Multi-Dimensional Assessment and Interdisciplinary Care to Reduce Asthma Readmissions in Safety Net Hospitals

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Asthma is a prevalent disease that disproportionately affects socioeconomically underprivileged minorities. In fact, racial and ethnic minorities such as Blacks and Latinos have higher rates of severe asthma, asthma-associated emergency department visits, hospitalizations, and readmissions compared with whites. Such disparities exist due to genetic predispositions and to socioeconomic determinants of health such as environmental factors and limited health-care access. A value-based purchasing program encourages hospitals to improve communication and care coordination to better engage patients and caregivers in discharge plans, and, in turn, reduce avoidable readmissions. The program supports the national goal of improving health care by linking payment to the quality of hospital care. Efforts have been made to address asthma-related complications in these populations, which have been addressed at various levels of the care system, including the patient and family, community, organization, provider/microsystem, and policy. Many of these programs promote patient education and health-care accessibility through interdisciplinary and multi-dimensional approaches, and have been shown to be effective in reducing asthma-associated readmissions and hospitalizations, but these localized approaches have not been largely adopted. The wide-spread implementation of asthma programs is necessary to address factors related to the increased incidence of asthma and associated rates of hospitalizations and readmissions in impoverished, minority populations. *Key words: asthma; readmissions; socioeconomic disparities; interdisciplinary care; minorities; policy*. [Respir Care 2021;66 (11):1768–1776. © 2021 Daedalus Enterprises]

Introduction

Asthma is a prevalent chronic condition, which affects 7.5% of children and 7.7% of adults.[1] Racial minority patients who are impoverished are associated with higher rates of asthma-related emergency department visits, hospitalizations, and readmissions (ie, at 60 d after hospital discharge) compared with a white population.[2-5] These higher rates have been linked to race,[6-11] socioeconomic status,[12-14] environmental factors,[15-21] and health-care inequities.[12,13,22-26] Moreover, uncontrolled asthma leads to a poorer quality of life for patients, which impacts their emotional and physical wellbeing, educational performance[27,28] as well as imposes a substantial financial burden to patients and society.[28,29] These aspects warrant urgent addressing and understanding of the underlying causes.

Review of the Literature

Previous studies examined strategies and systems of care to reach impoverished minority populations in underserved communities at varying levels of the care system, all of

which demonstrated a reduction in asthma-related complications. These strategies have been effective due to their multidimensional, interdisciplinary approaches. Importantly, a multi-dimensional setting provides patients the opportunity to receive specialized assessment and care, and to promote asthma health literacy from a team of health-care providers, such as a pulmonologist, allergist, immunologist, to diagnosis and prescribe treatment; a nurse to provide patient and family education and to coordinate disease management; a social worker to help improve home living conditions for the patient; along with many other care providers, such as a respiratory therapist to explain the role of peak flow measurement to assess asthma severity based on the traffic light concept and the pharmacist to explain the importance of controller and reliever medication by demonstrating the correct technique of self-administration of inhalers to optimize medication effect. An interdisciplinary approach requires care coordination and collaboration to improve disease outcomes. The severity of the economic and racial divide among patients with asthma calls for the implementation of a combined approach of multi-dimensional assessment and interdisciplinary care.

This review explores the genetic, environmental, and social factors that contribute to the high rates of asthma-related hospitalizations, readmissions, and emergency department visits in impoverished minority populations and present some effective multi-dimensional, interdisciplinary programs that work to reduce these encounters. Addressing the related issues is necessary to improve the quality of life of individuals who are affected, while also reducing the social and economic burden.

Ethnic Disparities

Asthma prevalence is higher in minority patients who are impoverished, with higher rates in Blacks (10.6%) and Puerto Ricans (14.9%) compared with non-Hispanic whites (7.6%), and among individuals with low income (10.8%), defined by <100% of the federal poverty level compared with those with income ≥ 250% of the federal poverty level (6.5%).[1] These higher rates tend to be attributed to genetics, environmental risk factors, and socioeconomic barriers. Minorities who are impoverished have higher rates of asthma-related hospitalizations, readmissions, emergency department visits, and deaths compared with a white population (Table 1). Compared with non-Hispanic whites, Black and Hispanic adults and children have twice as many asthma-related hospitalizations.[30-32] Compared with non-Hispanic white children, Blacks are twice as likely to be hospitalized[5,33] and Hispanics are 25% more likely to be hospitalized.[5,34]

