

# The Effect of National Health Service Corps Clinician Staffing on Medical and Behavioral Health Care Costs in Community Health Centers

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**Objective:** Prior studies of community health centers (CHCs) have found that clinicians supported by the National Health Service Corps (NHSC) provide a comparable number of primary care visits per full-time clinician as non-NHSC clinicians and provide more behavioral health care visits per clinician than non-NHSC clinicians. This present study extends prior research by examining the contribution of NHSC and non-NHSC clinicians to medical and behavioral health costs per visit.

**Methods:** Using 2013–2017 data from 1022 federally qualified health centers merged with the NHSC participant data, we constructed multivariate linear regression models with health center and year fixed effects to examine the marginal effect of each additional NHSC and non-NHSC staff full-time equivalent (FTE) on medical and behavioral health care costs per visit in CHCs.

**Results:** On average, each additional NHSC behavioral health staff FTE was associated with a significant reduction of 3.55 dollars of behavioral health care costs per visit in CHCs and was associated with a larger reduction of 7.95 dollars in rural CHCs specifically. In contrast, each additional non-NHSC behavioral health staff FTE did not significantly affect changes in behavioral health care costs per visit. Each additional NHSC primary care staff FTE was not significantly associated with higher medical care costs per visit, while each additional non-NHSC clinician contributed to a slight increase of \$0.66 in medical care costs per visit.

**Conclusions:** Combined with previous findings on productivity, the present findings suggest that the use of NHSC clinicians is an effective approach to improving the capacity of CHCs by increasing medical and behavioral health care visits without increasing costs of services in CHCs, including rural health centers.

**Key Words:** community health center, staffing, cost of care, primary medical care, behavioral health care

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Community health centers (CHCs) are an important component of the health care safety-net system in the United States. CHCs provide primary care and behavioral health care services to many low-income and uninsured patients in medically underserved areas, regardless of their ability to pay.<sup>1,2</sup> A number of studies have shown that CHCs offer services to patients with costs lower than other health care settings<sup>3–6</sup> and higher quality of care.<sup>7,8</sup> The capacity of CHCs to continuously provide high-quality, low-cost services is essential for ensuring access to affordable care among vulnerable population.

However, CHCs have long suffered from staffing shortages in large measure because they are located in medically underserved areas, such as rural areas and inner cities, where attracting qualified clinicians is often difficult.<sup>9</sup> Many CHCs rely on the availability of the National Health Service Corps (NHSC) clinicians to deliver services and to augment other non-NHSC clinical staff.<sup>10</sup> The NHSC is a federal program that offers loan repayments or scholarships to primary, dental and behavioral health care professionals working in Health Professional Shortage Areas (HPSAs), including CHCs.<sup>11</sup> Almost two third of the NHSC clinicians worked in CHCs in 2017.<sup>12</sup>

Prior studies have found that clinicians supported by the NHSC contribute equally to primary care visits and more

to behavioral health care visits, as compared with non-NHSC clinicians, presumably because NHSC-supported clinicians are required to spend the bulk of their time on direct patient care, leading to more visits per staff compared with non-NHSC clinicians who might spend more time in other functions, for example, quality management.<sup>10,13</sup> However, whether the use of NHSC clinicians are effective in reducing the cost of services in CHCs has been unclear.

Our conceptual model is that changes in the efficiency of visits—the cost per visit—is a function of the cost per health staff times the number of staff per visit. Moreover, the total capacity of a health center is related to the total number of providers. Thus, the use of NHSC or non-NHSC staff might affect the cost per visit either by influencing staff productivity, that is, the number of visits per staff,<sup>14</sup> or the relative cost of an additional staff, which is primarily related to salary levels. We do not have good information about the relative salary levels of NHSC and non-NHSC clinicians, but we know that NHSC clinicians effectively obtain additional compensation through loan forgiveness, so it is likely that salary levels between NHSC and non-NHSC clinicians might differ. In addition, NHSC staff may have less experience than their non-NHSC colleagues, which could reduce both their productivity and their salary levels. In this study, we lack information about the quality or ultimate efficacy of care rendered by different provider types, but we note that prior research has found health centers provide high-quality care.<sup>7,8</sup>

The purpose of this study was to extend prior research by comparing the effect of additional NHSC and non-NHSC medical and mental health staff on costs of medical and mental health care and provide more insights into the effectiveness of the NHSC in enhancing the capacity of CHCs to provide services in underserved communities.

