

Quality of Care at Retail Clinics for 3 Common Conditions

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Retail clinics have become increasingly prevalent in the United States. As of September 2014, there are about 1,760 retail clinics,^{1,2} a number that by some estimates will grow to 2800, with 10.8 million annual visits made to them, by 2015.³ Retail clinics aim to treat a limited range of clinical conditions that are routine family medical problems, and thus can serve as an alternative to care in physicians' offices, ambulatory/urgent care facilities (ACFs), or emergency departments (EDs).⁴ These clinics typically rely on nurse practitioners and physician assistants who deliver care based on strict adherence to clinical practice guidelines.

With increasing calls for healthcare delivery systems that can reduce the cost of care, offer more convenient primary care options to patients, and address primary care shortages, retail clinics may offer an attractive option.^{5,6} Recent studies suggest that retail clinics deliver care at substantially lower cost than ACFs and EDs, and have been associated with lower cost of care to the patient.^{7,8} Overall patient satisfaction is high, with walk-in care convenience and fixed, transparent pricing cited as 2 main attractions of the retail clinic model.⁴

At the same time, some have expressed concern that the retail clinic model of care may not provide care equivalent in quality to what is available in other settings.^{9,10} Professional physician organizations, such as the American Academy of Pediatrics (AAP) and the American Academy of Family Physicians (AAFP), have expressed ongoing concern about retail clinics, including questions about overall quality of care and the use of tests for the purpose of diagnosis without appropriate follow-up.¹⁰⁻¹² Notwithstanding these concerns, evidence regarding quality of care for acute conditions in particular, which account for the majority of retail clinic services, has suggested that the quality of care is high.

A study by Jacoby et al evaluating retail clinic performance on 2 Healthcare Effectiveness Data and Information Set (HEDIS) measures—the appropriate testing of children

ABSTRACT

Objectives

Evaluation of quality of care across retail clinics in a geographically diverse population has not been undertaken to date. We sought to evaluate and compare the quality of care for otitis media, pharyngitis, and urinary tract infection received in retail medical clinics in CVS pharmacies ("MinuteClinics" [MCs]), ambulatory care facilities (ACFs), and emergency departments (EDs).

Methods

We used 14 measures constructed from RAND Corporation's Quality Assurance Tools and guidelines from the American Academy of Pediatrics, the American Academy of Family Physicians, and the Infectious Diseases Society of America. Our cohort was drawn from Aetna medical and prescription claims, 2009-2012. Members were matched on visit date, condition, and propensity score. Generalized estimating equations were used to compare quality across clinic type, overall, and by index condition.

Results

We matched 75,886 episodes of care, of which 20,153 were eligible for at least 1 quality measure. MCs performed better than EDs and ACFs in 7 measures. In a multivariable model, MCs performed better than ACFs and EDs across all quality measures ([OR 0.42; 95% CI, 0.40-0.45; $P < .0001$; ACF vs MC] [OR 0.29; 95% CI, 0.27-0.31; $P < .0001$; ED vs MC]). Results for each condition were significant at $P < .0001$.

Conclusions

Quality of care for these conditions based on widely accepted objective measures was superior in MinuteClinics compared with ACFs and EDs.

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with strep throat and appropriate treatment of children with upper respiratory tract infection—concluded that retail clinics ranked above the 90th percentile for the former measure and between the 50th and 90th percentiles for the latter.¹³ A study by Rohrer et al evaluating return visits for children treated for ear infection found a lower rate of return visits within 2 weeks in retail clinics compared with standard office clinics,¹⁴ while a different analysis of retail clinics in Minnesota by Mehrotra et al examined 14 performance measures for care of 3 common conditions treated at retail clinics and found that the quality of care was superior to that received at ACFs and EDs.¹⁵

Nonetheless, evidence in this domain remains sparse. As the prevalence of these clinics grows, a contemporary evaluation of quality of care for acute conditions in a geographically diverse population is essential. We applied the performance measures for urinary tract infection (UTI), strep throat (pharyngitis), and ear infection (otitis media; OM) used in analysis of retail clinics in Minnesota by Mehrotra et al to a nationally representative cohort to compare the quality of care in retail clinics with that in ACFs and EDs.

METHODS

This study was approved by the institutional review board of Partners Healthcare System, Boston, Massachusetts, and Harvard University, Cambridge, Massachusetts.

