

ASTHMA IN THE EMERGENCY ROOM

The relationship between Direct to Consumer Advertising (DTCA) and asthma-related emergency department use among Medicaid-enrolled childrenLuceta McRoy, PhD¹, Robert Weech-Maldonado, PhD², and Meredith Kilgore, PhD³¹Morehouse School of Medicine, National Center for Primary Care, Atlanta, GA, USA, ²Department of Health Services Administration, University of Alabama Birmingham, Birmingham, AL, USA, and ³Health Care Organization and Policy, School of Public Health, University of Alabama Birmingham, Birmingham, AL, USA**Abstract**

Objective: Asthma is a leading cause of emergency department (ED) visits. There has been much debate on the impact of direct to consumer advertising (DTCA) on healthcare. This study seeks to examine the association between DTCA expenditure and asthma-related ED use. **Study design:** In this study, we combined Medicaid administrative data and a national advertising data on asthma medications. The sample size consisted of 180 584 Medicaid-enrolled children between the ages of 5 and 18 years who had an asthma diagnosis. Twenty percent of the Medicaid-enrolled children in the sample had asthma-related ED visits. **Results:** We found that DTCA expenditure is associated with a decrease in asthma-related ED visits (OR = 0.75; CI: 0.64–0.89). However, at higher levels of DTCA expenditure, the likelihood of asthma-related ED visits increases (OR = 1.25; CI: 1.05–1.49), indicating a decreased relationship between DTCA and asthma-related ED visits. **Conclusions:** Our findings suggest that DTCA may be associated with improved health outcomes for Medicaid-enrolled children with asthma.

Keywords

Asthma, disparities, DTCA, Medicaid, pediatrics

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Introduction

Asthma is a chronic disease, which affects close to 10% of US children, and disproportionately affects minorities and those from low-income families [1–3]. Asthma is one of the leading causes of healthcare use and morbidity among children in the United States [4]. Asthma accounted for approximately 440 thousand hospitalizations and 2 million asthma-related emergency department (ED) visits in 2010 [3].

Mortality, morbidity and health service utilization related to asthma are even higher among minority children. Asthma-related ED visits among Black children are 260% more than the number for non-Hispanic white children [5]. Furthermore, asthma-related mortality is estimated as 500% higher among minority children compared with non-Hispanic white children [5].

Asthma is a complex disease and so is the treatment. The variety of medications for the treatment of asthma are categorized in two groups: (1) long-term medications, which are taken over a period of time to maintain control of persistent asthma, and (2) quick-relief or rescue medications, which work to prevent or attenuate an asthma attack. Long-term (controller) medications are anti-inflammatory and

include inhaled corticosteroids, which have been advocated as the most consistently effective controller for mild to severe persistent asthma [6]. Regular adherence to long-term asthma medications leads to decreased ED visits [7–9] and subsequent lower hospitalizations [10].

Asthma medication adherence among children enrolled in Medicaid is poor [8], and as a result, they are more likely to have higher rates of ED visits compared to children with private insurance [11]. In addition, minorities are less likely to have or use controller medication [8,12–14]. Numerous factors are associated with adherence including education, knowledge of the risks and side effects of the drugs [6], forgetfulness and stigmatization [15]. Morbidity and mortality of asthma patients can be prevented with increased patient education and medical management [8].

Direct to consumer advertising (DTCA), defined as any type of prescription drug advertising that is geared toward the consumer or patient, rather than toward healthcare providers, is permitted in the United States [16]. However, DTCA may increase patient education of diseases and treatment options. The literature on the association between DTCA and adherence is sparse, however, with only a few studies showing a link between DTCA and use of antidepressants and cholesterol drugs [17–20]. Hansen et al. reported that patients were more likely to be adherent when they received antidepressants during periods of promotional spending directed toward physicians (detailing) and phases of higher DTCA spending

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[18]. Donohue et al. found an increase in the initiation of treatment therapy for depression during periods of high DTCA spending for a class of antidepressant drugs, but brand-specific DTCA and physician detailing did not affect adherence [19]. Wosinska also found that DTCA had a small effect on adherence to cholesterol-reducing drugs. As with the previous study by Donohue et al., Wosinska found no brand-specific effect of DTCA [20]. There are other studies that have examined DTCA effect on prescribing rates and health behavior [21,22]. However, to our knowledge, there has not been any study on the effects of DTCA on asthma-related ED visits, particularly among Medicaid-enrolled children. This article seeks to examine the association between the DTCA of asthma long-term medication and healthcare utilization among Medicaid-enrolled children with asthma.