## METHODS

### Data

We used 2013–2017 administrative data from the Uniform Data System (UDS)<sup>15</sup> provided by the Bureau of Primary Health Center and from the NHSC administrative database provided by the Bureau of Health Workforce. The UDS is an annual report filed by all health centers that receive Section 330 grants. Each center reports organizational-level information, including their patient demographics, staffing [including staff full-time equivalents (FTEs)] by service areas (eg, medical care, behavioral health care), number of total patients and annual visits by service categories, and total costs of care by service categories, as well as other organizational characteristics (such as rural-urban status, types of received funding). The NHSC data provide a profile of each NHSC participant on their discipline, specialty, award programs, obligation status, hours spent at each service site, and the number of weeks worked per year. The UDS data were merged with the NHSC data by grant number.

County-level poverty and uninsured rates were obtained from the Area Health Resources Files available at the Health Resources and Services Administration (HRSA) warehouse<sup>16</sup>

and merged with the UDS data using health center head-quarter zip codes.

### Measures and Outcomes

The key explanatory variables were NHSC and non-NHSC staffing, respectively, measured as the number of staff FTEs. We measured staffing in primary medical care and behavioral health care areas. In this study, NHSC staff included active participants in 2 main federal programs, that is, the loan repayment or scholarship program, during the study period. Because >90% of the NHSC awards are made for loan repayment recipients, our findings primarily represent the NHSC loan repayment program.<sup>9</sup> To be consistent with the NHSC loan repayment eligibility, primary medical care staff included family physicians, general practitioners, internists, obstetricians/gynecologists, nurse practitioners, physician assistants, and certified nurse-midwives.<sup>11</sup> Behavioral health staff included psychiatrists, psychologists, clinical social workers, other licensed behavioral health professionals, and substance abuse staff, although relatively few were psychiatrists.<sup>11</sup>

The UDS data do not directly differentiate NHSC and non-NHSC FTEs. We first used administrative data about NHSC placements to identify NHSC clinicians who were actively fulfilling services obligations in CHCs between 2013 and 2017 and then calculated the number of NHSC FTEs using a standard conversion factor where the number of FTEs = total hours/40 hours per week × 52 weeks per year<sup>15</sup> and linked the NHSC FTE data with the UDS data by grant number. We computed the number of non-NHSC FTEs by subtracting the number of NHSC FTEs from total FTEs in medical and behavioral health positions at each health center. Details on identifying NHSC and non-NHSC FTEs can refer to our prior studies.<sup>9,12</sup>

The outcomes of interest were total costs per medical care and behavioral health care visit. The UDS defines total costs of care as the sum of direct costs associated with clinical services plus allocated administrative and facility costs (ie, overhead). Thus, medical care costs include costs for medical care personnel, services provided under the agreement, laboratory and x-ray, and other direct costs wholly attributable to medical care, such as staff recruitment, equipment depreciation, medical supplies, professional dues and subscriptions, continuing medical education and travel associated with continuing medical education; it does not include costs associated with other clinical areas. Similarly, behavioral health care (including mental health care and substance abuse services) costs include staff, fringe benefits, supplies, equipment depreciation, related travel, and other direct costs. The cost data are self-reported by each health center based on the above definition.

We computed total medical care costs per visit using total medical care costs divided by total medical care visits and computed total behavioral health costs per visit using total behavioral health care costs divided by total behavioral health visits. Since our study period spans 5 years, to control for inflation, we converted the nominal costs to constant dollar costs, adjusting for annual changes in the average cost per medical or mental visit at health centers, as reported in the UDS reports.

**TABLE 1.** Average Costs Per Visit and Staff Full-time Equivalents Per Community Health Center in Medical and Behavioral Health Care, 2013–2017

