**UNMC COLLEGE OF PUBLIC HEALTH
CENTER FOR HEALTH POLICY**

Community Benefits Spending by U.S. Private Nonprofit Hospitals Improves Diabetes Screening Rates

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SUMMARY

- This retrospective longitudinal study examined the relationship between the spending by private nonprofit hospitals on community health improvement initiatives and lagged changes in six community health indicators (i.e., rates of diabetes screening, adult obesity, adult smoking, excessive drinking, preventable hospital stays, teen birth) in 223 counties across seven U.S. states.
- Spending on community health improvement initiatives was only associated with improvements in diabetes screening rates ($p = 0.03$), where 10% increase in spending was associated with a 6.9% increase in diabetes screening.
- Community-level diabetes screening is inexpensive and can be easily performed in an outpatient setting, and its return on investment is substantial.
- The other health indicators in this study, including adult smoking, adult obesity, and excessive drinking, were not significantly related to higher spending.
- Our findings suggest that linking screenings to lifestyle, behavioral, and early disease management interventions may reduce the burden of diabetes for individuals and communities.

INTRODUCTION

In the U.S., private nonprofit hospitals receive generous tax exemptions at the federal, state, and local levels in exchange for providing community benefits. Prior to 2008, government agencies, policymakers, and researchers faced considerable challenges quantifying spending by private nonprofit hospitals on community benefits activities. In 2008, the Internal Revenue Service (IRS) issued standard financial reporting guidelines for private nonprofit hospitals operating in the US [1]. Starting the fiscal year 2009, these hospitals began reporting their spending on nine community benefits (CB) categories:: 1) financial assistance at cost; 2) Medicaid; 3) costs of other means-tested government programs; 4) financial assistance and means-tested government programs; 5) community health improvement services and community benefit operations; 6) health professions education; 7) subsidized health services; 8) research; 9) cash and in-kind contributions for community benefit [2].

These new reporting requirements provided a reliable tool to assess the extent to which these hospitals fulfilled their tax-exemption requirements [3]. Additionally, these data allowed researchers and policymakers to analyze not only the level of spending, but also the programs and activities that have been given priority by these hospitals at the community level. It also became possible to track the changes in these spending patterns over time and relate them to community health measures, institutional performance, and various economic indicators. Perhaps most significantly, government agencies and researchers are now able to evaluate the effects of spending on community health indicators.

Hospitals, including governmental and private, for-profit and nonprofit, spend billions of dollars every year on a wide range of community benefits services and programs. One study by Young and his team estimated that spending on community health improvement activities in 2009 accounted for about 8% of total CB spending [4]. However, a report by the IRS in 2011 estimated this spending accounted for less than 1% of total hospital expenses, nevertheless, this was equivalent to $4.7 billion in 2011 [5]. In 2016, it was estimated that hospitals spent more than $95 billion on community health improvement initiaitves [6].

Diabetes is a group of chronic diseases that can have significant long term health consequences [7]. Uncontrolled diabetes can lead to serious complications including heart, vascular, kidney, and eye diseases and is associated with increased risk of certain types of cancer [7,8]. The economic costs of Diabetes were estimated at $327 billion in 2017 [9]. With the estimates indicating that more than 55 million Americans will have Diabetes by 2030, it is mandatory to adopt broader screening strategies [10]. Screening is recommended in high risk groups which are more prevalent among specific minority groups and the poor [11]. Diabetes screening can help identify new cases and provide a follow up mechanism for certain populations which can reduce the long term consequences of the disease. Community benefit spending by private nonprofit hospitals can provide a sustained source of funding to improve diabetes screening if spending is directed purposely.

To our knowledge, limited research has been conducted to assess the relationship between community benefits spending by nonprofit hospitals and the changes in health status of people within their communities. In this study, we examine the
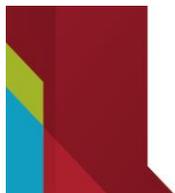
effect of the expenditures on community health improvement initiatives using a set of six community health indicators over four years from 2010-2013, including rates of diabetes screening, adult obesity, adult smoking, excessive drinking, preventable hospital stays, and teen birth.

