Retail Clinic Utilization Associated With Lower Total Cost of Care

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Objectives: To better understand the impact of retail clinic use on a patient's annual total cost of care.

Study Design: A propensity score matched-pair, cohort design was used to analyze healthcare spending patterns among CVS Caremark employees in the year following a visit to a MinuteClinic, the retail clinics inside CVS pharmacies.

Methods: De-identified medical and pharmacy claims for CVS Caremark employees and their dependents who received care at a retail clinic between June 1, 2009, and May 31, 2010, were matched to those of subjects who received care elsewhere. High-dimensional propensity score and greedy matching techniques were used to create a 1-to-1 matched cohort that was analyzed using generalized linear regression models.

Results: Individuals using a retail clinic had a lower total cost of care (–$262; 95% confidence interval, –$510 to –$31; $P = .025$) in the year following their clinic visit than individuals who received care in other settings. This savings was primarily due to lower medical expenses at physicians' offices ($77 savings, $P = .008$) and hospital inpatient care ($121 savings, $P = .049$). The 6022 retail clinic users also had 142 (12%) fewer emergency department visits ($P = .01$), though this was not related to significant cost savings.

Conclusions: This study found that retail clinic use was associated with lower overall total cost of care compared with that at alternative sites. Savings may extend beyond the retail clinic visit itself to other types of medical utilization.

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For author information and disclosures, see end of text.

Medical walk-in clinics located in retail stores have become increasingly prevalent since first appearing in 2000.[1] There are now more than 1400 retail clinics and the volume of patients treated increased more than 10-fold between 2007 and 2009 (personal e-mail communication with Tine Hansen-Tuton, MPA, JD, Convenient Care Association, June 6, 2012).[1-5] These clinics generally employ a nurse practitioner or physician assistant to care for patients with a defined set of conditions that include acute medical problems (eg, sore throat, upper respiratory infection) and vaccinations on a walk-in basis, without appointments.[6] Recently, monitoring services for chronic diseases and general physical examinations have been added.

Some have argued that the retail clinic could represent a positive development in American healthcare, suggesting that the care is both high quality and low cost.[7] Quality of care at retail clinics has been assessed by several investigators. Mehrotra and colleagues found that quality of care for patients treated at retail clinics with sore throat, ear infection, and urinary tract infection was at least as good as that at alternative sites of care on 14 objective quality measures.[8] Another study demonstrated 99% provider adherence to clinical practice guidelines for sore throat treatment.[9] Studies of pediatric patients have revealed similarly high levels of adherence to clinical practice guidelines at retail clinics.[10] Meanwhile, the costs per episode of illness have been observed to be 40% to 80% lower than those for services provided in physician offices, urgent care sites, and emergency departments (EDs).[8]

The impact of retail clinic medicine on the total cost of care has not been rigorously studied. After a literature review, we found only 1 study on total medical costs in the 6 months following a retail clinic visit, suggesting they are decreased, but this study did not examine the cost of pharmacy expenses or the total cost of care for patients seen at retail clinics.[11] One hypothesis would suggest that retail clinics serve as a lower-cost substitute site of care for needed services. Alternatively, total costs of care might be higher for retail clinic users if the clinics stimulate increased utilization, especially in light of the access that they provide, including weekend and evening walk-in care without appointments.[12] If patients additionally seek care from their regular care providers for the condition for which they were seen in the retail clinic, total cost and utilization might be higher. Similarly, if they seek care at retail clinics for conditions that would

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otherwise not be treated by professionals (self-care), overall utilization might be higher. Understanding the effect of retail clinic care on the total cost of delivered healthcare is essential as we seek new models to deliver high-quality care at lower overall costs.

Take-Away Points

If access to retail clinics can help to lower total medical expenditures while providing high quality of care, retail clinics could be an important component of the systems of care that provide comprehensive services at lower cost.

- Total cost of care savings associated with retail clinic usage.
- Savings were derived from decreased physician office and hospital visit expenses.
- Use of retail clinics associated with reduced number of emergency department visits.

METHODS

A propensity score matched-pair, cohort design was used to analyze the healthcare spending pattern of CVS Caremark employees and dependents who were continuously eligible for medical and pharmacy benefits between June 1, 2008, and May 31, 2011. MinuteClinic is the largest retail clinic chain in the United States, with approximately 600 clinics in CVS pharmacies in 25 states.

Data Sources

All de-identified medical and pharmacy claims were obtained for all members with services between June 1, 2008 and May 31, 2011 following internal and external guidelines designed to guarantee confidentiality and integrity of personal health information. The medical claims identified by a computer generated unique subject identification number were: date of service, diagnosis codes as defined by *International Classification of Disease, Ninth Revision* (*ICD-9*), procedures identified by the Current Procedure Terminology, Version 4 code (CPT-4), gross cost of service, hospital revenue code, the provider tax ID number, and the member's status as insured employee or dependent. The pharmacy claims identified by a computer generated unique subject identification number were: fill date of the prescription, generic product index (GPI) code, National Drug Codes (NDC), and gross cost of the drug. Internal de-identified employment data was aggregated and used to identify the environment of the subjects' workplace for the CVS Caremark employees.