Study Population

We used nationwide medical and prescription claims from Aetna, a large healthcare benefits company, with dates of service from January 1, 2009, through December 31, 2012. The study population included commercial members with a visit to a MinuteClinic (the retail medical clinics in CVS pharmacies, with locations in 25 states and the District of Columbia during the study period), an ACF facility, or an ED for OM, pharyngitis, or UTI during this period. ACF visits were defined using Aetna's definition of all visits to outpatient clinics including non-ED urgent care clinics, same-day surgeries, and same-day ambulatory hospital encounters. The analysis was restricted to the first episode of care for 1 of the 3 index conditions in the study period; if a member had episodes of care for more than 1 index condition, only the earliest episode and corresponding index condition were considered. Clinic type was identified using place of service codes, includ-

Take-Away Points

- These findings are consistent with previous studies demonstrating that quality of care is not compromised, and even appears superior, in retail clinics for specific acute conditions.
- When taken together with evidence suggesting that retail clinics are more cost-effective and even cost saving to patients, these results underscore the potential of retail clinics for offering care of higher quality and lower cost at a time of primary care shortages.
- More extensive studies exploring costs for chronic disease management and the role of retail clinics in improving care coordination and population health management are warranted.

ing specific codes for retail clinics, and conditions were identified using *International Classification of Disease, Ninth Revision, Clinical Modification (ICD-9-CM)* codes for OM (381, 382, 388.7), pharyngitis (034, 462, 463), and UTI (599, 595). Members were required to be continuously enrolled for the 6 months prior to and 60 days after their index episode.

Matching Episodes of Care

We matched members with MinuteClinic episodes of care to those from ACFs and EDs in a 1:1:1 fashion on the following criteria: month of index visit, index condition, and a propensity score. The propensity score was constructed from the following baseline characteristics: age, gender, tertile of household income (per zip code from 2000 US Census data), index condition, number of prescription medications and medical visits in the 6 months prior to the index visit, and Charlson Comorbidity Index score using *ICD-9-CM* codes from the 6 months prior to the index visit. Matching was operationalized using a validated SAS macro with a 0.05 caliper for the propensity score.¹⁶ We sampled without replacement, meaning an individual is a member of only 1 matched set.

Some zip codes in the 2000 US Census do not have income data available, and so members living in these zip codes were grouped into the second income tertile. A multiple imputation ($N = 10$) of these missing values was conducted as a sensitivity analysis.

Measuring Quality of Care

Quality of care was assessed using 14 measures constructed from RAND Corporation's Quality Assurance (QA) Tools as well as guidelines from the AAP, the AAFP, and the Infectious Diseases Society of America, measures also employed in the analysis by Mehrotra et al of retail clinics in Minnesota ([eAppendix Table 1](#) available at www.ajmc.com).¹⁵ The RAND QA Tools were developed through comprehensive evaluation of research literature and clinical guidelines, and are considered a gold stan-

dard for measurement of whether patients are receiving evidence-based healthcare including appropriate diagnosis, treatment, and follow-up.¹⁷⁻²³

Each measure is a binary marker of quality of clinical care (eg, throat culture or rapid strep test ordered on day of initial visit or day after in diagnosis of pharyngitis) and was oriented such that a higher score (ie, 1) indicates higher quality. There were 5 measures assessing quality of care for OM, and 6 and 3 measures for pharyngitis and UTI, respectively.

Statistical Analyses

We evaluated whether performance on each quality measure differed between visits to MinuteClinics and ACFs or EDs using χ^2 tests. To compare overall quality across the 3 clinic types, we used a generalized estimating equation with a binomial distribution and a logit link. Because members were typically eligible for more than 1 quality measure and up to as many as 5 measures, this model accounted for correlation across member responses using an exchangeable covariance matrix. We included the quality measure in the model as a categorical variable to account for differing mean success rates across measures. We compared this analysis with a multivariable analysis that also adjusted for the following baseline characteristics: gender, age, income, number of medications, and number of medical visits in the 6 months prior to the visit.

We excluded quality measure 11 from all models, as did Mehrotra et al, because from a clinical perspective, the measure does not discriminate high versus low quality of care as distinctly as the other 13 measures. We used SAS, version 9.3 (SAS Institute, Cary, North Carolina) to conduct all analyses.

RESULTS

Study Population and Matched Cohort

We identified 1,231,866 eligible members with an index episode for 1 of the 3 conditions occurring at 1 of the clinic types during the 3-year study period (Table 1). The majority of episodes (91%) were ACF visits, with 6% and 2% occurring at EDs and MinuteClinics, respectively. The majority of cases seen in MinuteClinics were for pharyngitis (61% vs 51% and 37% in ACFs and EDs, respectively), whereas the majority of cases seen in EDs were for UTI (40% vs 19.3% and 9.4% for ACFs and MinuteClinics, respectively).