Lower income is also associated with a higher risk of asthma hospitalization.[35] After an initial hospitalization, Blacks and Hispanics are more likely to return to the hospital,[30,36] and children with Medicaid have 33% higher readmission rates compared with children who are privately insured.[34] In addition, Black children and adults are twice as likely to visit an emergency department due to asthma,[3,32,37] and Hispanic children and adults are 1.5 times and 2 times, respectively, as likely to visit an emergency department due to asthma.[32,37] Individuals with asthma and who are impoverished, defined by an income < 100% of the federal poverty level, also have higher rates of emergency department visits versus individuals with asthma and with an income ≥ 200% of the federal poverty level (17.0% vs 7.9%) as well as those who received a education less than high school level versus those who studied beyond high school (13.3% vs 8.5%).[37] Despite more-frequent medical interventions, minority individuals who are impoverished face higher asthma-related morbidity and mortality rates from asthma. Mortality is 3 times higher in Blacks than in non-Hispanic white individuals.[38] Interestingly, Hispanics have lower rates of mortality than non-Hispanic whites[38]; however, Puerto Ricans have higher mortality rates.[39] The discrepancy between the rate of asthma and asthma-related complications in Hispanic and Puerto Rican individuals is known as the "Hispanic paradox", describing the high and low burden in Puerto Ricans and Mexican Americans, respectively.[40] This could be due to differences in ancestry, environment (ie, exposure to tobacco), and susceptibility to stress.[40]

According to the Centers for Disease Control and Prevention's Asthma Call-Back Survey, both children and adults with asthma report cost barriers to health care, including not being able to afford asthma medication or to see a primary care physician or an asthma specialist. Of the adults with active asthma and with no or partial-year insurance coverage, 48.9% reported cost barriers compared with 13.3% adults with full-year insurance coverage.[41] In a study of 44,204 United States children, Kenyon et al[5] found that 20–30% higher readmission rates were associated with public insurance, at time intervals delineated by 60, 180, and 365 days after index asthma admission.[42]

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Table 1. Rates of Asthma Prevalence and Asthma-Related Hospitalizations, Readmissions, Emergency Department Visits, and Mortality

Parameter Prevalence*	Pediatric Patients	Adult Patients
Non-Hispanic white	9.5	13.8
Black	18.1	14.8
Hispanic	12.4	11.4
Puerto Rican	23.6	22.8
Federal poverty level		
<100%	14.6	16.7
≥250%	10.7	13.3
Hospitalizations†		
Non-Hispanic white	3.3	ND
Black	6.8	ND
Hispanic	5.8	ND
Readmissions‡		
Non-Hispanic white	11.9	ND
Black	22.2	ND
Hispanic	14.5	ND
Public insurance	19.6	ND
Private insurance	13.4	ND
Emergency department visits†		
Non-Hispanic white	12.2	ND
Black	22.5	ND
Hispanic	16.2	ND
Mortality, rate per million§		
Non-Hispanic white	1.2	12.3
Black	11.4	26.6
Hispanic	1.7	7.7
Puerto Ricans	24.4 (all ages)	

Data are presented as percentages, except where otherwise noted.
* From Reference 1.
† From Reference 32.
‡ From Reference 5.
§ From References 39 and 80.
ND = no data

Social and Economic Burden

The prevalence of asthma in impoverished minority populations and associated high rates of hospitalizations and emergency department visits impose a substantial burden on the patients, families, and community. In adults, uncontrolled asthma affects health-related quality of life, including mobility, breathing, sleeping, and usual activities.[43] Adult patients with asthma are also less likely to be employed and more likely to spend more days sick in bed annually. They are significantly more likely to have activity limitations or to be unable to work.[28] All children with asthma have a significantly lower quality of life in the form of emotional and physical wellbeing, educational performance compared with children without asthma of the same age.[27] Moreover, asthma management imposes a substantial financial cost. The total national medical expenditure attributable to adult asthma was $18 billion in 2008,[28] and the total direct costs of pediatric asthma were $5.92 billion in 2013.[44] Children with asthma are faced with 92% higher total medical costs compared with those without the disease.[29]

Risk Factors

Genetic. There are clear differences in asthma prevalence and morbidity between minorities and non-minorities, and some of this may be attributed to genetics. Blacks and Puerto Ricans share a significant proportion of African ancestry, and also have high rates of lung disease, such as asthma and COPD, which thus supports the notion that genetics contribute to the higher rates of lung disease in these populations.[6] Also, allergen sensitivities, which have a genetic component,[10] often coincide with asthma. Interestingly, Black children are more likely to have at least one allergen-specific sensitization reaction (immunoglobulin E ≥ 0.35 mIU/mL) among 10 common allergens tested by the age of 2 years[11] and to be sensitized to ragweed, bluegrass, and certain foods (ie, wheat, soy, corn, fish, and shellfish)[7-9] when compared with white children, which further suggests that a genetic component predisposes Black individuals to sensitization.