METHODS

A retrospective longitudinal correlational study assessed the relationship between the aggregated total dollar spending reported by private nonprofit hospitals on community health improvement initiatives and the lagged changes in a set of community health indicators in seven U.S. states. We investigated the spending in one year and the change in community health indicators in the following year, using the community benefits spending in 2010, 2011, and 2012 and the community health indicators in 2011, 2012, and 2013. We used six community health indicators which offered standard definitions and measures over the study period. Four indicators represented health behaviors, while two indicators represented clinical care measures, as defined by County Health Rankings & Roadmaps [12].

Study Sample

The study sample included all 223 urban and rural counties that had at least one private nonprofit hospital reporting its CB spending to the IRS in seven U.S. states: Kentucky, Minnesota, Mississippi, Nebraska, New Hampshire, New Mexico, and Virginia. The states were selected based on poverty rates and regional variation in rurality, socioeconomic status, and insurance levels.

Data Sources

Private nonprofit hospitals in each of the seven states were identified using the American Hospital Association (AHA) Annual Survey [13]. The amounts of spending on community health improvement activities were collected from the hospitals' IRS income tax Form 990 for the years 2010 through 2012 [14]. Three sources were used to obtain, verify, and complete the income tax forms for the identified hospitals, including GuideStar, Economic Research Institute, and Foundation Center [15,16,17]. The 2003 and 2013 U.S. Department of Agriculture Rural-Urban Continuum Codes were used to differentiate rural and urban counties where hospitals were located [18]. States were selected based on the poverty rates using the American Community Survey (ACS) 2009-2013 [19]. Other population data were obtained from the U.S. Census Bureau [20]. The primary source for the community health indicators was the County Health Rankings & Roadmaps files [12]. All data sources are publicly available. The final dataset included a profile for each county that included total spending on community health improvement intiatives, community health indicators, and a population profile.

Independent Variable

For our analyses, we aggregated spending for each private nonprofit hospital on three community benefit categories: 1) community health improvement services and community benefit operations, 2) cash and in-kind contributions for community benefit; and 3) community-building activities. We further aggregated spending by state, county, and per capita. To standardize the levels of spending, we used the Consumer Price Index inflation calculator (CPI) for the U.S. to adjust nominal expenditures for each of the three years [21].

Other Covariates

We included several covariates that could influence community health. These
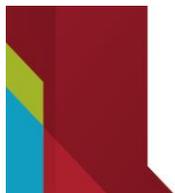
covariates included poverty rates, percentages of uninsured adults, unemployment, population under 18 years old, the population aged 65 years and older, and the female population. We also included a year variable to assess change over time, a location variable to examine the difference between rural and urban counties, and a state variable to investigate differences between states.

Analytical Approach

We examined different demographics, community health indicators, and spending patterns on the state, county, and per capita levels. We used a random-effects model to determine within and between subject effects. County-mean centering using hierarchical linear models was implemented and adjusted for multiple variables, including year, state, location, poverty rates, and other demographic characteristics. Log-

spending was used as our predictor variable because of a highly right-skewed distribution. SAS software (V 9.4) was used to execute the analyses. A p-value of ≤ 0.05 was considered statistically significant.

RESULTS

State Level Spending Findings

Over the 2010-2012 period and for the seven states, total inflation-adjusted spending on community health improvement initiatives increased by 6.3%. However, considerable variations in spending patterns existed between the seven states. The total annual spending on community health improvement initiatives varied from a high of $79 million in Virginia to a low of $8 million in Mississippi (Table 1). Additionally, notable variations in spending patterns were found between the states over the three years of the study. For example, there was

Table 1: Inflation-Adjusted Spending on Community Health Improvement Initiatives, 2010-2012*