Members seen in MinuteClinics tended to have lower Charlson Comorbidity Index scores and fewer physician visits in the 6 months prior to index. Children under 5

years of age comprised 3.4% of cases seen at MinuteClinics, compared with 10.6% and 13.7% in EDs and ACFs, respectively. Members seen in EDs generally lived in lower-income zip codes, followed by ACFs (second lowest) and MinuteClinics (highest).

After matching on propensity score, index condition, and index month, matches were found for 25,334 members (87% of eligible MinuteClinic episodes). The matched cohort was predominantly female (61%) and the majority (54%) were aged between 18 and 44 years. Most episodes were for pharyngitis (58%), while three-fourths of members had had at least 1 doctor's visit in the 6 months prior (74%), and about half had 1 to 5 unique medication fills in the 6 months prior (51%).

Quality of Care

There were 20,153 members from the matched cohort who were eligible for at least 1 quality measure; the number for which they were eligible ranged from 1 to 5. MinuteClinics had higher success rates than both EDs and ACFs in 7 of 14 measures (Table 2). Differences in success rates across sites of care were statistically significant ($P = .05$) in 10 measures, including all pharyngitis and UTI measures and 1 OM measure. Pooled, unadjusted success rates by index condition are presented in the Figure.

MinuteClinics performed better than ACFs and EDs across all quality measures ([OR 0.43; 95% CI, 0.40-0.45, comparing ACFs with MinuteClinics; OR 0.29; 95% CI, 0.27-0.31 comparing EDs with MinuteClinics]) with both results significant at $P < .0001$ (Table 3). Results were very similar after adjustment for baseline covariates ([OR 0.42; 95% CI, 0.40-0.45, comparing ACFs with MinuteClinics; OR 0.29; 95% CI, 0.27-0.31, comparing EDs with MinuteClinics]).

Results stratified by each of the conditions individually were also similar. The difference in quality between MinuteClinics and other clinic types was most pronounced for UTI ([OR 0.31; 95% CI, 0.27-0.35, comparing ACFs with MinuteClinics; OR 0.28; 95% CI, 0.25-0.32, comparing EDs with MinuteClinics]), and least pronounced for OM ([OR 0.82; 95% CI, 0.75-0.89, comparing ACFs with MinuteClinics; OR 0.73; 95% CI, 0.67-0.80, comparing EDs with MinuteClinics]). Results across each index condition remained statistically significant at $P < .0001$.

Sensitivity Analysis

Nearly 5% of income values were missing in the cohort prior to matching. After multiply imputing ($N = 10$) these values, results from the models adjusting for quality measure number were very similar ([OR 0.45; 95% CI, 0.42-

■ **Table 1.** Baseline Characteristics, Full and Matched Cohorts

Characteristic	Full Cohort				Matched Cohort			
	Emergency Department	Ambulatory Care Facility	MinuteClinic	Total	Emergency Department	Ambulatory Care Facility	MinuteClinic	Total
Age (in years)								
<2	3.3%	3.9%	0.1%	3.8%	0.4%	0.2%	0.1%	0.2%
2-5	7.3%	9.8%	3.3%	9.5%	5.3%	4.7%	3.7%	4.6%
6-17	13.3%	24.4%	19.2%	23.6%	18.8%	20.1%	19.8%	19.6%
18-44	50.0%	35.3%	54.5%	36.7%	53.2%	53.6%	53.9%	53.6%
45-64	21.9%	24.1%	22.0%	23.9%	21.4%	21.0%	21.5%	21.3%
≥65	4.3%	2.5%	0.9%	2.6%	0.9%	0.5%	1.0%	0.8%
Female sex	62.7%	60.4%	63.5%	60.6%	60.1%	60.8%	61.7%	60.8%
Income^a								
Tertile 1	45.6%	30.8%	18.5%	31.4%	24.8%	22.8%	20.2%	22.6%
Tertile 2	34.0%	37.3%	36.4%	37.1%	41.7%	41.3%	39.2%	40.7%
Tertile 3	20.4%	31.8%	45.1%	31.4%	33.5%	35.9%	40.5%	36.7%
Unique Prescriptions^b								
0	40.1%	38.2%	39.5%	38.4%	40.4%	41.3%	40.5%	40.7%
1-5	45.1%	50.0%	52.3%	49.7%	51.0%	51.9%	50.8%	51.3%
6-9	9.5%	8.4%	6.6%	8.4%	6.8%	5.8%	6.9%	6.5%
10-12	2.7%	2.0%	1.1%	2.0%	1.0%	0.7%	1.1%	1.0%
13-19	2.1%	1.2%	0.5%	1.2%	0.6%	0.3%	0.5%	0.5%
≥20	0.4%	0.2%	0.1%	0.2%	0.1%	0.0%	0.1%	0.0%
Medical visits^c								
0	24.3%	18.0%	25.2%	18.6%	25.5%	26.0%	25.7%	25.8%
1-3	38.7%	43.9%	44.9%	43.6%	44.1%	45.3%	44.3%	44.6%
4-9	23.1%	26.4%	21.0%	26.0%	22.0%	21.4%	20.9%	21.4%
≥10	13.9%	11.7%	8.9%	11.8%	8.4%	7.3%	9.0%	8.2%
CCI score								
0	83.8%	87.6%	93.1%	87.5%	92.6%	94.7%	92.5%	93.3%
1	9.9%	9.0%	5.2%	8.9%	6.0%	4.5%	5.6%	5.4%
2-3	4.2%	2.8%	1.5%	2.9%	1.4%	0.7%	1.6%	1.2%
≥4	2.0%	0.6%	0.2%	0.7%	0.1%	0.1%	0.2%	0.1%
Index condition								
Otitis media	23.0%	29.6%	29.9%	29.2%	31.6%	31.6%	31.6%	31.6%
Pharyngitis	37.0%	51.1%	60.7%	50.5%	58.0%	58.0%	58.0%	58.0%
UTI	40.0%	19.3%	9.4%	20.4%	10.5%	10.5%	10.5%	10.5%
Total	75,886	1,126,858	29,122	1,231,866	25,334	25,334	25,334	76,002