Study Cohort

Subjects were considered retail clinic users (exposed) if they were seen at CVS MinuteClinic locations. Retail clinic users (exposed) and nonusers (unexposed) were classified based on the presence or absence of medical claims billed by a MinuteClinic provider for services in the study entry period between June 1, 2009, and May 31, 2010. Index dates were defined for each member to create a subject-specific baseline covariate assessment period and follow-up period as the 365 days before and after the subject's index date, respectively. The index date was defined for the exposed subjects based on their first retail clinic visit between June 1, 2009, and May 31, 2010. Subjects were excluded from analysis if they visited the retail clinic in the year prior to June 1, 2009, but not during the study entry period. This exclusion criterion allowed for a 12-month washout period for unexposed subjects. Subjects who were classified as unexposed could have visited the retail clinic at some point after May 31, 2010, but not at any time prior to that date. The index dates for unexposed subjects were frequency matched to their exposed counterparts by calendar time. To account for outliers, all subjects who had total cost of care more than $100,000 per year in either the baseline or follow-up period were removed from the analysis. All subjects were required to have at least 1 medical claim and at least 1 *ICD-9* code for a condition that could be treated at the retail clinic in the follow-up period. However, neither restriction was applied to the baseline covariate assessment period. Retail clinic visits were defined by claims billed from MinuteClinic provider tax ID numbers only; use of other retail clinics is unknown. Physician office visits (including urgent care, mental health visits, and rehabilitation visits) were defined by the place of service code for office and urgent care centers that were not billed by MinuteClinic provider tax ID numbers. ED visits were defined by place of service code for ED care. Inpatient hospital-based care was identified by place of service codes for inpatient hospital and included claims for inpatient consulting, radiologic exam interpretation, and general inpatient care. Outpatient hospital care was defined by place of service codes for both outpatient hospital and ambulatory surgical center, including procedures such as surgical pathology, screening mammography, endoscopy, and eye surgery. All medical claims that did not fit these service categories were classified as "other" locations, and included laboratory and pathology expenses, radiology expenses, and other provider expenses such as physical therapy.

Covariates

The medical claims in the subject's baseline period were used to create several behavior and utilization variables to describe and balance patient characteristics. Healthcare-seeking behavior was defined by the presence of at least 1 *ICD-9* or CPT-4 code for a preventive healthcare service (see **Appendix**). Chronic illness status (present/absent) was

defined as presence of asthma, depression, chronic obstructive pulmonary disease, diabetes mellitus, coronary artery disease, or hypertension as indicated by *ICD-9* codes for these diseases. Medical visit day count was defined as the sum of distinct days the subject had medical services claims, including hospital inpatient visit days. Distance was calculated as the Euclidean distance from the subject's residence to the closest MinuteClinic in miles at the time of the initial MinuteClinic visit. Age was calculated as of the index date; sex and state of residence were identified. Claims in the follow-up period were categorized into 6 different locations of service based on the place of service code and provider tax ID number on the medical claims. From the internal employment data, subjects were defined as working in a retail pharmacy with a retail clinic on-site, as working in a retail store with no retail clinic on-site, as dependent subjects, or as subjects who worked at "other" sites of employment, which included office, distribution center, and mail center pharmacy employees.

Propensity Score Matching

A propensity score was calculated for each subject using the high-dimensional propensity score SAS macro.[13] The propensity score included 500 empirically identified covariates (190 CPT-4 codes, 159 National Drug Codes, 151 *ICD-9* codes), in addition to age, sex, state of residence, distance from residence to the nearest MinuteClinic, healthcare-seeking behavior, chronic illness status, and number of medical visits. The greedy matching algorithm was used to create 6022 matched pairs out of the 7545 exposed and 44,368 unexposed subjects who met study eligibility criteria.[14] A maximum distance of 0.01 in propensity scores and no more than 7 days of difference in index dates between the exposed and unexposed members of the pair were allowed.

Outcomes

Total costs of care per subject in both the baseline assessment and follow-up periods were calculated as the sum of gross (ie, combined patient and insurer) service costs on the paid medical claims and gross prescription costs on paid pharmacy claims. An analysis of the location of care (eg, ED, hospital, physician office, retail clinic, other) based on claims expense was undertaken, comparing exposed and unexposed subjects.

Statistical Analyses

McNemar and paired *t* tests were performed to test the differences between groups. To control for remaining significant differences after matching, we fit 3 generalized linear regression models, using generalized estimating equations with gamma error distribution and log link functions, to compare spending between exposed and unexposed subjects after adjusting for the matched design and other covariates (age, sex, state, distance to MinuteClinic location, healthcare-seeking behavior, chronic illness status, work location). Since this generalized estimating equation model does not allow for values of zero, $0.01 was applied for individuals who spent nothing at the pharmacy in the study period. All analyses were performed with SAS software, version 9.1 (SAS Institute Inc, Cary, North Carolina).