	Year	State Spending Total	Maximum	County spending Minimum	Average	Per capita spending Maximum**	Minimum	Average**
Kentucky	2010	67,943,432	37,507,623	5,796	1,415,488	82	0.08	13
	2011	73,131,973	34,284,446	642	1,492,490	179	0.10	18
	2012	75,685,709	37,308,167	1,260	1,513,715	141	0.16	16
Minnesota	2010	65,781,618	18,306,860	4,399	1,342,482	79	0.46	15
	2011	73,673,886	22,465,147	4,997	1,503,549	50	0.58	12
	2012	73,283,069	21,280,988	2,752	1,465,661	73	0.55	14
Mississippi	2010	9,565,575	2,476,246	1,162	797,132	30	0.03	6
	2011	9,977,187	2,322,084	8,663	712,656	28	0.40	6
	2012	8,419,964	4,117,926	1,698	601,426	28	0.16	6
Nebraska	2010	44,642,431	10,361,032	2,855	1,313,013	215	0.17	26
	2011	51,519,708	15,180,033	3,925	1,661,926	411	0.57	38
	2012	54,637,935	19,197,474	1,374	1,762,514	519	0.15	43
New Hampshire	2010	37,841,793	14,295,874	550,949	3,784,179	81	10.32	31
	2011	33,343,335	10,690,758	188,553	3,382,933	120	4.31	33
	2012	31,231,933	10,788,018	305,150	3,470,214	121	6.92	38
New Mexico	2010	13,431,860	4,892,169	44,539	1,033,220	34	0.73	11
	2011	12,252,041	3,802,466	30,119	942,465	45	1.10	11
	2012	11,698,912	3,954,300	43,419	899,916	32	1.53	10
Virginia	2010	75,419,733	15,722,651	660	1,984,730	643	0.03	40
	2011	73,844,355	20,168,838	2,122	1,893,445	626	0.21	39
	2012	79,617,591	22,187,034	819	2,041,477	614	0.12	41

*Excluding all zero and negative values
**Numbers approximated to the nearest US dollar
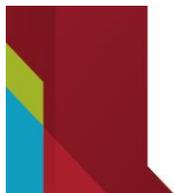
an incremental increase in spending in two states, Nebraska (22.4%) and Kentucky (11.4%), but spending decreased over the same period in New Hampshire (17.5%) and New Mexico (13%). Mixed patterns were found in the remaining three states. Based on the total state-level expenditures by private nonprofit hospitals on community health improvement initiatives, Kentucky, Minnesota, and Virginia provided the highest total spending. Over the same period, Mississippi and New Mexico had the lowest total spending.

County Level Spending Findings

From 2010 to 2012, considerable variations in spending on community benefits were found among the 223 counties, ranging from a high of $37 million in one Kentucky county to a low of $660 in a Virginia county. Substantial differences existed between counties in the same state as well: in New Mexico, county spending ranged from about $4 million to $28,000, while in Kentucky, county spending ranged from $37 million to $640. Extreme fluctuations in spending patterns also existed from year to year, with some showing steep increases while others saw severe declines. Several counties did not have any spending on community health improvement activities. For example, 21% of the counties in Kentucky and 42% of the

counties in Mississippi did not have any spending. The other states had fewer counties that did not show spending on these activities.

Per Capita Level Spending Findings

To better understand who benefited from spending on CB initiatives, we calculated spending on a per capita basis. Nebraska, Virginia, and New Hampshire were the highest per capita spenders while New Mexico and Mississippi spent the least. The data indicated a consistent decline of per capita expenditures in Minnesota, Kentucky, New Mexico, and Mississippi over the study period (Figure 1).

Community Health Indicators Findings

Within and between the seven states, community health indicators showed wavering patterns. Over the study period, adult smoking decreased in all seven states, albeit with different proportions. Diabetes screening showed consistent increase in all states except in Minnesota, which had an initial decrease and then a slight increase. Excessive drinking increased in Kentucky and Nebraska, while other states showed mixed patterns. Adult obesity increased in six states; Minnesota had an initial increase, but it was followed by a mild decrease. The

Figure 1. Inflation-adjusted average spending per capita on community health improvement initiatives in the seven states*, 2010-2012 (n = 223).
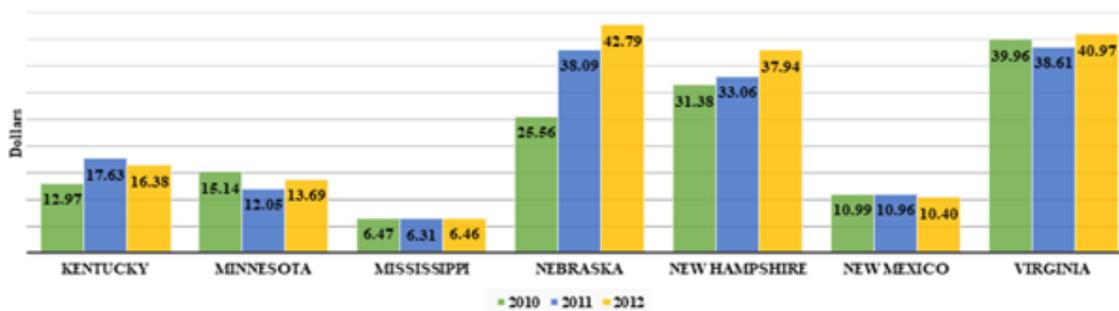
*Excluding all zero and negative values.