DTCA and patient behavior

Until the early 1990s, almost all advertising for prescription medications was aimed at physicians (detailing) who would make judgments about what to prescribe and when; and most advertisements directed toward consumers were in print [16,23]. This changed in August of 1997 when the Food and Drug Administration (FDA) eased the restrictions placed on DTCA of prescription drugs, allowing broadcast product-claim advertisements [16]. As a result of the policy changes by the FDA, there has been an exponential growth in DTCA of prescription drugs.

There are, however, two conflicting views of the effects of DTCA with supporting studies for both arguments. Opponents argue that DTCA can be potentially harmful to consumers and may produce more harm than good. DTCA may decrease the quality of healthcare, since it may impair the relationship between the patient and the physician [24,25]. Since DTCA increases the likelihood that a drug advertised may be requested and granted by the physician [24–26], there is concern that this may put pressure on physicians to comply with patients' requests [27] and even result in patients second-guessing the diagnosis [28].

Proponents, on the other hand, argue that it is good for consumers who seek autonomy and desire to have access to information concerning their medical care. Support for DTCA comes from a number of studies [27–34]. According to Adeoye & Bozic, DTCA allows patients to inform themselves of the various options available providing more patient empowerment and ownership of the decision making in healthcare [29]. The symptoms and treatments for certain medical conditions that are presented in the advertisements may help to raise awareness of those conditions among affected minority population [30] and increase compliance [27,28,35].

Methods

Data

To assess the association between DTCA expenditure and asthma-related ED visits, we utilized the Medicaid Analytic eXtract (MAX) dataset from 1999 to 2002 combined with advertising expenditure data of long-term asthma prescription drugs. The MAX dataset includes inpatient file, outpatient

file, prescription drug file and the personal summary file. These files provide demographic data such as date of birth, gender and race, healthcare utilization summary and prescription drug claims.

The advertising data were obtained from Competitive Media Reporting, a market research company that collects data on national and international advertising expenditures of all products, including pharmaceuticals. It includes national and local advertising spending reported in thousands of dollars on long-term asthma medications and the number of times the ads appeared in major metropolitan cities. The advertising dataset provides monthly data on advertising expenditures by product. Advertising spending covers 96 major metropolitan areas, which are the top media markets in the United States. For this study, we focus on advertising expenditures on asthma medications. We included only local television advertisements since they contained information at the county level. The advertising dataset has been used in several studies and provides rich information on DTCA spending [19–22]. The Medicaid data were merged with advertising data using county identifiers. The use of these data was approved by the University of Alabama at Birmingham's Institutional Review Board and by the Centers for Medicare and Medicaid Services Privacy Board.

Sample

We identified children with an asthma clinical diagnosis by the use of ICD-9 code 493.X and prescription claims for both short- and long-term medication. We then identified patients with persistent asthma as those that met at least one of the following Health Plan Employer Data and Information Set (HEDIS) criteria over the study period: (1) at least one ED visit with asthma as the principal diagnosis; (2) at least one hospital admission with asthma as the principal diagnosis; and (3) at least four ambulatory visits with asthma as the principal diagnosis [36]. In order to reduce potential bias, the HEDIS medication use criterion (at least four asthma medication dispensing events) was not used in this study.

The final sample included 180 584 children between the ages of 5 and 18 years. Only children residing in counties with DTCA advertising were included in the sample. The sample represented 44 states including the District of Columbia, and 496 counties in which there were children with an asthma diagnosis. The states excluded from the sample due to no reported DTCA of asthma medication during the study period include: Montana, Wyoming, North Dakota, South Dakota, Vermont, Idaho and Alaska.