RESULTS

Among the 51,913 potentially eligible individuals, 7545 used a MinuteClinic retail clinic and 44,368 did not. A total of 12,044 subjects were selected, creating 6022 matched pairs for analysis. Characteristics of both the unmatched and matched populations are displayed in **Table 1**.

Unmatched Population

The unmatched population of 7545 retail clinic users had few meaningful differences in measurable demographic characteristics from the 44,368 unexposed subjects. The only difference of note is average distance to the nearest MinuteClinic; exposed subjects lived an average of 6.2 miles from the nearest retail clinic and unexposed subjects lived an average of 32.9 miles from the nearest retail clinic.

Matched Population

In the matched population, both those exposed and unexposed to the retail clinic were composed of approximately 40% male subjects, 70% with healthcare-seeking behaviors, 19% with chronic illness, an average of 7 medical visit days in the baseline period, and an average age of 34 years. The retail clinic users lived an average of 0.3 miles (95% confidence interval [CI], 0.10-0.57; P <.01) closer to the nearest MinuteClinic than their matches. There were no other meaningful differences between the baseline characteristics of the exposed and unexposed subject groups. On average, the patients exposed to retail clinics had 1.56 (95% CI, 1.54-1.59; P <.001) retail clinics visits over the 12-month follow-up period and the unexposed subjects had an average of 0.06 (95% CI, 0.049-0.062; P <.001) retail clinic visits in the follow-up period. Of the 6022 unexposed subjects, only 288 (4.8%) went to the retail clinic in the follow-up period.

Matched Results

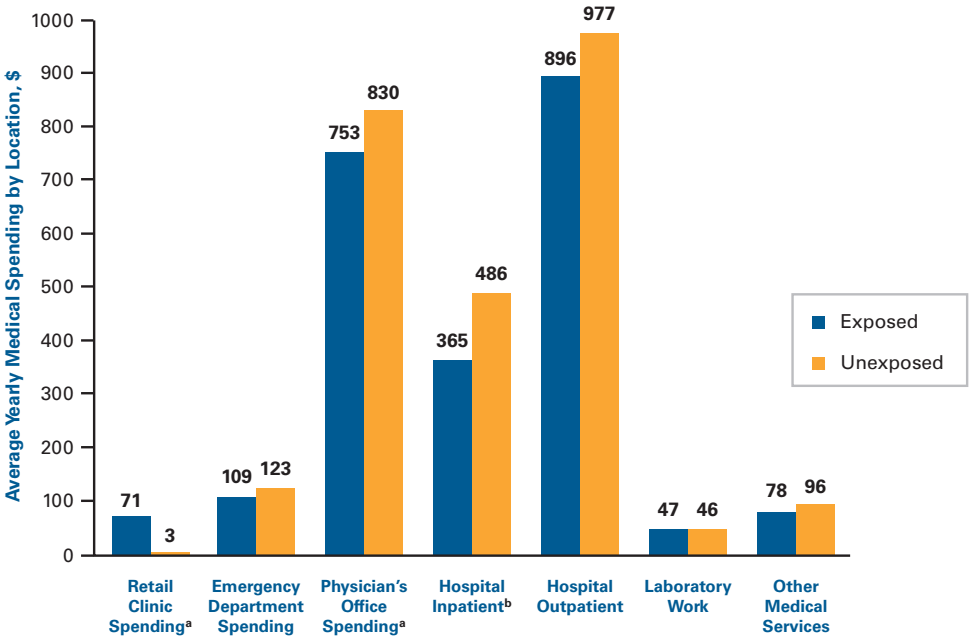
The average baseline assessment period total cost of care for the exposed (mean = $3255) and unexposed groups (mean = $3372) differed by a nonsignificant $117 (95% CI, –$350 to $116; P = .33). The exposed group on average spent a non-

Table 1. Characteristics of Unmatched and Matched Study Subjects: Exposed Versus Unexposed to Retail Clinics

