Family Medicine and Community Health

New hypertension and diabetes diagnoses following the Affordable Care Act Medicaid expansion

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ABSTRACT

Objective To assess the Affordable Care Act (ACA) Medicaid expansion's impact on new hypertension and diabetes diagnoses in community health centres (CHCs).

Design Rates of new hypertension and diabetes diagnoses were computed using generalised estimating equation Poisson models and we tested the difference-in-difference (DID) pre-ACA versus post-ACA in states that expanded Medicaid compared with those that did not.

Setting We used electronic health record data (pre-ACA: 1 January 2012–31 December 2013—post-ACA: 1 January 2014–31 December 2016) from the Accelerating Data Value Across a National Community Health Center Network clinical data network. We included clinics with ≥50 patients contributing to person-time-at risk in each study year.

Participants Patients aged 19–64 with ≥1 ambulatory visit in the study period were included. We then excluded patients who were pregnant during the study period (N=127 530). For the hypertension outcome, we excluded individuals with a diagnosis of hypertension prior to the start of the study period, those who had a hypertension diagnosis on their first visit to a clinic or their first visit after 3 years without a visit, and those who had a diagnosis more than 3 years after their last visit (pre-ACA non-expansion N=130 973; expansion N=193 198; post-ACA non-expansion N=186 341; expansion N=251 015). For the diabetes analysis, we excluded patients with a diabetes diagnosis prior to study start, on their first visit or first visit after inactive patient status, and diagnosis while not an active patient (pre-ACA non-expansion N=145 435; expansion N=198 558; post-ACA non-expansion N=215 039; expansion N=264 644).

Results In non-expansion states, adjusted hypertension diagnosis rates saw a relative decrease of 6%, while in expansion states, the adjusted rates saw a relative increase of 7% (DID 1.14, 95% CI 1.11 to 1.18). For diabetes diagnosis, adjusted rates in non-expansion states experienced a significant relative increase of 28% and in expansion states the relative increase was 25%; yet these differences were not significant pre-ACA to post-ACA comparing expansion and non-expansion states (DID 0.98, 95% CI 0.91 to 1.05).

Conclusion There was a differential impact of Medicaid expansion for hypertension and diabetes diagnoses. Moderate increases were found in diabetes diagnosis rates among all patients served by CHCs post-ACA (both in expansion and non-expansion states). These increases suggest that ACA-related opportunities to gain health insurance (such as marketplaces and the Medicaid expansion) may have facilitated access to diagnostic tests for this population. The study found a small change in hypertension diagnosis rates from pre-ACA to post-ACA (a decrease in non-expansion and an increase in expansion states). Despite the significant difference between expansion and non-expansion states, the small change from pre-ACA to post-ACA suggests that the diagnosis of hypertension is likely documented for patients, regardless of health insurance availability. Future studies are needed to understand the impact of the ACA on hypertension and diabetes treatment and control.

Key points

Question

- Our article explored the impact of the Affordable Care Act (ACA) Medicaid eligibility expansion on new hypertension and diabetes diagnoses in a network of community health centres.

Finding

- Hypertension diagnosis rates were higher post-ACA compared with pre-ACA in expansion states compared with non-expansion states. Rates of new diabetes diagnoses increased pre-ACA to post-ACA in both expansion and non-expansion states.

Meaning

- There was a differential impact of Medicaid expansion for hypertension and diabetes diagnoses. Pre-ACA to post-ACA findings within expansion and non-expansion states show increases in diabetes diagnoses and little change in hypertension diagnoses.

INTRODUCTION

In the USA, the Patient Protection and Affordable Care Act (ACA) included several provisions to increase health insurance coverage. For example, the ACA provided states the opportunity to expand Medicaid eligibility to citizens and legal residents earning ≤138% of the federal poverty level (FPL) and opened health insurance marketplaces; many states chose to expand Medicaid while others did

not.[1] The ACA Medicaid expansion improved access to healthcare[2] and reduced disparities for some patients,[3] which may have increased opportunities to identify health conditions. Indeed, the ACA decreased the number of uninsured by nearly 20 million[4] and increased preventive screenings.[5 6] Despite these advances, to date, little is known about the effects of the ACA Medicaid expansion on the diagnosis of serious chronic health conditions such as hypertension and diabetes. Yet, both conditions are major causes of morbidity and mortality and disproportionately affect low-income populations in the USA.[7] Hypertension, the most prevalent cardiovascular risk factor, affects approximately 103 million people representing 46% of US adults, using thresholds from the 2017 American College of Cardiology/American Heart Association blood pressure guideline.[8 9] Diabetes was diagnosed in over 30 million people in 2016 and is approaching a 10% prevalence rate in the US adult population.[10 11]