CCI indicates Charlson Comorbidity Index; GPI-8, generic product identifier-8; UTI, urinary tract infection; GPI, generic product identifier.

^aMembers with missing income were reclassified into the second tertile.

^bNumber of unique GPI-8 filled in 6 months prior to index date.

^cNumber of unique start dates across all places of service in 6 months prior to index date.

0.48, comparing ACFs with MinuteClinics; OR 0.30; 95% CI, 0.29-0.32; comparing EDs with MinuteClinics]).

DISCUSSION

The results from this analysis suggest that overall quality of care for OM, pharyngitis, and UTI at MinuteClinics is superior to that delivered at ACFs or EDs^{13,14,24,25} based on widely accepted objective measures. Whereas

ACFs and EDs performed better on several individual quality measures, overall performance at the index condition level and across all measures was consistently higher in MinuteClinics. These results did not differ after adjustment for baseline covariates.

This study is the largest to date evaluating the quality of care for acute conditions at retail clinics compared with other care settings, and corroborates previous findings regarding quality of care.¹⁵ In particular, the success rates

Table 2. Comparison of Quality Indicators Across Care Settings

Quality Measure	MinuteClinic			Ambulatory Care Facility			Emergency Department		
	Age (y)	Applicable Episodes (N)	Success %	Applicable Episodes (N)	Success %	P ^a	Applicable Episodes (N)	Success %	P ^a
Otitis Media									
1. Therapy ≥10 days	2-5	415	93.7%	463	95.5%	.256	471	91.5%	.208
2. Amoxicillin prescribed	2-5	415	81.2%	463	70.0%	.001	471	76.9%	.114
3. Follow-up within 8 weeks	2-12	1706	45.5%	1897	50.0%	.007	1861	46.8%	.431
4. If no antibiotics prescribed, seen 48-72 hours after first appointment	2-5	163	7.4%	252	2.0%	.007	302	10.3%	.303
5. Received antibiotics at appointment	2-12	1706	74.6%	1897	62.3%	<.0001	1861	57.6%	<.0001
Pharyngitis									
6. Received recommended antibiotics used to treat GABHS	3+	2365	72.5%	1488	43.6%	<.0001	1531	38.3%	<.0001
7. Culture or rapid strep test obtained in diagnosis of GABHS (children)	3-17	1045	98.2%	832	86.9%	<.0001	751	47.7%	<.0001
8. Culture or rapid strep test obtained in diagnosis of GABHS (adults)	18+	2034	98.3%	1033	72.2%	<.0001	1155	41.8%	<.0001
9. Duration of therapy for GABHS ≥10 days	3+	3157	73.6%	1930	54.6%	<.0001	2043	40.8%	<.0001
10. Tetracycline or TMP-SMX not used to treat GABHS	3+	3157	85.7%	1930	70.3%	<.0001	2043	57.1%	<.0001
11. Antibiotics prescribed in all episodes	3+	14,591	30.1%	14,536	50.5%	<.0001	14,421	45.9%	<.0001
Urinary Tract Infection									
12. Urine culture obtained for all high-risk patients	18-65	70	2.9%	174	41.4%	<.0001	127	63.0%	<.0001
13. Antibiotics prescribed for ≤7 days for uncomplicated lower tract infections	18-65	2449	50.6%	2282	21.0%	<.0001	2279	18.5%	<.0001
14. Antibiotics prescribed for ≥7 days for complicated lower tract infections	18-65	106	12.3%	162	30.9%	.001	139	28.8%	.002