Variables

The outcome variable was whether or not a child experienced an asthma-related ED visit (1 = yes and 0 = no) during the study period based on the MAX inpatient claim file. DTCA is the primary independent variable and is defined as expenditures on local advertising for asthma controller medications that are directed to the patient. We measured DTCA expenditure as the aggregated DTCA spending by quarter by county. A squared term for DTCA expenditure was also included given the nonlinear relationship between DTCA expenditure and the likelihood of an asthma-related ED visit.

We focused on six long-term (controller) asthma prescription drugs, which were included in the advertising data set: Flovent (Fluticasone), Serevent (Salmeterol), Singulair (Montelukast), Advair (Fluticasone and Salmeterol), Accolate (Zafirlukast) and Qvar (Beclomethasone). We also studied the short-term (rescue) medication, albuterol.

Covariates race (White, Black and Other), age (5–18 years) and gender (male and female) were included to control for predisposing factors that may influence health-care use according to the Andersen model [37], which suggests that socio-demographic factors affect the use of healthcare. The majority of the children in the sample were either Black or White. Due to the small percentage of other races, they were aggregated as other race. Age was a continuous variable and was classified as age at baseline. The data were structured as repeated observations for each child in each quarter.

Statistical analysis

We estimated a logistic regression model to examine the relationship between DTCA expenditures and the likelihood of asthma-related ED visits. This was a balanced panel dataset containing observations on individuals over 16 quarters in the four-year study period. We used the Generalized Estimating Equation population-averaged model to control for the repeated quarterly observations on each Medicaid-enrolled child. Odds ratios were calculated and marginal effects were then obtained to determine the marginal association between DTCA and healthcare use. All analyses were performed using STATA 10 (College Station, TX).

Results

Table 1 presents the descriptive statistics. A larger proportion of the sample was male (56.5%) with an average age of nine years. White children accounted for a larger percentage of the sample (43.9%) compared to Blacks (32.6%). Only 20% had at least one or more asthma-related ED visits over the study period. In the sample, Black children had less asthma-related ED visits compared to White children. The average DTCA spending per county for each quarter was \$3940.

In Table 2, we present the results from our logistic regression model estimating the likelihood of an asthma-related ED visit. DTCA expenditure on asthma medication was associated with asthma-related ED use among Medicaid-enrolled children. As advertising of asthma medication increased, Medicaid-enrolled children were 25% less likely to have an asthma-related ED visit (95% CI: 0.64–0.89, $p = 0.001$). For every one-hundred thousand dollar increase in DTCA expenditure there is a 0.3% increase in asthma-related ED visits ($p < 0.001$). DTCA expenditure squared was associated with a 25% greater likelihood of asthma-related ED visits (95% CI: 1.06–1.49, $p = 0.01$). The association between asthma-related ED visits and DTCA is lost at the 75 percentile level of DTCA spending.

The covariates, Black, White and age had no significant association with asthma-related ED visits. However, males were 10% more likely to have asthma-related ED visits compared to females (95% CI: 1.08–1.12, $p < 0.001$).

Table 1. Sample characteristics of Medicaid-enrolled children with asthma ($N = 180\,584$).

Variables	Mean/percent
Demographics	
White	43.9
Black	32.6
Other	23.3
Male	56.5
Age (years)	9.1
Healthcare utilization	
Asthma-related ED visits ^a	20.2
ED visits among Black	32.8
ED visits among Whites	43.6
DTCA expenditure	
Average quarterly advertising expenditure ^b	3940

^aPercentage of emergency department visits for asthma-related illnesses among children with asthma.

^bDTCA expenditure represents thousands of dollars by county of residence per quarter and ranges from no spending in some counties to 116 000 in some counties.

Table 2. Logistic Regression Results of the Association between DTCA Expenditure and Asthma-related ED Utilization.

Variables	Asthma-related emergency department visits ($N = 180\,584$)		
	OR	CI (95%)	Marginal effect
DTCA spending	0.75 ^a	0.64–0.89	0.3 ^a
DTCA spending squared ^b	1.25 ^a	1.06–1.49	
Black ^c	0.98	0.96–1.01	
White ^c	0.98	0.96–1.00	
Age	1.00	0.99–1.00	
Male	1.10 ^a	1.08–1.12	

^a $p \leq 0.05$.