Characteristics	Unmatched Subjects		Matched Subjects	
	Exposed to Retail Clinic (n = 7545)	Unexposed to Retail Clinic (n = 44,368)	Exposed to Retail Clinic (n = 6022)	Unexposed to Retail Clinic (n = 6022)
Age, y, mean (95% CI)	35 (34.2-35.0)	35 (35.3-35.7)	34.07 (33.6-34.5)	34.06 (33.6-34.5)
0-5, n (%)	447 (5.9)	3182 (7.2)	404 (6.7)	432 (7.2)
6-17, n (%)	1154 (15.3)	7091 (16.0)	972 (16.1)	1056 (17.5)
18-44, n (%)	3445 (45.7)	17,428 (39.3)	2692 (44.7)	2506 (41.6)
45-64, n (%)	2341 (31.0)	15,369 (34.6)	1828 (30.4)	1871 (31.1)
≥65, n (%)	158 (2.1)	1298 (2.9)	126 (2.1)	157 (2.6)
Distance to MinuteClinic, miles, mean (95% CI)	6.18 (6.0-6.4)	32.89 (32.3-33.4)[a]	6.79 (6.5-7.0)	7.12 (6.9-7.4)[a]
0-1, n (%)	620 (8.2)	1258 (2.8)	444 (7.4)	349 (5.8)
1-5, n (%)	4068 (53.9)	11,480 (25.9)	3075 (51.1)	2890 (48.0)
5-10, n (%)	1796 (23.8)	8649 (19.5)	1517 (25.2)	1697 (28.2)
10-20, n (%)	734 (9.7)	5772 (13.0)	661 (11.0)	717 (11.9)
>20, n (%)	327 (4.3)	17,209 (38.8)	325 (5.4)	369 (6.1)
Medical services utilization in baseline period, mean (95% CI)	7.3 (7.1-7.5)	7.5 (7.4-7.6)	6.91 (6.7-7.1)	7.00 (6.8-7.2)
≤2 visits, n (%)	2274 (30.1)	13,062 (29.4)	1978 (33.0)	2025 (34.0)
3-5 visits, n (%)	2033 (26.9)	11,583 (26.1)	1608 (27.0)	1512 (25.0)
6-10 visits, n (%)	1674 (22.2)	10,107 (22.8)	1290 (21.0)	1326 (22.0)
>10 visits, n (%)	1564 (20.7)	9616 (21.7)	1146 (19.0)	1159 (19.0)
Male, n (%)	2878 (38.1)	18,026 (40.6)[a]	2379 (39.5)	2400 (39.9)
Health seeking, n (%)	5486 (72.7)	31,994 (72.1)	4186 (69.5)	4210 (69.9)
Chronic illness, n (%)	1375 (18.2)	10,473 (23.6)[a]	1125 (18.7)	1080 (17.9)
Work location				
Retail location without retail clinic, n (%)	4492 (59.5)	31,835 (71.8)	3667 (60.9)	4273 (7.0)
Retail location with retail clinic, n (%)	1359 (18.0)	1058 (2.4)	941 (15.6)	259 (4.3)
Other location, n (%)	862 (11.4)	5598 (12.6)	735 (12.2)	678 (11.3)
Dependent, n (%)	832 (11.0)	5877 (13.2)	679 (11.3)	812 (13.5)
Total cost of care baseline period, $, mean, (95% CI)	3391.13 (3245-3537)	3767.36 (3701-x3834)[a]	3255.27 (3094-3416)	3372.28 (3201-3543)
Medical spending baseline period, $, mean (95% CI)	2186.33 (2069-2304)	2510.23 (2454-2567)[a]	2098.08 (1969-2226)	2282.97 (2137-2428)
Pharmacy spending baseline period, $, mean (95% CI)	1204.80 (1141-1269)	1257.13 (1232-1282)	1157.19 (1083-1232)	1089.31 (1027-1151)
Total healthcare cost study period, $, mean (95% CI)	3750.71 (3592-3908)	4186.36 (4114-4257)[a]	3610.27 (3436-3783)	3789.34 (3606-3972)
Medical spending study period, $, mean (95% CI)	2397.55 (2270-2524)	2791.99 (2731-2852)[a]	2318.92 (2179-2458)	2561.03 (2408-2713)[b]
Pharmacy spending study period, $, mean (95% CI)	1353.16 (1283-1423)	1394.37 (1366-1422)	1291.35 (1216-1366)	1228.31 (1151-1305)

CI indicates confidence interval.
[a]Significant difference at $P < .01$.
[b]Significant difference at $P < .05$.

Figure 1. Average Medical Expenses Based on Location of Care for Matched Subjects



[a]Significant difference at $P < .01$.
[b]Significant difference at $P < .05$.

significant $185 less (95% CI, –$378 to $8; $P = .06$) on their medical claims in the baseline period than the unexposed group, and about $68 more (95% CI, –$29 to $165; $P = .17$) on pharmacy expenses (Table 1).