GABHS indicates group A beta-hemolytic streptococci; TMP-SMX, trimethoprim-sulfamethoxazole.
^aCompared with MinuteClinic.

by quality measure and clinic type (Table 2) were similar to those of Mehrotra et al.¹⁵ However, Mehrotra et al did not observe statistically significant differences by site of care in regression analysis, which may in part be due to the fact that the sample from that prior analysis was less than 1/15 the size of ours. Moreover, we account for correlation within success rates by individuals who are eligible for more than 1 quality measure, as well as response trends within a quality measure (eg, 1 measure may have a higher success rate than another), providing more robust results. By matching on numerous demographic and clinical covariates, we also addressed concerns about residual confounding by baseline characteristics.

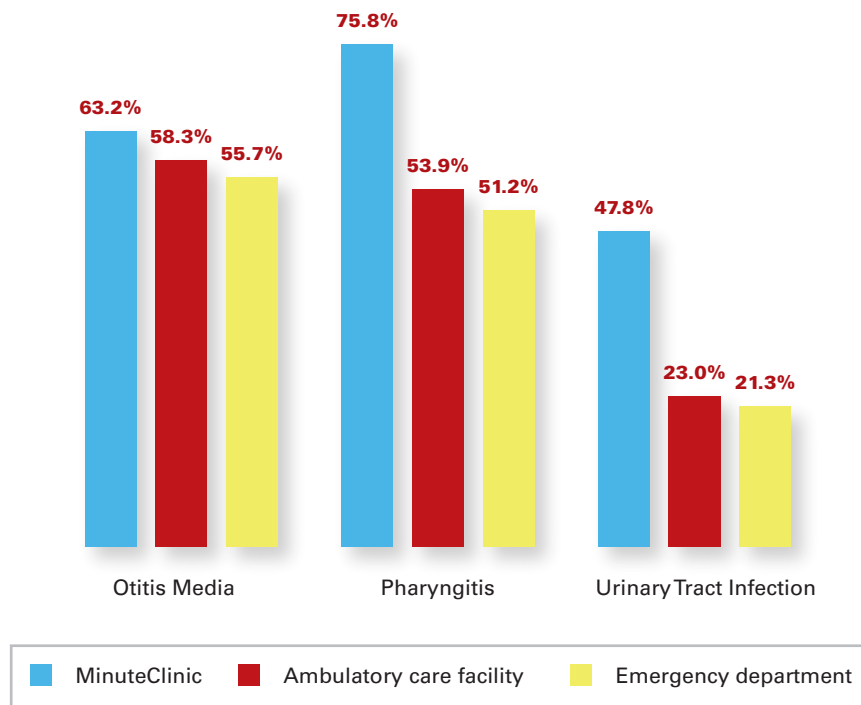
It is notable that MinuteClinics performed worse than other settings for UTI indicators that focused on high-risk patients and long-term antibiotic therapy to treat compli-

cated UTIs (quality measures 12 and 14). MinuteClinic guidelines indicate that such patients should be referred to more acute settings; until 2014, MinuteClinics did not even offer urine cultures on the premises. The low prevalence of visits for these measures suggests that patients are selecting appropriate levels of care for this condition.

We did not include quality measure 11 in our multivariate analyses, consistent with the exclusion in the study conducted by Mehrotra et al. The indicator was not deemed clinically appropriate as designed, as it rewards antibiotic prescribing even in the absence of documented strep infection. In contrast, in the setting of an OM diagnosis, antibiotic treatment is clinically appropriate (measure 5).