| Cost and Full-time Equivalent              | 2013   |        | 2014   |        | 2015   |        | 2016   |        | 2017   |        | 5-Year Average |        | 5-Year Growth Rate (%) |
|--|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|----------------|--------|------------------------|
|  | Mean   | SD     | Mean   | SD     | Mean   | SD     | Mean   | SD     | Mean   | SD     | Mean           | SD     |                        |
| Average costs per visit (2013 constant \$) |        |        |        |        |        |        |        |        |        |        |                |        |                        |
| Medical care                               | 161.37 | 42.58  | 161.91 | 40.98  | 161.88 | 42.62  | 161.36 | 42.31  | 161.96 | 41.95  | 161.70         | 42.08  | 0                      |
| Behavioral health care                     | 135.77 | 104.50 | 143.95 | 129.50 | 148.05 | 131.40 | 150.45 | 119.33 | 145.13 | 102.33 | 144.71         | 118.12 | 7                      |
| Staff full-time equivalents                |        |        |        |        |        |        |        |        |        |        |                |        |                        |
| Primary medical care                       |        |        |        |        |        |        |        |        |        |        |                |        |                        |
| NHSC                                       | 3.40   | 4.98   | 3.37   | 5.15   | 3.64   | 5.27   | 4.01   | 5.67   | 4.27   | 5.98   | 3.74           | 5.43   | 25                     |
| Non-NHSC                                   | 32.58  | 31.23  | 34.02  | 31.47  | 36.20  | 34.61  | 38.31  | 36.70  | 40.24  | 37.27  | 36.29          | 34.47  | 24                     |
| Behavioral health care                     |        |        |        |        |        |        |        |        |        |        |                |        |                        |
| NHSC                                       | 0.67   | 1.48   | 0.80   | 1.82   | 1.08   | 2.43   | 1.41   | 2.92   | 1.61   | 3.09   | 1.12           | 2.46   | 141                    |
| Non-NHSC                                   | 8.76   | 15.88  | 9.37   | 17.05  | 10.57  | 18.56  | 12.43  | 21.39  | 13.99  | 23.05  | 11.04          | 19.48  | 60                     |

Cost data were normalized using Consumer Price Index to control for inflation.

Means were weighted by the number of total patients at each center to account for the disproportionate influence of small centers.

NHSC indicates National Health Service Corps.

## Analysis

This analysis included 1109 CHCs (totaling 5411 y observations) that reported to the UDS during 2013–2017. Accordingly, our unit of analysis is a center-year.

We calculated the mean numbers of costs per visit and staff FTEs for NHSC and non-NHSC clinicians in medical care and behavioral health care areas from 2013 to 2017, weighted by the number of total patients at each center to account for the disproportionate influence of small centers. We then constructed multivariate linear regression models with health center and year fixed effects to examine the marginal effect of NHSC and non-NHSC staff FTEs on costs per visit. In the model, the dependent variable was each of the outcome variables, and the key explanatory variables were the number of NHSC FTEs and the number of non-NHSC FTEs in medical care and behavioral health care, respectively. Models were run separately for medical care and behavioral health care.

We controlled for patient and facility characteristics, including the number of total patients (as a proxy for health center size), percentages of patients by age, race/ethnicity, income level, insurance type, managed care enrollments, and chronic disease conditions (as a proxy for disease complexity), and services provided by nonphysician clinicians, dummy variables indicating the type of grant funding health center received, as well as county poverty rates and county uninsured rates. We clustered SEs by center to adjust for autocorrelation within centers across the year. We considered a 2-sided  $P$ -value  $< 0.1$  to be statistically significant.

As rural centers face more severe staffing challenges and financial constraints and they are often more reliant on NHSC staff than urban centers,<sup>9</sup> we also conducted a subgroup analysis by restricting regression analysis to rural centers to see if staffing affects costs differently in rural centers.

All analyses were performed using Stata, version 15 (StataCorp).

## RESULTS

Table 1 shows the average costs per visit (in 2013 dollars) and staff FTEs in medical and behavioral health

care per CHC during 2013–2017. Over the 5-year period, the average cost per medical care visit per center was \$161.70, and the average cost per behavioral health care visit was \$144.71. Medical care cost per visit had nearly no changes during this period (\$161.37 in 2013 and \$161.96 in 2017), while the average cost per behavioral health visit increased by about 7%, from \$135.77 in 2013 to \$145.13 in 2017.

The 5-year mean number of NHSC staff FTEs was 5.43 in primary care and 2.46 in behavioral health care. In comparison, the mean number of non-NHSC staff FTEs was 34.47 in primary care and 19.48 in behavioral health care. The number of FTEs for NHSC and non-NHSC staff in primary medical care both rose by about 25% from 2013 to 2017. Behavioral health staff FTEs rose faster during the same period: the number of NHSC staff FTEs increased by 141% from 0.67 in 2013 to 1.61 in 2017 and non-NHSC staff FTEs also increased at a rapid pace of 60% from 8.76 in 2013 to 13.99 in 2017.

Table 2 presents key estimates of the contribution of each additional NHSC and non-NHSC staff FTE to cost per medical and behavioral health visit from 2013 to 2017, after using multivariate analysis and controlling for patient, CHC and county characteristics described in the Methods section. Full regression results are provided in the Appendix (Supplemental Digital Content 1, <http://links.lww.com/MLR/C301>). We report adjusted regression coefficients and their corresponding 95% confidence intervals (CIs).