Accurate and timely diagnosis is the first step in hypertension and diabetes care to ensure adequate treatment and symptom management, which can lead to reduction in morbidity and mortality associated with these conditions.[9] Yet, nearly 16% of adults with hypertension were unaware they had it.[12] While there have been improvements in diagnosing hypertension and diabetes in the US general population, recent data indicate declines in hypertension awareness and treatment.[13] For example, nearly 85% of US adults with hypertension were aware of the diagnosis in 2013–2014, whereas awareness declined to 77% in 2017–2018.[14] Nearly 30% of adults without health insurance were unaware of their hypertension in comparison to more than 14% of those with health insurance.[12] In addition, the HealthyPeople 2020 target for those with diabetes to receive a correct diagnosis (79.8%) has been met or is closely approaching the target in those with high educational attainment, while trailing for those with less than a high school degree (70.9%).[15]

Community health centres (CHCs) serve a large proportion of medically underserved adults in the USA and are an essential source of care for racial/ethnic minorities and those with low socioeconomic status.[16] They provide services to over 27 million Americans, regardless of health insurance, and care for more than one in six Medicaid beneficiaries.[17] Yet, lack of insurance remains a barrier for CHC patients to receive some services even though clinic visits are available.[18 19] For example, a patient without insurance might be able to access a visit but cannot pay for medications or laboratory testing. After the ACA Medicaid expansion, CHCs saw a decrease in uninsured visits in both expansion and non-expansion states, and a significant increase in Medicaid-insured visits in expansion states.[20] Previous studies also showed an increase in preventive and primary care services at CHCs post-ACA.[5 20 21]

These studied and established effects the ACA had on CHCs make them the ideal setting for studying the impact health insurance policy changes had on recognising and documenting the diagnosis of chronic conditions among underserved populations. Thus, the purpose of this study was to assess whether: (1) new hypertension and diabetes diagnoses increased from pre-ACA to post-ACA among a large cohort of CHC patients and (2) this change, if any, varied in states that chose to expand Medicaid eligibility vs the states that did not. We hypothesised that new diagnoses would increase pre-ACA to post-ACA and that the states which elected to expand Medicaid would see a greater increase in diagnosis rates compared with states that did not expand Medicaid due to increased access to healthcare services (especially diagnostic tests), and consequently, greater opportunities to identify previously undocumented health conditions.

METHODS

Data source

We used electronic health record (EHR) data from the Accelerating Data Value Across a National Community Health Center Network clinical data network (CDN) of CHCs. This CDN brings together outpatient clinical EHR data from more than one million patients from three health systems.[22] The study included 110 primary care CHCs 'live' on an EHR ≥12 months before the start of the study period and maintained on the EHR throughout the study period (1 January 2012–31 December 2016) in nine states (California, Hawaii, Maryland, New Mexico, Ohio, Oregon, Rhode Island, Washington, Wisconsin) that expanded Medicaid eligibility on 1 January 2014 and four states (Florida, Kansas, Missouri, North Carolina) that did not expand during the study time period. WI was included as an expansion state because they increased Medicaid eligibility to 100% FPL.

We included clinics with ≥50 patients contributing to person-time-at risk in each study year and patients aged 19–64 with ≥1 ambulatory visit in the study period (n=581 936) meaning patients had to have visited a CHC at least once (but could have visited several times) during the entire study period and that visit could have been either pre-ACA or post-ACA. We excluded patients who were pregnant during the study period (N=127 530).

For the hypertension outcome, we excluded individuals with a diagnosis of hypertension prior to the start of the study period (N=107 930), those who had a hypertension diagnosis on their first visit to a clinic or their first visit after 3 years without a visit (N=76 079), and those who had a diagnosis >3 years after their last ambulatory visit and thus not an active patient in the health system (N=80 442). The resulting dataset used in the analyses for hypertension incidence included pre-ACA cohorts from non-expansion (N=130 973) and expansion states (N=193 198), and post-ACA cohorts from non-expansion (N=186 341) and expansion states (N=251 015).

For the diabetes outcome, we excluded patients with a diabetes diagnosis prior to study start (N=3284), on their first visit or their first visit after inactive patient status (N=15 557), and those who had a diagnosis while not an active patient (N=27 572). The resulting dataset

used in the analyses for diabetes incidence included pre-ACA cohorts from non-expansion (N=145 435) and expansion states (N=198 558) and post-ACA cohorts from non-expansion (N=215 039) and expansion states (N=264 644).