Environmental. Minorities who are impoverished experience increased exposure to allergens,[15,21] such as environmental and tobacco smoke, and to exposure to other indoor and outdoor pollutants.[18] For example, 36.0% of those individuals with a GED (general education development) certificate smoked cigarettes compared with 3.7% of those with a graduate degree, and 21.3% of those with a household income of > $35,000 compared with 7.3% of those with an annual household income > $100,000.[17] Another predisposing factor to asthma is stress. Minority children who are impoverished experience increased exposure to violence, which often leads to psychological stress, which has been shown to increase asthma morbidity in adults and their children.[16,19] In addition, vitamin D deficiency has been linked to the development of asthma.[18] Reduced maternal intake of vitamin D during pregnancy increases the risk of childhood asthma or wheezing and increases asthma morbidity in children and adults.[20]

Socioeconomic Status. Poverty is a strong risk factor for asthma and asthma-related complications,[12,45] and is related to the limited availability of and access to quality health care.[2,14,22] Hispanic patients of all ages are less likely to be prescribed inhaled corticosteroids.[24] A retrospective analysis that included 1,785 adults showed that Black adults with increased chronic asthma severity were only as likely to use controller medications as were non-Hispanic whites or Hispanics.[26] Another reason that patients of lower socioeconomic status may have worse asthma outcomes is poor health

literacy. Health literacy has been shown to lead to differences in asthma quality of life, emergency department visits, and asthma control between minorities who were impoverished and non-Hispanic whites with higher incomes.[23,25]

Pediatric patients with asthma face unique disparities because minority children with asthma and who are impoverished are less likely to have an asthma specialist or an asthma care plan,[12] be prescribed a controller medication when indicated,[46] or receive a guideline-based treatment.[13] A prospective, observational study that involved 695 children showed higher rates of readmissions in the Black children compared with the white children and that the socioeconomic hardship variables explained 53% of the observed disparity. When combined with biologic, environmental, disease management, and access variables, this resulted in 80% of the readmission disparity.[47]

Current Programs and Interventions to Address and Reduce Disparities

Asthma can be effectively managed through multi-dimensional, interdisciplinary strategies that provide patients the opportunity to receive specialized care and education from a team of health-care providers who work together to coordinate their care plan to improve disease outcomes. Several of these strategies have been developed and implemented to overcome the economic and racial disparities among patients with asthma at the level of the patient and family, community, health-care provider/microsystem, organization, and policy. Although most study interventions target pediatric patients with asthma, many are applicable to all age groups as well.

Patient and Family. Educational programs have been shown to improve asthma-related outcomes and quality of life for the patients and their families as well as reduce urgent care visits. Educational programs have been shown to be effective for both adult and pediatric patients with asthma. An asthma education program within an inner-city hospital was offered to adult patients with asthma and of low socioeconomic status. It was provided by certified asthma educators, a bilingual (English and Spanish) respiratory therapist, and a clinical pharmacist. The program led to decreased emergency department visits and hospital admissions, and increased asthma control and clinic visits.[48]

An educational platform for pediatric patients with asthma focused on self-management skills and fostered self-monitoring and self-care, and was delivered via an interactive, web-based computer program. This intervention used a nurse coordinator who conducted an initial teaching session and then distributed the queries daily. Most of the participants were Black and used public insurance. At a 90-d follow-up, there were decreased activity limitations, a reduction in peak flow readings in the yellow-to-red zone (a measurement of obstruction in large airways), decreased urgent calls to health providers, and increased medication adherence without reminders.[49] These educational interventions demonstrated effective interdisciplinary strategies to improve asthma symptoms, while reducing clinic and emergency department visits for the minority patients with asthma who were impoverished.