Table 2: Regression of Community Health Indicators over Spending on Community Health Improvement Initiatives

		Adult smoking		Adult obesity		Excessive drinking		Teen birth rate		Preventable hospital stays		Diabetic screening	
		Est	P value	Estimate	P value	Estimate	P value	Estimate	P value	Estimate	P value	Estimate	P value
Predictor variables													
Log spending on community health improvement initiatives		-0.02	0.84	0.04	0.57	0.05	0.69	0.23	0.33	0.45	0.51	0.69	0.03
Year	2011	21.71		28.24		14.81		41.74		82.47		82.06	
	2012	21.06	<.0001	29.40	<.0001	14.77	0.31	41.68	0.58	78.81	<.0001	82.47	0.02
	2013	20.82		29.24		14.49		41.35		77.39		83.49	
State	Kentucky	24.66		31.15		10.82		47.39		119.73		83.79	
	Minnesota	17.77		28.73		19.31		34.03		58.34		82.74	
	Mississippi	20.24		31.57		12.11		42.95		81.80		87.59	
	Nebraska	21.25	<.0001	30.46	<.0001	18.03	<.0001	35.43	0.0007	68.26	<.0001	83.07	<.0001
	New Hampshire	23.05		29.12		15.77		38.14		86.63		84.74	
	New Mexico	20.19		21.97		13.56		45.49		62.25		72.74	
	Virginia	21.23		29.76		13.21		47.69		79.89		84.06	
Location	Urban	21.19	0.99	28.54	0.07	15.31	0.09	40.15	0.20	78.60	0.73	82.70	0.97
	Rural	21.20		29.39		14.06		43.02		80.51		82.65	
Poverty rates		0.03	0.63	0.01	0.67	0.06	0.34	-0.05	0.67	-0.11	0.75	0.09	0.54
Medically uninsured adults		0.06	0.05	0.09	<.0001	-0.02	0.51	0.08	0.18	0.003	0.99	0.21	0.01
Unemployment		0.64	<.0001	0.07	0.28	-0.19	0.10	1.26	<.0001	1.88	0.007	0.64	0.04
Population under 18		-0.09	0.64	-0.15	0.20	-0.15	0.48	1.3	0.0008	-0.93	0.43	0.30	0.56
People 65 and older		0.0008	0.99	0.07	0.37	0.33	0.02	0.67	0.02	-0.44	0.59	0.23	0.52
Female population		0.26	0.17	-0.06	0.60	-0.003	0.99	-0.27	0.52	1.98	0.10	-0.35	0.51

teen birth rate decreased in five states except for Mississippi, which had an initial increase and then a decrease and New Mexico, which showed an initial decrease and then an increase. Preventable hospital stays decreased in all states except New Mexico, where there was an initial decrease then slight increase.

Bivariate and Multivariate Analyses

The bivariate relationship between spending on community health improvement initiatives and community health indicators showed that over the study period Kentucky and Nebraska, the two states with a total incremental increase in spending, had a concurrent improvement in four of the six indicators: adult smoking, teen birth rate, preventable hospital stays, and diabetes screening. However, there was a decline in two indicators, adult obesity and excessive drinking, over the same period. In the two states with a steady annual decrease in spending, New Hampshire and New Mexico, there was an improvement in four of the six indicators, adult smoking and preventable hospital stays in both states, along with the teen birth rate in New Hampshire, and diabetes screening in New Mexico. However, adult obesity increased in both states.

We could not observe any differences in community health indicators between states with the highest and lowest per capita spending. Two of the top three states with highest per capita spending, Virginia and Nebraska, had improvements in four indicators, adult smoking, teen birth rate, preventable hospital stays, and diabetes screening, while the third state, New

Hampshire, had improvements in three of the six indicators, adult obesity, teen birth rate, and preventable hospital stays. In states with least spending on these activities, Kentucky, New Mexico, and Mississippi, improvements were observed in adult obesity, preventable hospital stays, and diabetes screening. Kentucky also showed improvement in the teen birth rate.