Measures

Hypertension diagnoses were assessed using International Classification of Diseases (ICD)-9: 401.00–401.99, 402.00–405.99 or ICD-10: I10–I15. Diabetes diagnoses were assessed using ICD-9: 250.00 or ICD-10-CM E11.9.

Analysis

Hypertension and diabetes diagnoses were defined as incidence rates by estimating the number of diagnoses at a clinic over person-time at risk (visit date plus a 1 year buffer).[23] In other words, each patient seen in the clinic was included in the person-time at risk (denominator) at each visit they had plus 1 year of time after that visit within the study time period. If they had another visit within the year, the year buffer started again. Since this is a clinic-level analysis, the incidence rate is the sum of diagnoses over the person-time at risk for a given clinic. Using person-time at risk allows for accurate rates regardless of the time frame included. We used generalised estimating equation (GEE) Poisson models with an interaction term that tested a difference in difference (DID) of diagnosis incidence rates pre-ACA versus post-ACA Medicaid expansion between expansion and non-expansion states. These GEE models produced incidence rate ratios (IRRs) comparing post-ACA versus pre-ACA periods within and between expansion groups. All models were adjusted for study year and primary CHC patient population demographics in the preperiod (ie, clinic-level distributions of race/ethnicity, sex, age, most frequent insurance coverage and % FPL). Data processing was managed in R V.3.6.0; analyses were conducted using STATA V.15.

RESULTS

Overall, sex and age distributions were similar (table 1 and online supplemental appendix table 1). However, non-expansion and expansion states differed in race/ethnicity distributions and FPL. Specifically, large differences were noted in percentage of non-Hispanic

Table 1 Demographics of patients pre-Affordable Care Act (ACA) and post-ACA by Medicaid expansions status

	Pre-ACA*		Post-ACA*	
	Non-expansion states	Expansion states	Non-expansion states	Expansion states
Total patients	N=130 973	N=193 198	N=186 341	N=251 015
Race/ethnicity	N (%)	N (%)	N (%)	N (%)
Hispanic	41 684 (31.8)	54 071 (28.0)	63 328 (34.0)	67 632 (26.9)
Missing	11 739 (9.0)	14 608 (7.6)	18 006 (9.7)	23 197 (9.2)
NH black	36 820 (28.1)	12 165 (6.3)	47 645 (25.6)	14 958 (6.0)
NH other	2792 (2.1)	10 239 (5.3)	4733 (2.5)	13 982 (5.6)
NH white	37 938 (29.0)	102 115 (52.9)	52 629 (28.2)	131 246 (52.3)
Sex				
Female	84 036 (64.2)	115 501 (59.8)	116 853 (62.7)	142 921 (56.9)
Male	46 934 (35.8)	77 693 (40.2)	69 485 (37.3)	108 089 (43.1)
Not indicated	3 (0.0)	4 (0.0)	3 (0.0)	5 (0.0)
Age at first visit, N (%)				
19–25	24 765 (18.9)	35 163 (18.2)	33 749 (18.1)	44 785 (17.8)
26–39	44 482 (34.0)	72 082 (37.3)	65 793 (35.3)	95 206 (37.9)
40–64	59 228 (45.2)	80 807 (41.8)	86 298 (46.3)	109 320 (43.6)
N/A	2498 (1.9)	5146 (2.7)	501 (0.3)	1704 (0.7)
Federal poverty level (most frequently recorded)				
≤138	105 007 (80.2)	129 990 (67.3)	145 586 (78.1)	167 152 (66.6)
>138	13 754 (10.5)	24 404 (12.6)	24 497 (13.1)	39 233 (15.6)
N/A	12 212 (9.3)	38 804 (20.1)	16 258 (8.7)	44 630 (17.8)
Insurance (most frequently recorded)				
Private	7548 (5.8)	32 165 (16.6)	38 562 (20.7)	43 794 (17.4)
Public	52 429 (40.0)	91 485 (47.4)	64 108 (34.4)	160 685 (64.0)
Uninsured	68 498 (52.3)	64 402 (33.3)	83 170 (44.6)	44 831 (17.9)
N/A	2498 (1.9)	5146 (2.7)	501 (0.3)	1705 (0.7)

Patients with visits in both periods contribute distinct demographics in the pre-ACA and post-ACA columns.
*All demographics were significantly different (<0.001) between expansion and non-expansion states in both the pre-ACA and post-ACA periods.
NA, not available; NH, non-Hispanic.

blacks and percentage of non-Hispanic whites, and the percentage of patients with ≤138% FPL. As expected, there were notable differences in insurance status between expansion and non-expansion states and pre-ACA versus post-ACA. Pre-ACA to post-ACA Medicaid expansion there was a decrease in patients without insurance, with a smaller decrease in non-expansion states than in expansion states. Due to these differences in group characteristics, we adjusted models as specified above.

