.53–55 HealthFirst preliminary results are in the same direction of systematic reviews that show that effective asthma self-management programs in children and adolescents improve lung function, physical activities, and feelings of self-control, along with a reduction of asthma symptoms, hospitalizations, and absenteeism.53–56 Lessons learned from the design and implementation of the HealthFirst model are used to expand other primary care practices at St. Luke’s Health Care Center.

Our preliminary results have limitations. They are based on self-report from a small cohort of patients. We are aware that the successful delivery of HealthFirst self-management services and patients adherence to self-management action plans depends not only on the provision of HealthFirst services, but on patient’s individual, social and contextual factors including cultural beliefs, perceived barriers, experience with healthcare providers, education, literacy, insurance, race, and age among other factors. We plan to carefully monitoring these factors to guide decisions regarding the type of patient who would benefit by HealthFirst.

Besides these challenges, we are convinced that a successful Integrated Team-Based Approach for pediatric patients and their caregivers such as HealthFirst must have a multi-faceted approach to be successful: promote an integrated team-based approach, expand the role of community health workers to liberate physician time to do what they do best, empower patients and their caregivers to play a central role to in managing their disease, support and follow-up patients and their caregivers in setting obtainable goals and action plans, create a culture of collaboration and mutual support among healthcare providers and patients/caregivers, promote linguistically and culturally appropriate delivery services, track clinical outcome performance measures to monitor progress, and promote an organizational commitment and a culture of continuous quality and organizational improvement.

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Authors
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Judy N. Li, DrPH, MBA is a healthcare strategist committed to improving quality and access for the underserved. Currently, she is the Chief Administrative Officer of St. Luke’s, with overall responsibility for the operations of the newest campus of California Pacific Medical Center (CPMC). Previously, she was the Director of Strategy and Program Development at CPMC, where she developed initiatives aimed at the revitalization of St. Luke’s and integration into CPMC. Dr. Li worked extensively in the area of health informatics, research and program
design. She implemented a physician connectivity system to improve outpatient services at Brown & Toland and co-founded a startup, Consumer Health Interactive, to develop Web-based applications and award-winning consumer health content. Dr. Li also conducted quality research on the impact of remote monitoring technologies and on the potential of electronic medical records to improve disease management. She serves as a consultant to the Moore Foundation’s Integrated Nursing Leadership Program to create nursing leaders and demonstrable quality improvements in Bay Area hospitals.

Outside of healthcare, Dr. Li served as a legislative aide to U.S. Senator Dianne Feinstein in Washington D.C. and led program and business development efforts for the Policy Division of SRI International. Dr. Li holds Bachelor’s degree from New York University, a Master of Business Administration and Doctor of Public Health from the University of California at Berkeley.

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Julie McKown, RCP, RRT, AE-C is a Respiratory Therapist and coordinator of the St. Luke’s Hospital Pulmonary Education Program. At HealthFirst, she provides asthma education and training to the community health workers and partners with them and the primary care physicians by evaluating, assisting with disease management, and providing diagnostic testing to their patients. Ms. McKown received her training from the Respiratory Therapy Program of Skyline College. As a therapist, she has experience in critical care, adult and pediatric care, and pulmonary function and is a nationally certified asthma educator. She has been a past co-chair for the San Francisco Asthma Task Force, past board member of the Bayview Hunters Point Health and Environmental Resource Center, and is a current member of the board of the Asthma Resource Center of San Francisco, Inc.

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Russell D. Lee, PhD is the HealthFirst Program Manager. Besides his administrative responsibilities in developing the HealthFirst pilot program, he is part of the management team involved in restructuring the delivery of primary care services at St. Luke’s Health Care Center. For the past 15 years, he has worked as the operations manager in a hospital-centered outpatient specialty clinic, a senior analyst in surgical services at St. Francis Memorial Hospital in San Francisco, and a business development manager at California Pacific Medical Center in San Francisco. Prior to health care, Dr. Lee worked over 10 years for two major ocean container carriers - Maersk Line and American President Lines - in market research and logistics. His forte is in applying logistics planning and other decision support tools to optimize outpatient clinic scheduling, patient flow, and operations. He received his doctorate in Sociology from Harvard University.

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Victoria Ngo, B S. has helped develop this program as a health coach at CPMC HealthFirst Center since its inception. She was in charge of HealthFirst data management and trained community health workers. A tri-lingual, San Francisco native, she is passionate about improving healthcare access for the underinsured and underserved population of her community. She received her bachelor degree in Molecular and Cell Biology at the University of California, Berkeley. She strives to bring innovation to the evolving realm of healthcare.

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