The 3 conditions we examined, along with several upper respiratory conditions, swimmer’s ear, and pinkeye, comprise nearly 90% of all MinuteClinic acute care visits.¹⁶

■ **Figure.** Quality Measure Success by Index Condition



When taken with evidence that retail clinics offer care at lower cost than other places of service and also lower the patient and payer's total cost of care, the results of our study suggest that strategies for treatment of these conditions may be both economically advantageous and cost-effective.^{7,8}

Our study did not examine MinuteClinic preventive care service visits, about half of which are for influenza vaccination.²⁶ More research is needed to understand the quality of preventive care services offered at retail clinics as well as the integration of these services into a larger primary care medical home strategy. In particular, ACFs may provide better education or preventive services that reduce the rates of subsequent presentation.

Since 2010, retail clinics have begun to broaden their array of services, including care for chronic disease management. While early findings suggest that there is no detrimental effect of retail clinic care on preventive care and diabetes management,^{27,28} more research is needed to evaluate the quality of care in expanded domains and to examine the extent to which retail clinic care can be integrated into preventative care services offered in other settings.

Some research has shown that more affluent people have greater access to retail clinics,²⁹ and that retail chain pharmacies tend to locate in wealthier neighborhoods.³⁰ Conversely, other studies have observed that retail clinics serve a large segment of people with weak or no ties to a primary care physician.^{31,32} In our analy-

sis, members seen at MinuteClinics generally lived in more affluent areas than those seen at EDs and ACFs, but by matching on income we ensured that this potential confounder did not bias our results. Our analysis examined only MinuteClinic retail clinics, offered by a single pharmacy chain. While MinuteClinics represent more than half the nation's retail clinics, the extent to which these findings can be generalized to other retail clinics is not known.

Performance measures are inherently limited in their ability to capture the full spectrum of clinically appropriate care. While the RAND QA Tools and other similar measure sets reflect the current standard of measurement for appropriate diagnosis, treatment, and follow-up for acute conditions,^{20,33} the use of any claims-based quality indicators is limited in its ability to fully account for illness severity and capture clinical reasoning that would justify diagnostic and treatment behavior outside clinical guidelines. Matching on Charlson Comorbidity Index score as well as other patient characteristics, such as age associated with illness severity, may account for many of the severity differences that exist across these care settings. If anything, we expect that patients with more severe illness would be more likely to receive guideline-adherent care, which would bias our results toward the null under the assumption that EDs and ACFs differentially treat patients with more severe illness. Additionally, the quality

Table 3. Univariable and Multivariable Analysis Across Care Settings

Index Condition	Univariable ^a		Multivariable ^b	
	OR (95% CI) ^c	P	OR (95% CI) ^c	P
Otitis Media				
Ambulatory care facility	0.82 (0.75-0.89)	<.0001	0.84 (0.77-0.91)	<.0001
Emergency department	0.73 (0.67-0.80)	<.0001	0.74 (0.67-0.80)	<.0001
Pharyngitis				
Ambulatory clinic	0.35 (0.32-0.39)	<.0001	0.35 (0.31-0.38)	<.0001
Emergency department	0.17 (0.15-0.19)	<.0001	0.17 (0.15-0.19)	<.0001
Urinary Tract Infection				
Ambulatory care facility	0.31 (0.27-0.35)	<.0001	0.31 (0.27-0.35)	<.0001
Emergency department	0.28 (0.25-0.32)	<.0001	0.28 (0.24-0.31)	<.0001
Overall				
Ambulatory care facility	0.43 (0.40-0.45)	<.0001	0.42 (0.40-0.45)	<.0001
Emergency department	0.29 (0.27-0.31)	<.0001	0.29 (0.27-0.31)	<.0001

^aAdjusted for quality measure number.
^bAdjusted for quality measure number, gender, age, income, number of medications, and number of medical visits in the 6 months prior to the visit.
^cReference = MinuteClinic.

measures in this analysis focus on same-day care and so are not subject to any bias from follow-up care that may have been received differentially at another care setting. Mehrotra et al found that fewer than 20% of episodes in their analysis included any follow-up visits.¹⁵ Finally, to capture clinical reasoning that would justify treatment outside of these quality indicators, we would need data typically only available in electronic medical records, which were outside the scope of this analysis but may be an area of future research.

CONCLUSIONS

Overall, these findings are consistent with previous studies that demonstrate that quality of care is not compromised, and even appears superior, in retail clinics for specific acute conditions. When taken together with evidence suggesting that retail clinics are more cost-effective and even cost saving to patients, these results underscore the promise of retail clinics in offering care of higher quality and lower cost at a time of primary care shortages.^{7,8} In a healthcare system that sees 177 million ED and 577 million physician office visits annually, there is significant potential for retail clinics to play an increasingly important role in reducing the burden on our primary care channels.³¹ In light of a transforming healthcare system, more extensive studies exploring costs for chronic disease management and the role of retail clinics in improving care coordination and population health management are warranted.