After controlling for patient, CHC and county characteristics, we found no significant associations between increases in NHSC primary care FTEs, and changes in medical care costs per visit in CHCs, although the direction of the effect was negative. In contrast, each additional non-NHSC primary care staff FTE was significantly associated with an increase of \$0.66 (95% CI, \$0.29–\$1.03) per medical care visit. When we restricted the analyses to rural centers, the results were similar, although the effects were not significant for either NHSC or non-NHSC medical staff.

**TABLE 2.** Regression Estimates of Each Additional NHSC and Non-NHSC Full-time Equivalent on Costs Per Medical and Behavioral Health Care Visit in CHCs

| Staff Full-time Equivalents | Average Costs Per Visit (2013 Constant \$) |                       |                          |                           |
|-----------------------------|--|-----------------------|--------------------------|---------------------------|
|                             | Medical Care                               |                       | Behavioral Health Care   |                           |
|                             | All CHC                                    | Rural CHC             | All CHC                  | Rural CHC                 |
| NHSC                        | -0.54 (-1.23 to 0.15)                      | -0.40 (-1.70 to 0.91) | -3.55** (-6.55 to -0.55) | -7.95** (-14.08 to -1.83) |
| Non-NHSC                    | 0.66*** (0.29-1.03)                        | 0.61 (-0.25 to 1.47)  | 0.44 (-0.47 to 1.36)     | -0.21 (-1.74 to 1.32)     |

Adjusted regression coefficients and their corresponding 95% confidence intervals are presented.

Results are from multivariate linear regression models with health center and year fixed effects, controlling for the number of total patients (as a proxy for size), percentages of patients by age, race/ethnicity, income level, insurance type, managed care enrollments, and chronic disease conditions (as a proxy for disease complexity), and services provided by nonphysician clinicians, dummy variables indicating the type of grant funding health center received, as well as county poverty rates and county uninsured rates.

SEs were clustered at the center level. Models were run separately for medical care and behavioral health care.

Full regression results are provided in the Appendix (Supplemental Digital Content 1, <http://links.lww.com/MLR/C301>).

CHC indicates community health center; NHSC, National Health Service Corps.

\*\**P* < 0.05.

\*\*\**P* < 0.01.

When we examined behavioral health services, we found that each additional NHSC behavioral health FTE was significantly associated with a reduction of \$3.55 (95% CI, -\$6.55 to -\$0.55) per behavioral health care visit in overall CHCs. When the analyses were restricted to rural centers, we found an even larger reduction (\$7.95; 95% CI, -\$14.08 to -\$1.83) in behavioral health costs per visit associated with per additional NHSC staff FTE. In comparison, there was no evidence that increases in non-NHSC staffing were associated with changes in behavioral health costs per visit in CHCs, either overall or in rural centers.

### DISCUSSION

This was the first study to examine how the presence of NHSC medical and behavioral health clinicians contributes to costs of care in CHCs. We did not find that increases in NHSC primary care staffing was statistically significantly associated with medical costs per visit, but we found that increases in non-NHSC staff were significantly associated with higher medical care costs. This finding suggests that it is relatively less expensive to increase medical care capacity by using more NHSC staff than non-NHSC staff in CHCs.

Our analysis of behavioral health care showed an even more pronounced effect of the NHSC staffing on costs of behavioral health care. Increases in NHSC behavioral health staffing were significantly associated with lower behavioral health care costs per visit in CHCs, and even more so in rural centers. In contrast, an additional non-NHSC behavioral health staff was not significantly associated with higher or lower behavioral health care costs per visit.

Combined with prior research on NHSC and non-NHSC staff productivity,<sup>10,13</sup> the present findings suggest that the NHSC staffing effectively helps contain the costs of medical and behavioral health care in CHCs and are, therefore, an effective way to increase patient care capacity in underserved communities. This effect is especially strong in behavioral health care, and in rural areas.

In light of the opioid epidemic, in recent years, the federal government has an increasing interest in using NHSC clinicians to bolster behavioral health services (including

substance use disorder) in underserved communities.<sup>17</sup> Although the estimated cost savings per visit associated with the use of NHSC versus non-NHSC staffing are modest—<\$1 per medical visit and several dollars per behavioral health visit, the net savings to each health center could be substantial when accumulated across thousands of patients and tens of thousands of visits per year. These savings could be used to expand services, such as substance use disorder treatments and many other activities. Cost savings could be used for investments in staffing and in the facility itself, further enhancing the capacity of CHCs.