Kentucky showed improvement in four of the six indicators, although adult obesity and excessive drinking rates deteriorated. Minnesota had three of its health indicators improve, adult smoking, teen birth rate, and preventable hospital stays, while three indicators showed mixed patterns. In Mississippi, three of the health indicators improved, including adult smoking, preventable hospital stays, and diabetic screening, but diverse patterns were found in the other three indicators. Nebraska had improvements in four of the six indicators; however, there was a deterioration in adult obesity and excessive drinking.

Table 2 shows the random effects of multivariate regression results. Interestingly, spending on community health improvement activities was only significantly associated with improvement in diabetes screening (p=0.03). A 10% increase in spending was associated with a 6.9% increase in the percentage of people receiving diabetes screening.

DISCUSSION

In this study, we examined community benefits spending on the state, county, and per capita levels to analyze changes in six community health indicators. At the state level, there was considerable variation in community health improvement expenditures and greater spending in low poverty states compared to high poverty states. At the county level, the multivariate regression analysis was used to estimate the impact of community benefit spending on six health indicators. We found that spending on community health initiatives was only associated with improvements in diabetes screening rates. The association of spending with other community health measures (rates of adult smoking, adult obesity, excessive drinking, teen birth rate, and preventable hospital stays) was not statistically significant.

Further research is needed to determine the reasons for these findings and examine the return on investment. For example, diabetes screening for glucose levels is an inexpensive test that can be easily performed in an outpatient setting, during an education campaign, or a wellness fair, and thus the return on investment for this activity may be significant relative to other activities. If screenings are linked to referrals to lifestyle and behavioral interventions and early disease management programs such as the evidence-based National Diabetes Prevention Program, there would also be opportunities to address the risk factors such as smoking and obesity that eventually could reduce the burden of diabetes across communities.

Using the 2016 fiscal data, the AHA reported that private nonprofit hospitals spent about $95 billion on community benefits [6]. About 91% of total community benefits spending was spent on means-tested government programs, financial assistance to poor patients, subsidized health services, health professions education, and research. Only 8.3% of the total CB spending was invested in activities to improve the health of the community. Spending on community health improvement services and operations accounted for about 4%, and cash and in-kind contributions to community groups were about 3% of total CB spending. Although this 7% spending represented less than 1% of total hospital expenses, in dollar

terms, this amount was estimated to be about $4.7 billion in 2011 [5]. While no study to our knowledge has estimated the effect of such spending on community health, it is logical to expect that these types of targeted spending initiatives will have a positive impact on health outcomes.

Ongoing federal laws and regulations granted private nonprofit hospitals the freedom to decide the appropriate approaches to address the health needs of their communities [22]. To address identified health needs, private nonprofit hospitals have initiated activities that include health education, disease prevention activities such as free classes for diabetes management, childbirth and breast-feeding, wellness events and health fairs, financial support and subsidies to nursing education programs, and free or discounted health screening for common types of cancers, blood pressure, cholesterol, glucose, and obesity. The long-standing expectation was that private nonprofit hospitals would engage in programs and services that respond to and improve their communities' health needs. According to the American Hospital Association (AHA), by 1995, about 60% of private nonprofit hospitals had conducted community health-status assessments and used the results to structure and modify their services [6]. In 2010, the Affordable Care Act (ACA) mandated that at least every three years each nonprofit hospital will conduct a Community Health Needs Assessment (CHNA) that establishes high priority community health needs and develop an implementation plan that includes intervention strategies to address these needs [23]. As private nonprofit hospitals continue to improve their CHNA and develop appropriate implementation plans, there is a greater likelihood that spending on community health improvement programs will have a greater impact on community health outcomes [22].

Limitations

To our knowledge, this research is the first longitudinal study that assesses the relationship between community benefits spending by private nonprofit hospitals and community health indicators after the 2008 and 2010 federal reporting requirements. Additionally, this study considers the four years after the enactment of the IRS and ACA reporting regulations, 2010 to 2013, which provides a baseline for future analysis since research into community benefits spending is uniquely characterized by a significant lag between when spending occurs and when financial data are reported and become available. One of the main limitations of this study is that it only included six community health indicators which might not be reflective of the overall health status of a community.