Hypertension diagnosis analysis

The incidence rate of hypertension diagnosis showed a small change in CHCs in both expansion and non-expansion states (table 2). In non-expansion states, adjusted hypertension diagnosis rates saw a relative decrease of 6% (IRR 0.94, 95% CI 0.91 to 0.97), while in expansion states, the adjusted rates had a relative increase of 7% (IRR 1.07, 95% CI 1.03 to 1.10). The DID of diagnosis incidence rates pre-ACA versus post-ACA Medicaid expansion between expansion and non-expansion states was significant (DID 1.14; 95% CI 1.11 to 1.18) (p<0.05).

Diabetes diagnosis analysis

The adjusted diabetes diagnosis rates in non-expansion states saw a relative increase of 28% (IRR 1.28, 95% CI 1.18 to 1.34) in non-expansion states, while the relative increase was 25% (IRR 1.25, 95% CI 1.16 to 1.34) in expansion states (table 2). The DID of diagnosis incidence rates pre-ACA versus post-ACA Medicaid expansion between expansion and non-expansion states was not significant (DID 0.98; 95% CI 0.91 to 1.05).

DISCUSSION

The ACA expanded access to health insurance coverage, which led to increased preventive service receipt for patients.[2] We assessed the change in new hypertension and diabetes diagnoses pre-ACA and post-ACA comparing CHCs in states that expanded Medicaid and those in states that did not. We hypothesised that following ACA Medicaid expansion there would be an increase in the rate of diagnoses. We found a differential impact of Medicaid expansion for hypertension and diabetes diagnoses. Moderate increases were found in diabetes diagnosis rates among all patients served by CHCs post-ACA (both in expansion and non-expansion states). These increases suggest that ACA-related opportunities to gain health insurance (such as marketplaces and Medicaid expansion) may have facilitated access to diagnostic tests for this population. The study found small changes in hypertension diagnosis rates from pre-ACA to post-ACA. Thus, despite a significant difference between expansion and non-expansion states the small change in diagnosis of hypertension pre-ACA to post-ACA suggests it is likely documented for patients, regardless of health insurance availability.

Our findings pertaining to hypertension diagnosis incidence rates were in the range reported by the US

Table 2 Hypertension and diabetes diagnosis rates, IRRs and difference-in-difference post-ACA versus pre-ACA by Medicaid expansion status

	Hypertension diagnosis		Diabetes diagnosis	
	Pre-ACA	PostA-ACA	Pre-ACA	Post -ACA
Non-expansion states				
Unadjusted rate per 100 patients per year	7.0	5.5	0.8	0.9
Adjusted rate* per 100 patients per year	5.5	5.2	0.6	0.7
Post-ACA versus pre-ACA IRR 95% CI		0.94 (0.91 to 0.97)†		1.28 (1.18 to 1.38) †
Expansion states				
Unadjusted rate per 100 patients per year	4.7	4.4	0.6	0.7
Adjusted rate* per 100 patients per year	4.6	4.9	0.7	0.8
Post-ACAt versus pre-ACA IRR 95% CI		1.07 (1.03 to 1.10)†		1.25 (1.16 to 1.34) †
Difference in difference (DID)				
Expansion versus non-expansion, DID 95% (CI)		1.14 (1.11 to 1.18)†		0.98 (0.91 to 1.05)

*Generalised estimating equation Poisson models adjusted for year and primary community health centre patient population demographics (ie, clinic-level distributions of race/ethnicity, sex, age, most frequent insurance coverage and % federal poverty level).
†Statistically significant p<0.05.
‡Incidence rate was defined as number of new diagnoses at a clinic over person-time at risk.
ACA, Affordable Care Act; CI, confidence interval; IRR, incidence rate ratio.

Preventive Services Task Force.[24] They were not consistent with previous studies comparing health conditions pre-ACA to post-ACA, which did not find changes in diagnoses of hypertension, despite changes in diagnoses of diabetes and high cholesterol.[25 26] Minimal or no change in hypertension diagnosis rates in multiple pre-ACA versus post-ACA studies may be explained by the common and systematic practice of taking a person's blood pressure at every healthcare visit, which often results in a patient receiving a diagnosis regardless of health insurance coverage, especially in the CHC setting.