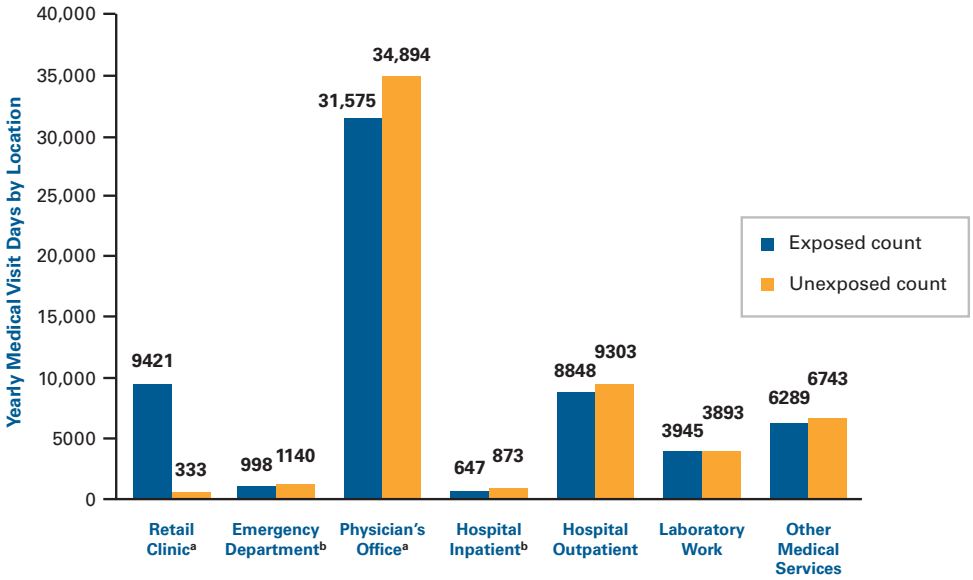
The unadjusted average medical cost for the exposed group in the 365 days including and following the initial retail clinic visit was $242 less (95% CI, –$450 to –$34; $P = .02$) than the average medical cost for the unexposed subjects in the same time period. The exposed subjects' unadjusted average pharmacy cost was a nonsignificant $63 more (95% CI, –$44 to $170; $P = .25$) than that of the unexposed subjects. The overall unadjusted yearly total cost of care for the exposed subjects was $179 (95% CI, – $434 to $76; $P = .17$) less than that of the unexposed subjects (Table 1).

The location of service for medical care expenses and visit count were analyzed for each site of care (Figure 1 and Figure 2). On average, the retail clinic–exposed subjects had $77 lower (95% CI, –$134 to –$20; $P < .01$) expenses at their physician's offices than their unexposed matches. The retail clinic users also had inpatient hospital expenses that were $121 lower (95% CI, –$242 to –$0.34; $P = .049$) than those of the unexposed subjects, but there was no significant difference in outpatient hospital expenses ($80 lower; 95% CI, –$192 to $31; $P = .16$). Exposed subjects had ED expenses that were $14 lower (95% CI, –$30 to $1; $P = .07$), but this finding did not reach significance. As expected, exposed subjects had significantly higher expenses at the retail clinic of $68 (95% CI, $67-$69; $P < .0001$).

Medical utilization based on count of visit days for the retail clinic exposed subjects was lower than that of the unexposed subjects at several locations of service. The exposed members had a total of 142 (12%) fewer ED visit days ($P = .01$), 3319 (10%) fewer physician visit days ($P < .001$), and 226 (26%) fewer hospital inpatient visit days ($P = .014$) than the unexposed group in the follow-up period (Figure 2). Utilization of hospital outpatient services, laboratory work, and other medical services did not differ significantly between the groups.

To control for the significant difference in distance to MinuteClinic locations between the exposed and unexposed subjects after matching, and to control for any differences due to the location of an employee's work, we fit a regression model adjusting for distance to MinuteClinic, work location, age, sex, healthcare-seeking behavior, and chronic illness status. From this model, total cost of care was found to be a significant $262 less (95% CI, –$510 to –$31; $P = .025$) for retail clinic–exposed patients compared with unexposed subjects, corresponding to $297 (95% CI, –$504 to –$106; $P = .0017$) less in medical costs and a nonsignificant $10 (95% CI, –$140 to $106; $P = .75$) less in

Figure 2. Total Utilization Count Based on Days of Service and Location of Care



[a]Significant difference at $P < .01$.
[b]Significant difference at $P < .05$.

pharmacy cost. The adjusted analysis results are shown in Table 2.

DISCUSSION

The results reveal that total cost of care in subjects who used a retail clinic was an adjusted $262 lower than that in unexposed subjects, after using a high-dimensional propensity score matching paradigm and adjusting for distance to a retail clinic, demographic factors, health status, chronic disease, overall number of medical visits, and healthcare-seeking behavior. Pharmaceutical expenses were not significantly different for retail clinic patients compared with unexposed subjects. Based on these results, there was no evidence that convenient access to retail clinics was driving up costs or overall utilization; in fact, total healthcare expenses were lower for those using retail clinics. Savings resulted from lower medical spending, primarily for physician office visits (including urgent care) and hospital-based care. ED expenses were also lower for exposed subjects, though the difference did not quite achieve statistical significance. In terms of utilization, exposed subjects did have significantly fewer visits to the physician office and the ED, as well as fewer hospital inpatient days, than their matches. For ED care, the significant decrease in visits, but not in total emergency care expenses, may suggest that retail clinic patients who go to the ED do so for more complex and expensive care per visit (eg, major medical illness, trauma) that is not appropriate for a retail clinic.