CONCLUSION

Although the recent IRS reporting requirements may incentivize private nonprofit hospitals to increase investments in community health improvement programs, there is no expectation that these investments are effective in improving community health, and it is unclear whether these hospitals systematically evaluate the impact of their spending. While community benefit spending may not be effective at influencing risk factors of diabetes, diabetes screening rates appear to be more responsive to modest increases in community benefits spending, which would could reap significant individual and population health benefits if screenings are linked to lifestyle and behavioral interventions and early disease management. Future research should consider high-impact community health improvement investments and whether the responsiveness of community-level diabetes screening rates might be leveraged for other community health improvements.

REFERENCES

1. Internal Revenue Service. *New requirements for 501(c)(3) hospitals under the Affordable Care Act.* Available at: https://www.irs.gov/charities-non-profits/charitable-organizations/new-requirements-for-501c3-hospitals-under-the-affordable-care-act

2. American Hospital Association. *IRS Form 990 and Schedule H.* Available at: http://www.aha.org/advocacy-issues/taxexempt/irs.shtml

3. Catholic Health Association. *The IRS Form 990, Schedule H: Community benefit and Catholic Health Care Governance Leaders.* Available at: https://www.chausa.org/docs/default-source/general-files/form990_booklet-pdf.pdf

4. Young, G.J., Chou, C.H., Alexander, J., Lee, S.Y.D., & Raver, E. (2013). Provision of community benefits by tax-exempt US hospitals. New England Journal of Medicine, 368(16), 1519-1527.

5. Rosenbaum ,S., Kindig, D.A., Bao, J., Byrnes, M.K., & O'Laughlin, C. (2015). The value of the nonprofit hospital tax exemption was $24.6 billion in 2011. Health Affairs, 34(7), 1225-1233.

6. American Hospital Association. *New analysis: tax-exempt hospitals provided $95 billion in total benefits to their communities.* Available at: https://www.aha.org/press-releases/2019-05-22-new-analysis-tax-exempt-hospitals-provided-95-billion-total-benefits

7. Pippitt, K., Li, M., & Gurgle, H.E. (2016). Diabetes mellitus: screening and diagnosis. American Family Physician, 93(2), 103-109.

8. Centers for Disease Control and Prevention. (2020). *Diabetes Report Card 2019.* Atlanta, GA: Centers for Disease Control and Prevention, US Dept of Health and Human Services. Available at: https://www.cdc.gov/diabetes/pdfs/library/Diabetes-Report-Card-2019-508.pdf

9. American Diabetes Association. *The cost of diabetes.* Available at: https://www.diabetes.org/resources/statistics/cost-diabetes

10. Rowley, W.R., Bezold, C., Arikan, Y., Byrne, E., & Krohe, S. (2017). Diabetes 2030: insights from yesterday, today, and future trends. Population Health Management, 20(1), 6-12.

11. Gaskin, D.J., Thorpe, R.J., McGinty, E.E. et al. (2014). Disparities in diabetes: The nexus of race, poverty, and place. American Journal of Pub Health, 104(11), 2147-2155.

12. County Health Rankings & Roadmaps. (2016). Available at: http://www.countyhealthrankings.org/explore-health-rankings/our-methods/ranking-system

13. American Hospital Association. *2013 Annual Survey.* Available at: https://ahasurvey.org/taker/asindex.do.

14. Internal Revenue Service. *Schedule H (Form 990) 2017.* Available at: https://www.irs.gov/pub/irs-pdf/f990sh.pdf

15. GuideStar. Available at: http://www.guidestar.org/

16. Economic Research Institute. Available at: http://www.eri-nonprofit-salaries.com/.

17. Foundation Center. Available at: http://foundationcenter.org/.

18. United States Department of Agriculture. *Rural-Urban Continuum Codes.* Available at: http://www.ers.usda.gov/data-

products/rural-urban-continuum-codes.aspx.

19. United States Census Bureau. American Community Survey. Available at: https://www.census.gov/programs-surveys/acs
20. United States Census Bureau. Factfinder. Available at: http://factfinder.census.gov/.
21. United States Bureau of Labor Statistics. Available at: https://www.bls.gov/.
22. Proenca, E.J., Rosko, M.D., & Zinn, J.S. (2000). Community orientation in hospitals: An institutional and resource dependence perspective. Health Services Research, 35(5 Pt 1), 1011.
23. Patient-Centered Primary Care Collaborative. A roadmap for population health management. Available at: https://www.pcpcc.org/sites/default/files/resources/PHM-IBM_Watson-RR.pdf

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CONFLICT OF INTERESTS

None

DISCLAIMER

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