Unlike a hypertension diagnosis that can be made on the basis of blood pressure screening results[9] requiring limited resources, a diagnosis of diabetes requires laboratory testing, which may not be accessible to a patient without health insurance coverage. Our findings showing a relative increase in incidence of diabetes diagnosis for CHC patients of 28% and 25% in non-expansion and expansion states post-ACA, respectively, may be due to an increase in the number of CHC patients able to access lab testing with newly acquired health insurance coverage from both Medicaid expansion and marketplaces. The increase in newly diagnosed diabetes in this population is in contrast with the Centers for Disease Control and Prevention's report of a downward trend in age-adjusted incidence of diagnosed diabetes among the general adult population in the USA, which has been declining since 2008.[27] We found it puzzling to see no significant difference in the incidence of diabetes diagnosis comparing pre-ACA to post-ACA in expansion versus non-expansion states, as we had hypothesised that states that had expanded Medicaid would see higher rates. However, findings are aligned with a previous study comparing diagnosis of pre-existing conditions among previously CHC patients without insurance who gained insurance following the ACA, which showed an absence of differences in expansion compared with non-expansion states.[26] One explanation for a lack of difference between expansion and non-expansion states is that access to preventive care increased post-ACA regardless of expansion status; suggesting that gaining any type of health insurance was important for patients (options to gain coverage via marketplace were implemented in 2014 as well) and that CHCs gained additional resources post-ACA allowing them to provide more preventive care to those without individual coverage.[28] This finding is in contrast to previously reported differences in the post-ACA self-reported prevalence of diabetes among adults with family incomes below 138% FPL in expansion states versus non-expansion states[25]; however, the study used self-reported data from the National Health Interview Survey, and the postperiod was 1 year; whereas, we used EHR data from patients receiving care at CHCs with a 2-year post-ACA follow-up period.

The relatively small changes to hypertension diagnosis and modest changes to diabetes diagnosis observed in this study suggest that health insurance plays a minimal role in CHCs' ability to diagnose chronic diseases for patients who are able to consistently receive care at a CHC. Indeed, previous research found patients with a regular source of care were more likely to know that they had hypertension compare to patients without a usual source of care.[14] Our analyses focused on diagnosis incidence rates as the study main outcomes; other outcomes such as time to obtaining diagnosis may be more sensitive to ACA-related changes in our population of interest. Finally, while we did not see large changes in the hypertension and diabetes diagnosis rates among this CHC population, patients without stable health insurance may not be able to seek regular care,[29] afford medications, or adjust medications as needed to control symptoms,[30] therefore, the presence of absence of stable health insurance may have a larger impact on these outcomes than on incidence of disease. Future investigations to understand the impact of the ACA insurance expansions on hypertension and diabetes treatment and control are warranted.

Limitations of this research include our inability to detect temporal changes, and potential ceiling effects, with high baseline hypertension diagnosis rates and little opportunity to observe improvement. We were only able to assess patients that came in for a visit, which may be a different population than patients who do not access primary care. Additionally, we included only some states and some CHCs, which may not be representative of all states or clinics. Our CHC population, however, is similar to the national CHC population.[31] Despite these limitations, this investigation adds important insights on the impact of the ACA Medicaid expansion on populations served by CHCs.

CONCLUSION

There was a differential impact of Medicaid expansion for hypertension and diabetes diagnoses. We found moderate increases in diabetes diagnosis rates among patients served by CHCs after the implementation of the ACA, suggesting that increased health insurance opportunities with Medicaid expansion and marketplaces may have facilitated access to diagnostic tests for this population. Despite significant differences between expansion and non-expansion states, the study found a small change in hypertension diagnosis rates pre-ACA to post-ACA, suggesting that the diagnosis of hypertension is likely documented for patients regardless of health insurance availability. Additional research is needed to evaluate whether the ACA led to improvements in hypertension or diabetes treatment and/or control for patients from underserved populations.

Contributors HA, NH, MM, BBG and JED designed the study. TS acquired and processed the data. DE-H, MM and TS contributed to different aspects of data analyses. HA wrote the manuscript. All authors contributed to data interpretation and critical revision of the manuscript. The final version of the manuscript was approved by all authors.

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Patient consent for publication Not required.

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Data availability statement Data may be made available on reasonable request. The datasets analysed during the current study may be made available from the corresponding author on reasonable request.

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