A sizable investment has recently been made in NHSC funding, including an \$800 increase included in the 2021 American Rescue Plan Act.<sup>18</sup> More research is warranted to document the effectiveness of the programs in expanding access to care in underserved areas. This study lays the groundwork for more in-depth studies of the contributions of NHSC programs in providing care for underserved populations. It would be important for future research to extend this study by examining the effect of NHSC staffing on care quality in CHCs. With value-based and other alternative payment models emerging, quality will also need to be considered in any assessment of cost-effectiveness, and it could shift the balance. This would be especially important given the earlier findings that NHSC clinicians contribute to more patient visits and lower medical care costs since high visit volumes could be negatively associated with quality. Examining productivity, costs, and quality together can provide more comprehensive insights on the effect of the NHSC on improving the capacity of CHCs in serving underserved communities.

Although we hypothesize that differences in costs between NHSC and non-NHSC clinicians could be attributable to productivity differences, it may also be attributable to differences in labor costs, which should be primarily affected by salary costs for NHSC and non-NHSC staff. A limitation of this study is that our analysis did not account for potential labor cost savings, as we do not have the actual data on salaries. But we note that the salaries borne by health centers—and reflected as CHC expenditures in the UDS data—do not include the value of loan forgiveness provided to NHSC

staff.<sup>19</sup> Those costs are accounted for separately in funding for the NHSC program at HRSA, not in the CHC budgets. NHSC contracts say that salaries (and salary increases) are not to be altered for loan repayment purposes. Nonetheless, loan forgiveness does make total compensation more attractive to NHSC clinicians, which could influence salary differences between NHSC and non-NHSC staff. It is also possible, however, that other incentives or amenities are available to non-NHSC staff, for example, different work schedules or administrative responsibilities. Finally, there may be heterogeneity in the use of NHSC and non-NHSC staff in specific training or experience, such as the use of medical doctors versus osteopathic physicians or nurse practitioners or of psychiatrists or psychologists instead of licensed clinical social workers.

It is also worth noting that NHSC awards are not the only incentive options available to encourage clinicians to practice in underserved areas. Other options include similar state-funded financial incentive and loan forgiveness programs<sup>20</sup> and visa waiver programs which offer immigrant physicians US residency for the immigrant (and his or her family) in return for practicing in an underserved area.<sup>21</sup> Because we lack data about CHC clinicians who have state-funded incentives or visa waivers, they are classified as non-NHSC clinicians in this analysis. Further research might examine the value of loan forgiveness, salary and other role differences for NHSC and non-NHSC staff.

We acknowledge other limitations of this analysis. First, although we used fixed-effect modeling to account for unobservable time-invariant factors, due to the observational nature of the data, causality cannot be inferred from this study. Second, the self-designation of rural-urban status may lead to bias if large parts of “urban” centers are rural or vice versa. Third, we assessed staffing by clinical areas, but staffing impact on costs could be different by specialties and provider types. We have included the percent of services provided by nonphysician clinicians in the model to reduce the influence of such a limitation. Fourth, although we controlled for the type of funding the health center received (which may indicate whether a health center provides services to special populations such as the homeless people), we lack information on services provided outside of the facility such as services delivered at school health clinics. Similarly, we do not have information on the cost of living and thus were unable to tease out, for example, cost differences due to differences in cost of living between rural and urban areas. Fifth, since the absolute number of NHSC staff was relatively smaller as the NHSC offers limited spots for eligible providers, the detected differences between NHSC and non-NHSC staff might be misleading. However, because we compared the visits per staff rather than the absolute number of NHSC versus non-NHSC staff, this should balance out the differences in the size of these 2 types of providers. Sixth, since many health centers have sites in multiple counties, using health center headquarter zip codes to link county-level data is a limitation. However, because the UDS data are reported at the center level, using headquarter zip-code as an identifier is the most efficient way to link other data sources.

## CONCLUSIONS

Our analyses, coupled with prior studies, suggest that the use of NHSC clinicians is an effective approach to building primary care and behavioral health care capacity in CHCs in underserved communities by increasing patient visits while at the same time lowering service costs. A fundamental concern, however, is that federal funding for the NHSC is capped and not steady,<sup>21</sup> although funding levels increased somewhat through 2020 to support a response to the opioid crisis.<sup>22,23</sup> Thus, CHCs do not have an unlimited supply of NHSC clinicians available to them and must consider how to meet all their staffing needs using NHSC clinicians and others.

As noted earlier, staffing shortages remain a fundamental challenge for CHCs and other health providers in HPSAs. This study underscores the importance of the NHSC program as an element of the nation’s efforts to support medical and behavioral health care, along with the CHC program, for populations living in underserved rural and urban communities across the nation.

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