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REFERENCES

1. Robert Wood Johnson Foundation and University of Wisconsin Population Health Institute. County health rankings & roadmaps: retail clinics. <http://www.countyhealthrankings.org/policies/retail-clinics>. Accessed September 23, 2013.
2. Merchant Medicine. Retail Clinics in the United States. 2013. <http://www.merchantmedicine.com>. Accessed December 2013.
3. Accenture. Retail medical clinics: from foe to friend? <http://www.accenture.com/SiteCollectionDocuments/PDF/Accenture-Retail-Medical-Clinics-From-Foe-to-Friend.pdf>. Accessed December 1, 2013.
4. Wang MC, Ryan G, McGlynn EA, Mehrotra A. Why do patients seek care at retail clinics, and what alternatives did they consider? *Am J Med Qual.* 2010;25(2):128-134.
5. Angstman KB, Bernard ME, Rohrer JE, Garrison GM, Maclaughlin KL. Repeat retail clinic visits: impact of insurance coverage and age of patient. *Popul Health Manag.* 2012;15(6):358-361.

6. Garbutt JM, Mandrell KM, Allen M, et al. Parents' experiences with pediatric care at retail clinics. *JAMA Pediatr.* 2013;167(9):845-850.
7. Thygeson M, Van Vorst KA, Maciosek MV, Solberg L. Use and costs of care in retail clinics versus traditional care sites. *Health Aff (Millwood).* 2008;27(5):1283-1292.
8. Sussman A, Dunham L, Snower K, et al. Retail clinic utilization associated with lower total cost of care. *Am J Manag Care.* 2013;19(4):e148-e157.
9. Rohrer JE, Angstman KB, Garrison GM, Maxson JA, Furst JW. Family medicine patients who use retail clinics have lower continuity of care. *J Prim Care Community Health.* 2013;4(2):150-153.
10. American Academy of Family Physicians. Retail clinics. <http://www.aafp.org/about/policies/all/retail-clinics.html>. Accessed September 13, 2013.
11. Retail-Based Clinic Policy Work Group. AAP principles concerning retail-based clinics. *Pediatrics.* 2006;118(6):2561-2562.
12. Policy Statement—AAP Publications Reaffirmed and Retired. *Pediatrics.* 2011;127(3):e857.
13. 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.
14. Rohrer JE, Garrison GM, Angstman KB. Early return visits by pediatric primary care patients with otitis media: a retail nurse practitioner clinic versus standard medical office care. *Qual Manag Health Care.* 2012;21(1):44-47.
15. Mehrotra A, Liu H, Adams JL, 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.
16. 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.
17. Hilborne L, Damberg C. Otitis media. RAND corporation website. http://www.rand.org/content/dam/rand/pubs/monograph_reports/MR1283/mr1283.ch15.pdf.
18. Kerr E, Schuster M. Upper respiratory infections. RAND corporation website. http://www.rand.org/content/dam/rand/pubs/monograph_reports/MR1283/mr1283.ch19.pdf.
19. Schuster M. Urinary tract infections. RAND corporation website. http://www.rand.org/content/dam/rand/pubs/monograph_reports/MR1283/mr1283.ch20.pdf.
20. Dougherty D, Simpson LA. Measuring the quality of children's health care: a prerequisite to action. *Pediatrics.* 2004;113(1, pt 2):185-198.
21. RAND Corporation. Quality of care for general medical conditions. http://www.rand.org/content/dam/rand/pubs/monograph_reports/MR1280/mr1280.intro.pdf. Accessed May 2014.
22. RAND Corporation. Quality of care for general medical conditions. http://www.rand.org/content/dam/rand/pubs/monograph_reports/MR1280/mr1280.ch21.pdf. Accessed May 6, 2014.
23. McGlynn EA, Damberg CL, Kerr EA, Schuster MA. *Quality of Care for Children and Adolescents: A Review of Selected Clinical Conditions and Quality Indicators.* Santa Monica, CA: Rand; 2000.
24. 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.
25. Rohrer JE, Yapuncich KM, Adamson SC, Angstman KB. Do retail clinics increase early return visits for pediatric patients? *J Am Board Fam Med.* 2008;21(5):475-476.
26. Uscher-Pines L, Harris KM, Burns RM, Mehrotra A. The growth of retail clinics in vaccination delivery in the U.S. *Am J Prev Med.* 2012;43(1):63-66.
27. Reid RO, Ashwood JS, Friedberg MW, Weber ES, Setodji CM, Mehrotra A. Retail clinic visits and receipt of primary care. *J Gen Intern Med.* 2013;28(4):504-512.
28. Shrank W. The Center For Medicare And Medicaid Innovation's blueprint for rapid-cycle evaluation of new care and payment models. *Health Aff (Millwood).* 2013;32(4):807-812.
29. Pollack CE, Armstrong K. The geographic accessibility of retail clinics for underserved populations. *Arch Intern Med.* 2009;169(10):945-949; discussion 950-953.
30. Gellad WF, Choudhry NK, Friedberg MW, Brookhart MA, Haas JS, Shrank WH. Variation in drug prices at pharmacies: are prices higher in poorer areas? *Health Serv Res.* 2009;44(2, pt 1):606-617.
31. Mehrotra A, Lave JR. Visits to retail clinics grew fourfold from 2007 to 2009, although their share of overall outpatient visits remains low. *Health Aff (Millwood).* 2012;31(9):2123-2129.
32. 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.
33. Shaller D. Implementing and using quality measures for children's health care: perspectives on the state of the practice. *Pediatrics.* 2004;113(1, pt 2):217-227. ■