There are several potential explanations for the cost savings we identified. The savings described here, based on 12 months of overall cost data, may relate to both substitute care for higher-cost settings and to savings that extend beyond the day of the retail clinic visit (eg, fewer physician consultations or hospital visits). Limited access to primary care for unexposed patients may lead to evaluation of patients in higher-cost settings and further along in the natural course of illness, which may itself drive up the cost of care ultimately provided.[15,16] This could have a substantial effect if the result is excess hospital and physician-based care.

The expanding literature on retail clinics largely aligns with our findings. First, it appears that retail clinics are less expensive on an episode-of-care basis. A prior study has suggested that as an alternative to other sites of care, care at retail clinics for an episode of illness is associated with savings of 40% to 80%.[8] Another study suggested that 6-month follow-up expenses were lower for patients who initiated care in a retail clinic for a set of acute family medical problems.[11] Other studies on the cost of an episode of care have reached the same conclusion.[6,17] Several studies of follow-up care after retail clinic visits have demonstrated

Table 2. Adjusted Mean Total Cost of Care, Medical Expenses, and Pharmacy Expenses in Study Period After Matching

Type of Adjusted Cost	Exposed to Retail Clinic	Unexposed to Retail Clinic	Difference
Total healthcare cost, mean (95% CI)	$3083.44	$3345.26	$261.82 ($31.30-$509.77)
Medical cost, mean (95% CI)	$2078.29	$2374.87	$296.59 ($106.34-$503.66)
Pharmacy cost, mean (95% CI)	$1115.77	$1126.20	$10.43 (–$105.57 to $139.74)

CI indicates confidence interval.

that retail clinic care is not usually followed by care for the same episode of illness in a physician's office, urgent care site, or ED.[17,18] Our data suggest that both the observed frequency and cost of physician office visits are significantly lower in the matched exposed group.

Second, the notion that retail clinic visits could substitute for more expensive ED and urgent care settings is supported by several studies that have demonstrated that the majority of patients treated at retail clinics believe they would have pursued a variety of alternative sites for their care if no retail clinic were available, including EDs and urgent care centers. Only a minority of patients (fewer than 30%) would rely on self-care.[19,20] Our results suggest a significant decrease in the frequency of physician and ED visits for exposed subjects, a finding that could be confirmed in future studies in a larger subject sample. A recent study suggests that 59% of all ED visits could potentially have been treated at a less expensive ambulatory care center.[21] Another recent retrospective study of ED visits has suggested that as many as 14% of ED patients could have been cared for in a retail clinic based on their discharge diagnoses and low complexity.[22] Access to primary care without barriers has been cited as an important factor in diminishing unnecessary ED utilization and thereby holding down costs.[15,16,23,24]

One recent preliminary study based on a claims data analysis of "retail clinic sensitive conditions" has suggested that retail clinics could add to healthcare costs, based on analysis of utilization from 2007 to 2009.[12] The investigators hypothesize that convenience leads patients to use services that otherwise they would forgo, hence increasing overall costs. We did not find this to be the case. Indeed, if convenient access leads to unnecessary utilization, that factor should have been evident in this analysis of employees of a company that operates retail clinics within its retail pharmacies, where some of the subjects were employed. Despite this ease of access, there was no evidence of increased total healthcare costs; in fact, costs were lower in exposed subjects.

As observed in the current study for matched subjects, prior studies have demonstrated that pharmaceutical expenses per episode of care were the same or lower for patients treated in retail clinics.[8] This is an important point, as many retail clinics are located in and operated by retail pharmacies, making it important to ensure that increased pharmaceutical costs are not replacing decreases in other types of utilization.

Use of evidence-based, clinical practice guidelines embedded in electronic medical records at some retail clinics may help diminish medical expenses and improve quality. Under these guidelines, judicious use of clinical tests and treatments, including use of generic medications, may help diminish costs and improve adherence to therapy.[25] In addition, the focus at retail clinics tends to be on the presenting problem, rather than other medical problems that may not be symptomatic at the time of the visit. The impact of this focused approach to care deserves further study. Interestingly, a prior study has suggested that retail clinic patients with a primary care provider tend to maintain their primary care provider relationship, and are no less likely to have preventive health tests and services than non–retail clinic patients.[8]

As retail clinics begin to offer more comprehensive services, including those for chronic disease and wellness, the impact on total healthcare costs deserves further study, as does the impact on relationships between patients and their primary care providers. As healthcare reform is implemented, the shortage of primary care providers will likely necessitate the further development of alternative care models, including a role for retail clinics. This is especially true as retail clinics provide an expanded scope of services. Both governmental and commercial payers will be looking toward inexpensive alternatives for delivery of healthcare services, and retail clinics may play a role in networks of care such as the newly formed accountable care organizations. Convenient access to retail clinics does not appear to increase overall costs, and may in fact diminish the total cost of care.

Limitations of This Study

Despite achieving robust matching in health status, healthcare-seeking behavior, chronic disease status, and demographics between exposed and unexposed subjects with the matching process and regression analysis, we cannot entirely eliminate the possibility that these subjects were themselves different from one another on unmeasured variables.