Importantly, culturally specific education programs have also been shown to be effective for both Blacks and Hispanics in reducing symptoms, emergency department visits, and hospitalizations.[50,51] One example is the Multifamily Asthma Group Treatment, which was created to improve asthma management and reduce emergency department visits of Black and Hispanic families by using a culturally competent approach.[50] This program allowed families to discuss and learn about their own cultural resources in managing their children's asthma. Compared with the control, the Standard Psychoeducational Asthma Intervention, the Multifamily Asthma Group Treatment, was significantly more effective in decreasing emergency department visits and increasing parents' knowledge of asthma.[50]

Community. Many community programs have been developed to improve asthma control in minority patients with asthma and who were impoverished, which thereby reduced hospitalizations, readmissions, and emergency department visits. Interventions that address the home environment have been shown to improve asthma management. One such program targeted low-income older adults (ages $\geq$ 62 y) with asthma or COPD. It involved pest management, mattress encasement for dust mites, cleaning supplies, and structural interventions. The adults were educated about asthma triggers and treatment. This led to a statistically significant reduction in self-reported environmental asthma triggers and improvement in the number of physician visits, use of antibiotics for pulmonary issues, respiratory symptoms, quality of life, and asthma control.[52] A different public housing redevelopment initiative aimed to reduce moisture, enhance ventilation systems, minimize dust and off-gassing to reduce asthma triggers for low-income children and adolescents with asthma. There was also in-home asthma education provided by community health-care workers to address self-management and trigger reduction. Of the participants, 85% were low income. At a 1-y follow-up, there was improvement in symptom-free days, caretakers' quality of life, urgent care visits, asthma control, activity-limited days, rescue-medication used days, nighttime symptoms, and asthma attacks; and reduced mold, rodents, moisture exposure, and trigger score.[53]

Community health-care workers serve as an invaluable resource in improving symptoms and quality of life as well as in reducing hospitalizations. In a randomized clinical trial, community health-care workers provided home visits

for low-income adults between 18 and 65 y old.[54] Those who received home visits had a significantly greater increase in symptom-free days and quality of life, and decreased urgent care use.[54] Another intervention targeted Black, low-income adults in Chicago.[55] They were offered 4 group sessions led by a community social worker and 6 home visits by community health-care workers. The participants had increased asthma self-efficacy, improved asthma quality of life, and improved coping compared with controls.[55] A different program that targeted children showed that, when community health-care workers made home visits to Blacks who were impoverished to conduct assessments and deliver interactive, tailored, culturally sensitive education to the child and family, the participants reported reduced asthma symptoms, health resource use, and activity-limited days, and improved caregiver quality of life, knowledge, and self-efficacy at 1-y follow-up. This intervention was also shown to be cost-effective, which resulted in $5.58 saved per dollar spent due to the improvement in urgent health resource utilization and the relatively low cost of implementing this model.[56]

There are several community-based efforts to target pediatric asthma. In 2005, local leaders in New York City developed the Washington Heights/Inwood Network for Asthma program to target the high rates of asthma in New York City, which is presently active. With the help of community health-care workers, families who participated in the yearlong care-coordination program received comprehensive asthma education, home environmental assessments, trigger reduction strategies, and clinical and social referrals. After 12 months, hospitalizations and emergency department visits decreased by $>$ 50% and caregiver confidence in controlling the child's asthma increased to nearly 100%.[57] A second community-based intervention that targeted children involved supervision of daily asthma-controlling medication, such as inhaled corticosteroids by the school staff and the school administration in an effort to improve medication adherence. This intervention was implemented in 36 schools in Alabama in which most students were Black. At 15-month follow-up, there was an improvement in asthma control based on missed school days, quick-relief inhaler use, and peak flow readings.[58] Although these community-based efforts were targeted toward the pediatric asthma population, they would be effective across all age groups. These programs illustrate how community-based interventions can make a substantial impact on asthma control for minorities who are impoverished.