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eAppendix Table 1. Quality Measures Used by Mehrotra et al (2009)

Quality Measure	Age (Years)	Eligibility Criteria	Criteria for Success
Otitis Media (OM)			
1	2-5	<ul style="list-style-type: none"> No OM or antibiotic in previous 30 days Any antibiotics prescribed on day of visit or subsequent 2 days 	Antibiotic course for 10 days or azithromycin prescribed
2	2-5	<ul style="list-style-type: none"> No OM or antibiotic in previous 30 days Any antibiotics prescribed on day of visit or subsequent 2 days 	Amoxicillin or augmentin prescribed
3	2-12	<ul style="list-style-type: none"> No OM or antibiotics in previous 30 days 	Any E&M visit in subsequent 8 weeks
4	2-5	<ul style="list-style-type: none"> No OM or antibiotics in previous 30 days No antibiotics prescribed on day of visit or day after 	Any E&M visit 2 or 3 days after initial visit
5	2-12	<ul style="list-style-type: none"> No OM or antibiotics in previous 30 days 	Any antibiotics prescribed on day of initial visit or day after
Pharyngitis			
6	3+	<ul style="list-style-type: none"> Either streptococcal pharyngitis or pharyngitis with an antimicrobial prescribed No medications in previous 30 days 	Amoxicillin, erythromycin, penicillin, or first-generation cephalosporin prescribed on day of initial visit or day after
7	3-17	<ul style="list-style-type: none"> Either streptococcal pharyngitis or pharyngitis with an antimicrobial prescribed 	Throat culture or rapid strep test ordered on day of initial visit or day after

		<ul style="list-style-type: none"> No antibiotics or streptococcal pharyngitis in previous 30 days 	
8	18+	<ul style="list-style-type: none"> Either streptococcal pharyngitis or pharyngitis and antimicrobial prescribed No antibiotics or streptococcal pharyngitis in previous 30 days 	Throat culture or rapid strep test ordered on day of initial visit or day after
9	3+	<ul style="list-style-type: none"> Streptococcal pharyngi No streptococcal pharyngitis in previous 30 days 	Antibiotic course for 10 days or injectable antibiotic prescribed on day of initial visit or day after
10	3+	<ul style="list-style-type: none"> Streptococcal pharyngi No streptococcal pharyngitis in previous 30 days 	Any antibiotic other than tetracycline or sulfamethoxazole/trimethoprim prescribed on day of initial visit or day after
11	3+	<ul style="list-style-type: none"> Pharyngitis No pharyngitis in previous 30 days 	Any antibiotic filled on day of initial visit or day after
Urinary Tract Infection (UTI)			
12	18-65	<ul style="list-style-type: none"> UTI ≥ 3 UTIs in previous 365 days or recent invasive urinary procedure or diabetes or HIV or urinary tract abnormality or UTI within previous 6 weeks Female 	Urine culture within 2 days of initial visit
13	18-65	<ul style="list-style-type: none"> UTI and no UTI ≤ 14 days prior to index No invasive urinary procedure or diabetes or HIV or 	Antibiotics prescribed ; ≤ 7 days supply

		urinary tract abnormality <ul style="list-style-type: none"> • Female 	
14	18-65	<ul style="list-style-type: none"> • UTI and diabetes or urinary tract abnormality anytime prior to index • No UTI \leq 21 days prior to index • Female 	Antibiotics prescribed ; \geq 7 days supply

E&M indicates evaluation and management.