Claims data based on *ICD-9* and CPT codes are limited in terms of the full details of the services and diagnoses evaluated, which could lead to some incorrect categorizations or health status assessments. However, these would not be expected to affect the groups exposed and unexposed to retail clinics differentially.

The subjects in the study were from a single payer and employer, using a single retail company, which may limit applicability to other populations. Data were analyzed for healthcare spending of employees and dependents who were continuously eligible for benefits over a 3-year period. The result might have been a study population with a single employer who were more consistent in their healthcare habits than the average American population. These patients may also be higher consumers of certain healthcare services since many of them work in the healthcare field and may be more knowledgeable about healthcare services. Some of the studied employees worked in retail stores that house a retail clinic; however as noted, this proximity and general familiarity with retail clinics might be expected to increase overall utilization rather than diminish it, and this variable was controlled for in the adjusted results.

Among patients who seek medical services at a retail clinic, 20% to 30% are uninsured; thus, it may be difficult to generalize from the findings of the current study of fully insured subjects to the entire usual population of retail clinic patients.[3,6,26] As healthcare reform and the individual mandate are implemented, the proportion of uninsured individuals should diminish, lessening the concern about broad applicability of these findings. Finally, the percentage of subjects who had primary care providers was unknown, making it difficult to assess whether patients chose to use retail clinics because of convenience and lower cost rather than because they did not have a usual primary care provider. In general, prior studies have suggested that more than 50% of retail clinic patients do not have a primary care provider at the time of their visit.[6] Whether access to a primary care provider could have impacted the total cost of care is uncertain.

CONCLUSIONS

The finding that retail clinic use is associated with lower overall total cost of care is an important observation that deserves further study in larger populations and with different methodologies. If access to retail clinics can help to lower total medical expenditures while providing high-quality care, retail clinics could be an important component of systems of care that provide comprehensive services at lower cost as we enter an era of healthcare reform.

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Authorship Information: Concept and design (AS, LD, KS, MH, OSM, WHS); acquisition of data (LD, TB); analysis and interpretation of data (AS, LD, MH, NKC, OSM, WHS); drafting of the manuscript (AS, LD, MH); critical revision of the manuscript for important intellectual content (AS, LD, KS, OSM, WHS, NKC, TB); statistical analysis (LD, NKC, OSM, WHS); obtaining funding (AS, TB); administrative, technical, or logistic support (AS, LD, TB); and supervision (KS, MH).

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REFERENCES

1. Merchant Medicine website. http://www.merchantmedicine.com. Accessed June 6, 2012.

2. Ashwood JS, Reid RO, Setodji CM, Weber E, Gaynor M, Mehrotra A. Trends in retail clinic use among the commercially insured. *Am J Manag Care*. 2011;17(11):e443-e448.

3. Deloitte Center for Health Solutions. Retail clinics: facts, trends and implications. http://www.deloitte.com/view/en_US/us/Industries/health-care-providers/center-for-health-solutions/d941dd26f00e110VgnVCM100000ba42f00aRCRD.htm. Last updated May 14, 2012. Accessed June 6, 2012.

4. Rudavsky R, Pollack CE, Mehrotra A. The geographic distribution, ownership, prices, and scope of practice at retail clinics. *Ann Intern Med*. 2009;151(5):315-320.

5. PricewaterhouseCoopers. *Medical Cost Trend: Behind the Numbers 2013*. PwC Health Research Institute report. http://www.pwc.com/us/en/health-industries/behind-the-numbers/index.jhtml. Accessed February 26, 2013.

6. Mehrotra A, Wang MC, Lave JR, Adams JL, McGlynn EA. Retail clinics, primary care physicians, and emergency departments: a comparison of patients' visits. *Health Aff (Millwood)*. 2008;27(5):1272-1282.

7. Cassel CK. Retail clinics and drugstore medicine. *JAMA*. 2012;307(20):2151-2152.

8. Mehrotra A, Liu H, Adams J, et al. Comparing costs and quality of care at retail clinics with that of other medical settings for 3 common illnesses. *Ann Intern Med*. 2009;151(5):321-328.

9. Woodburn JD, Smith KL, Nelson GD. Quality of care in the retail health care setting using national clinical guidelines for acute pharyngitis. *Am J Med Qual*. 2007;22(6):457-462.

10. Jacoby R, Crawford AG, Chaudhari P, Goldfarb NI. Quality of care for 2 common pediatric conditions treated by convenient care providers. *Am J Med Qual*. 2011;26(1):53-58.

11. Rohrer JE, Angstman KB, Bartel GA. Impact of retail medicine on standard costs in primary care: a semiparametric analysis. *Popul Health Manag*. 2009;12(6):333-335.

12. Ashwood JS, Gaynor M , Setodji CM, Reid RO, Weber EA, Mehrotra A. Estimating the impact of retail clinics on health care utilization and spending. Paper presented at: AcademyHealth Annual Research Meeting; June 25, 2012; Baltimore, MD.