Provider/Microsystem. Several interdisciplinary asthma interventions are microsystems of care that are directed by a physician. For example, a large barrier to asthma control for adults is treatment adherence. A technology-based medication intervention for young Black adults was shown to be feasible and effective in improving adherence. The program involved 2 computerized motivational sessions, along with individualized text messages. This led to improved self-reported adherence behavior, reduced number of doses missed, and improved asthma control; the intervention group also had an improvement in their FEV_1 (a measure of lung function) by 4.41%.[59]

Another example is the Breathmobile/PADMAP (pediatric asthma disease management program), which is a mobile asthma clinic developed as an outreach program that aimed to overcome barriers to health care and to deliver effective long-term asthma care to children who live in lower socioeconomic areas of Los Angeles. Each Breathmobile houses a 4-member team, including an allergist (physician), 2 staff members (either a registered nurse and a respiratory therapist or 2 registered nurses), and a patient-service worker. With the pioneering of the Breathmobile, the patients saw a reduction in asthma-related emergency department visits or hospitalizations, from 37.3% to 8.7% within the first 6 visits of the program.[60] For the first 7 years, it cost $365,865 per year to purchase the unit and to operate it as well as pay the staff; however, in a cost analysis study, the return on investment per mobile unit was $6.73 per invested dollar, due to the money saved from avoided emergency department visits and relative value of quality-adjusted life-years saved.[61] The annual estimated emergency department cost in 4 geographic regions was reduced by $2,541,639.[61] The Breathmobile/PADMAP system is a valuable example of the effectiveness of an interdisciplinary approach to improve asthma care. Further studies have demonstrated that the Breathmobile/PADMAP system could be implemented in a stationary clinic and achieve similar asthma-related outcomes.[62]

Organization. The Centers for Disease Control and Prevention funded programs, such as The National Asthma Control Program, have improved the quality of asthma care and management tools, while also promoting policies to reduce air pollution.[63] There are numerous multi-dimensional, interdisciplinary programs supported by federal funding; therefore, increasing support to them may reduce health-care costs and improve quality of life for patients at risk for developing asthma, reduce the burden of asthma in the United States, and also reduce racial and ethnic asthma-related disparities.[64]

Quality-improvement projects, those that improve a system to provide consistent care, have demonstrated improvement in asthma-related outcomes in minority children who were impoverished. The California Asthma Among the School Aged project was a continuous quality-improvement process used by an interdisciplinary clinic-based team that included community health-care workers[65] and aimed to promote interdisciplinary team building and creative improvements in clinic systems and processes, and to provide guideline-based clinical care. This program targeted

minority children who were impoverished and led to clinic-wide improvements in the documentation of asthma severity, review of action plans, health services use, and asthma symptoms. At follow-up, fewer patients reported emergency department visits, hospitalizations, daytime and nighttime symptoms, and missed school days compared with the baseline. In addition, more patients reported excellent or very good quality of care and confidence in asthma self-management.[65]

A similar quality-improvement project provided enhanced care through home visits by nurse case managers to pediatric patients with asthma who were impoverished. The majority of the study participants were Black or Hispanic, with 72.7% using Medicaid and 70.8% with a household income of <$25,000. This intervention led to a significant decrease in asthma-related emergency department visits, hospitalizations, days of limited physical activity, missed school days, and parents' missed work days. This was also shown to be cost-effective, with an investment return calculated at $1.46 saved per dollar spent.[66] These interventions show that quality-improvement efforts improve symptoms and reduce hospitalizations, readmissions, and emergency department visits.

Another attractive concept is care coordination. It is defined as a client-centered interdisciplinary approach to integrate health-care and social-support services in which an individual's needs and preferences are assessed, a comprehensive care plan is developed, and services are managed and monitored by a care coordinator who followed evidence-based standards of care.[67] In one example of this, the intervention targeted children and adults with asthma, and involved a patient registry, a systematic approach to assessing asthma control by using the Asthma Therapy Assessment Questionnaire, case management, and physician education. The team involved nurses, asthma specialist case managers, office-based asthma nurse educators, and physicians. This intervention led to decreased asthma-related emergency department visits and hospitalizations.[68]

In another example of care coordination, nurses, health-care educators, and community health-care workers served as asthma-care coordinators while working to connect patients with asthma with clinical care providers. A care-coordination program was implemented in underserved communities, where the participants were mostly Black or Hispanic. At follow-up, intervention participants reported 2.2 fewer symptom days per month and 1.9 fewer symptom nights per month compared with the control group. Also, the relative risk in the past year for the intervention group was 0.63 for an emergency department visit and 0.69 for hospitalization.[69] Care coordination is an excellent example of multi-dimensional, interdisciplinary care, and results in improved symptoms and reduced emergency department visits and hospitalizations.