^bThe squared value of advertising spending per quarter per county.

^cThe reference group for White and Black is Other Races.

Discussion

Previous studies have examined the relationship between DTCA and adherence [18–20], diagnosis and treatment [17], prescribing rates [21] and attainment of health goals [22]. To date, however, to our knowledge there have been no studies examining the relationship between DTCA and its association with healthcare use among Medicaid-enrolled children with asthma. As such, this study helps to fill a knowledge gap in this area. Our results suggest that DTCA expenditure is associated with healthcare use among Medicaid-enrolled children after controlling for confounding factors.

We found that quarterly DTCA spending per county is associated with a decreased likelihood of asthma-related ED visits. One potential mechanism that may explain this finding is that DTCA may lead to increased adherence to preventive asthma medication or the use of long-term asthma medications. This may decrease the likelihood of an asthma attack and thus decrease the need to visit an emergency room [8,10]. McRoy found there is a greater likelihood of asthma medication use as DTCA spending increases [38]. Additional studies also show an association between DTCA and healthcare use [18,19,20]. Furthermore, previous research shows that Medicaid-insured individuals are more likely to watch television and to be

influenced by DTCA [39–41]. The association between DTCA and decreased asthma-related ED visits may also be explained by increased visits to primary care physicians as a result of information gained through the advertisements [31]. Asthma prevalence among children increased at a rapid rate between the early 1990s and 1999, the first year of this study [42] and has remained stable between 2001 and 2009 [43]. This may have contributed to an increase in physician visits. However, future research is needed to examine the mechanisms that may explain the relationship between DTCA expenditure and healthcare use.

The findings also show that at higher levels of DTCA expenditure the association between DTCA expenditure and asthma-related ED visits begins to decline and we see an increase in the likelihood of asthma-related ED visits. This is supported by previous studies [21,22]. One possible explanation is that while increased DTCA spending may lead to increased request for medication, it does not always translate into increased compliance with prescription medication. In addition, unobserved factors may be correlated with both high DTCA spending and asthma-related ED use. For example, markets with high DTCA expenditure may also be markets with barriers to primary care, which can result in increased asthma-related ED use in this population.

Limitations

There are some limitations to the study. Use of Medicaid claims data may result in miscoding, missing information and other factors associated with administrative data sources. However, the Medicaid claims data provide a large national sample that is representative of asthmatic children and serves as a rich source of information on health care utilization. The time period in this study (1999–2002) was chosen due to the availability of Medicaid data that matched with the available DTCA data. The asthma drugs studied were introduced during this time period and spending on advertising may have changed since the study period. However, the association between DTCA and healthcare use may not change much over time. Future research could examine the association in recent years. Information on individual primary care physicians was not available in the dataset. Hence, we were unable to assess the primary care, which may impact ED use. The measurement of increased office visits is beyond the scope of this study. In addition, although the HEDIS criteria for persistent asthma served as an inclusion criteria, the severity of asthma was not available in the MAX data files. The advertising data present some limitations as well. Given the nature of the data, the study does not measure the effect of DTCA at the individual level but rather at the county level. Finally, detailing, marketing efforts directed toward physicians still accounts for a large portion of pharmaceutical marketing efforts other than DTCA advertising. Therefore, further study on the comparison of the association between DTCA expenditures and detailing may provide more insights to the findings of this study.

Conclusions

This study showed that DTCA is associated with a decreased likelihood of asthma-related ED visits among Medicaid-enrolled children. However, at higher levels of DTCA

expenditure, the association was reversed with higher spending, increasing the likelihood of asthma-related ED visits. Although DTCA is controversial, this study suggests that it may play a significant role in healthcare utilization. The increasing burden of asthma requires creative measures to combat the associated health, economic and social costs. DTCA helps to disseminate information that could potentially lead to improved health outcomes among this population.

Declaration of interest

The authors declare there is no conflict of interest.

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