13. Schneeweiss S, Rassen JA, Glynn RJ, Avorn J, Mogun H, Brookhart MA. High-dimensional propensity score adjustment in studies of treatment effects using health care claims data. *Epidemiology*. 2009;20(4):512-522.

14. Kosanke J, Bergstralh E. GREEDY algorithm. Locally written SAS macros. Division of Biomedical Statistics and Informatics, Mayo Clinic. http://mayoresearch.mayo.edu/mayo/research/biostat/upload/gmatch

.sas. Published July 23, 2003. Revised October 31, 2003. Accessed Spring 2012.

15. Cheung PT, Wiler JL, Lowe RA, Ginde AA. National study of barriers to timely primary care and emergency department utilization among Medicaid beneficiaries. *Ann Emerg Med.* 2012;60(1):4-10.

16. Parchman ML, Culler S. Primary care physicians and avoidable hospitalizations. *J Fam Pract.* 1994;39(2):123-128.

17. Rohrer JE, Angstman KB, Furst JW. Impact of retail walk-in care on early return visits by adult primary care patients: evaluation via triangulation. *Qual Manag Health Care.* 2009;18(1):19-24.

18. Rohrer JE, Angstman KB, Garrison G. Early return visits by primary care patients: a retail nurse practitioner clinic versus standard medical office care. *Popul Health Manag.* 2012;15(4):216-219.

19.Wang MC, Ryan G, McGlynn EA, Mehrotra A. Why do patients seek care at retail clinics, and what alternatives do they consider? *Am J Med Qual.* 2010;25(2):128-134.

20. CS Mott Children's Hospital National Poll on Children's Health. *Retail Clinics: An Emerging Source of Health Care for Children.* Vol 4, issue 3. http://mottnpch.org/reports-surveys/retail-clinics-emerging-source-health-care-children. Published August 11, 2008. Accessed April 2012.

21. Sadownik S, Ray N. *Population-Based Measures of Ambulatory Care Quality: Potentially Preventable Admissions and Emergency Department Visits.* Presented at: Medpac Public Meeting; October 5, 2012; Washington, DC. http://www.medpac.gov/transcripts/1012_presentation_ppv.pdf. Accessed February 26, 2013.

22. Weinick RM, Burns RM, Mehrotra A. Many emergency department visits could be managed at urgent care centers and retail clinics. *Health Aff (Millwood).* 2010;29(9):1630-1636.

23. Baicker K, Chandra A. Medicare spending, the physician workforce, and beneficiaries' quality of care. *Health Affairs Web Exclusive.* http://content.healthaffairs.org. Published April 2004.

24. Medicare Payment Advisory Commission. *Report to Congress: Reforming the Delivery System.* Washington, DC: MedPAC; June 2008. http://www.medpac.gov/documents/jun08_entirereport.pdf. Accessed February 26, 2013.

25. Shrank WH, Hoang T, Ettner SL, et al. The implications of choice: prescribing generic or preferred pharmaceuticals improves medication adherence for chronic conditions. *Arch Intern Med.* 2006;166(3): 332-337.

26. Tu HT, Cohen GR. Checking up on retail-based health clinics: is the boom ending? The Commonwealth Fund. Issue Brief 48. http://www.commonwealthfund.org/Publications/Issue-Briefs/2008/Dec/Checking-Up-on-Retail-Based-Health-Clinics--Is-the-Boom-Ending.aspx. Published December 15, 2008. Accessed February 26, 2013. ■

Appendix. Healthcare-Seeking Behaviors

Bone density	Prophylactic vaccinations
Breast screening	Prostate-specific antigen
Cancer screening	Radiologic exam
Cardiovascular stress	Routine cervical pap smear
Chlamydia	Routine general medical exam
Cholesterol	Routine infant or child check
Diagnostic colonoscopy	Screening for iron-deficiency anemia
Diagnostic proctosigmoidoscopy, rigid	Screening for lipid disorders
Diagnostic sigmoidoscopy, flexible	Screening malignant neoplasm, small intestine
Electrocardiogram	Screening malignant neoplasm, colon
Exam of eyes and vision	Screening malignant neoplasm, ovary
Glaucoma screening	Screening malignant neoplasm, prostate
GTT and glucose	Screening malignant neoplasm, rectum
Gynecologic exam	Screening malignant neoplasm, testis
Hemoccult stool test	Screening malignant neoplasm, vagina
Immunization administration	Screening mammograms
Insulin (total and free)	Special screening for depression
Iron	Special screening for glaucoma
Laboratory exam	Special screening for other eye conditions
Lead	Special screening for sickle cell disease/trait
Lipid panel	Special screening for viral/chlamydia disease
OB panel	Special screening for osteoporosis
Pap smears	Special screening for PKU
Pregnancy exam or test	Triglycerides
Prenatal care visits	Unspecified general medical exam
Preventive medical services	Urine tests

GTT indicates glucose tolerance test; OB, obstetric; PKU, phenylketonuria.