Policy. Policy-focused interventions can also improve asthma symptoms and reduce medical visits. For example, policy efforts can focus on minimizing exposure to pollution and allergens. After implementation of a tax grade, a survey of 24 million individuals showed that a stronger tobacco tax was associated with reduced severity of childhood asthma.[70] Similarly, when a Smoke-Free Air Law was implemented in Michigan, there was an 8% decrease in adult asthma hospitalization rates. However, despite there being universal decreases, Blacks were still 3% more likely to be hospitalized for asthma than whites.[71]

The change in insurance reimbursement to providers from fee-for-service to pay-for-performance will incentivize providers to deliver high-quality asthma care. Public reporting of asthma hospital readmissions and payment penalties for readmissions will serve as effective deterrents and improve asthma care. Accountable care organizations will promote care coordination and collaboration between hospitals and physicians. Promoting diversity and inclusiveness among health-care providers will help reduce asthma treatment disparities in underserved minorities.

Future Directions

Despite these efforts and their successes, minorities who are impoverished are still disproportionately affected by asthma. Creating interventions is especially difficult due to multiple factors that contribute to the high rates of asthma and its complications in these populations.[72] Providing asthma care through other settings shows promise in improving asthma outcomes. This was observed in the Breath-Mobile/PADMAP initiative.[60-62] Another alternate setting is through telemedicine, which has been shown to reduce disparities in rural areas.[73] A randomized controlled trial is currently looking into the effect of school-based telemedicine on asthma morbidity.[74] Home-based medicine may also reduce asthma disparities. A randomized controlled trial is looking at a home-based intervention's effect on asthma control in Blacks.[75] Although some of the aforementioned programs target pediatric patients, these measures are likely to be effective for all age groups.

Providers can also optimize care of patients with asthma, which, in turn, reduces disparities, such as implementing asthma action plans and use of electronic health records. At an initial hospital visit, it is beneficial when physicians explain how to monitor asthma symptoms and pharmacists explain the correct technique of administering inhalers.[76] An example of an asthma action plan (Supplemental Fig. 1A [see the supplementary materials at http://www.rcjournal.com]) comes from the National Institutes of Health.[77] It is made up of 3 zones: "Doing Well," "Asthma is Getting Worse," and "Medical Alert!" Each of these zones describes the symptoms that the patient might be feeling, and there is an associated plan of action that is put

together by the patient and the physician. There is an additional educational page that outlines common triggers for patients with asthma (Supplemental Fig. 1B [see the supplementary materials at http://www.rcjournal.com]).[77] In addition, incorporating electronic health records to develop asthma care plans can enhance patient care. An example is the Asthma Management and Outcomes Monitoring System, which is integrated into the hospital's electronic health records system and connected with asthma assessment tools to generate an asthma action plan. The Asthma Management and Outcomes Monitoring System has led to an increase in the number of patients with controlled asthma.[78] Further research is required to assess their use in underserved communities and determine if these strategies reduce asthma disparities.

Longitudinal studies are necessary to further understand the risk factors associated with high rates of asthma and complications among impoverished minorities, for example, assessing exposure to pollutants and allergens that precede the onset of sensitization, including during the prenatal and early life periods.[79] Beyond organic causes, research is needed to investigate the environmental and systematic factors that predispose these patients to the high rates of hospitalizations, readmissions, and emergency department visits, such as differential quality of health care, air pollution, tobacco smoke, substandard living conditions, violent crime, and racial discrimination, and to develop interventions to address these.[33] Further knowledge of risk factors would allow for the development of interventions that target the risk factors to reduce asthma-related hospitalizations, readmissions, and emergency department visits.

Additional federal funding for these programs is needed. The Centers for Disease Control and Prevention funded programs, such as The National Asthma Control Program, has improved the quality of asthma care, improved asthma management tools, and promoted policies to reduce air pollution.[63] Increasing the number of federally funded programs that provide in-home asthma intervention services may reduce health-care costs and improve quality of life for patients with at-risk asthma. It can also help reduce the burden of asthma in the United States and reduce racial and ethnic asthma disparities.[64] In turn, this would reduce the burden of asthma-related hospitalizations and urgent care visits that minorities who are impoverished currently face.

Summary

Many successful multi-dimensional, interdisciplinary programs have been implemented to improve asthma-related outcomes; however, minorities who are impoverished remain disproportionately affected by this disease and experience increased rates of hospitalizations, readmissions, and emergency department visits due to genetics, socioeconomic status, and environmental and lifestyle factors. To improve the lives of these patients and reduce the economic burden, widespread implementation of asthma programs is necessary.

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