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# Nurse practitioners, physician assistants, and physicians in community health centers, 2006–2010



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## ABSTRACT

**Purpose:** Community health centers (CHCs) fill a vital role in providing health care to underserved populations. This project compares characteristics of patient visits to nurse practitioners (NPs), physician assistants (PAs), and physicians in CHCs.

**Methods:** This study analyzes 2006–2010 annual survey data from the National Ambulatory Medical Care Survey CHC sample, a representative national sample of CHC providers and patient visits. We examine trends in provider mix in CHCs and compare NPs, PAs, and physicians with regard to patient and visit attributes. Survey weights are used to produce national estimates.

**Results:** There were, on average, 36,469,000 patient visits per year to 150,100 providers at CHCs; 69% of visits were to physicians, 21% were to NPs, and 10% were to PAs. Compared to visits to NPs, visits made to physicians and PAs tended to be for chronic disease treatment and for patients whom they serve as primary care providers. Visits to NPs tended to be for preventive care.

**Conclusions:** This study found more similarities than differences in characteristics of patients and patient visits to physicians, NPs, and PAs in CHCs. When statistical differences were observed, NP patient and visit characteristics tended to be different from those of physicians.

**Implications:** Results provide detailed information about visits to NPs and PAs in a setting where they constitute a significant portion of providers and care for vulnerable populations. Results can inform future workforce approaches.

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## 1. Background

Since their creation as part of the *War on Poverty* in the 1960s, community health centers (CHCs) have filled an important role in providing health care to underserved populations in the United States.<sup>1</sup> Infusions of federal support over the past decade have expanded this role,<sup>2,3</sup> with the number of patient visits to CHCs increasing from 15,681,407 in 2001<sup>2</sup> to 56,105,525 in 2010.<sup>4</sup>

Nurse practitioners (NPs) and physician assistants (PAs) have been employed extensively in CHCs for decades,<sup>5</sup> but their use has increased, with NPs and PAs together providing 30% of CHC visits in 2006–2007.<sup>6</sup> With primary care physician shortages predicted,<sup>7</sup> CHC use of NPs and PAs is expected to continue to grow.

In primary care in the U.S., NPs and PAs fill a variety of roles, including serving as the primary care provider for patients, providing acute care, and providing chronic disease management.<sup>8</sup>

How the work of primary care is divided among teams of physicians, NPs, and PAs depends on many factors, such as the regulatory environment, local availability of providers, and local population needs. For example, NPs and PAs more often provide care and serve as patients' primary care providers in rural areas, where physicians are scarcer, and in states with less restrictive practice regulations.<sup>9–14</sup>

CHCs may provide a model for NP and PA use in emerging modes of care designed for efficient service delivery to high-need populations.<sup>15</sup> The population served by CHCs is medically and socially complex.<sup>16</sup> In 2010, over 75% of CHC patients earned less than 200% of the federal poverty level; 76% were uninsured or covered by Medicaid; 62% belong to racial or ethnic minority groups; and 5% were homeless.<sup>4</sup> Physician vacancy rates in CHCs are persistently high.<sup>17</sup> Despite these challenges, CHC quality<sup>18,19</sup> and cost<sup>16</sup> outcomes compare favorably with other settings. As CHCs adapted to care for high-need populations with constrained budgets and chronic staffing shortages, many features of CHCs have evolved to resemble those of patient-centered medical home (PCMH) models. For example, many CHCs have adopted a holistic approach, accessibility, care coordination, and team approaches.<sup>3,20</sup> For these

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reasons, the CHC care environment may demonstrate emerging patterns of NP and PA care for complex patients using team-based approaches similar to the PCMH care model.<sup>20,21</sup>

While sometimes considered interchangeable, NPs and PAs are trained in different educational models and may have different strengths. NPs are trained using a nursing model that places high value on psycho-social aspects of care<sup>22,23</sup> and may be especially suited to provide preventive care and chronic disease management.<sup>24,25</sup> PAs are trained in a medical model similar to the physician's approach that focuses on treatment of disease states.<sup>5</sup>

Past research has sometimes been limited on information about NPs and PAs because data sources did not accurately represent them.<sup>26</sup> The sample design of the core National Ambulatory Medical Care Survey (NAMCS) provides national estimates for physicians, but not for NPs and PAs.<sup>26</sup> Starting in 2006 the NAMCS survey added a CHC stratum designed to accurately represent CHC physicians, NPs and PAs. This stratum provides an opportunity to compare patient care activities by provider type. Earlier studies have reported data on 2006–2008.<sup>27</sup> Our project presents a more detailed analysis of patient and visit data to CHC providers and extends through 2010 to encompass a time period of known rapid growth in CHCs and in the NP and PA professions. We analyze NPs and PAs separately and describe differences in their practice patterns in CHCs.

## 2. Methods

This study used data from the National Ambulatory Medical Care Survey (NAMCS) Community Health Center stratum from 2006 to 2010.<sup>28</sup> The NAMCS uses a three stage probability sample designed to reflect physician practice in the U.S. This sample is based on geographic primary sampling units (PSUs), physician practices within the PSUs, and patient visits within physician practices. The NAMCS CHC sample is drawn from a roster of health centers and takes, within those centers, representative samples of physicians, NPs and PAs. This CHC stratum, consisting of approximately 104 CHCs each year, was added to the NAMCS family of surveys in 2006. Sampled CHCs include Federally Qualified Health Center (FQHC) clinics that receive Section 330 grants under the

Public Health Service Act, “look-alike” health centers that meet FQHC requirements but do not receive federal funding, and federally-qualified urban Indian Health Service clinics. Among CHCs, the response rate was 86.6% among NPs, PAs, and nurse midwives (NMs) and 85.5% among physicians (unpublished calculations by authors).

Our study included only visits to Section 330 grantees and “look-alike” CHCs, and used all available data to date. Altogether, the sample included 670 physicians, 245 NPs/NMs, and 103 PAs in these CHCs, and 24,528 patient visits that were made to these CHC providers from 2006 to 2010. All sampled providers were asked to complete a provider induction survey and patient visit forms for a randomly selected sample of up to 30 patient visits over a randomly selected one-week period. Our estimates were based on the provider type that actually saw and provided care to the patient. For 107 visits (0.4%), time spent with the patient was recorded for a physician and an NP or PA; we attributed these visits to the physician.

Since the sample of NMs was too small (1.7%) to support valid statistical analysis as a separate group, NM were included in the NP category. Since NM patient care activities vary from those of NPs, we conducted sensitivity analyses (including vs. excluding NM visits) to determine if combining NMs with NPs significantly affected the outcomes. Outcomes were statistically similar for all variables (data available upon request).

Among the CHC visits, the nonresponse rates for most questions were less than 5%. Exceptions were race (15.8%), ethnicity (16.4%), and number of past visits during the previous 12 months (10.5%). Missing data for these variables were imputed and used in our analysis. Missing data for these items were imputed by National Center for Health Statistics analysts by randomly assigning a value from another record with similar characteristics. Imputations, in general, were based on physician specialty, geographic region, and diagnosis codes.<sup>29</sup>

Patient characteristics analyzed included patient age group, sex, race/ethnicity, urban/rural status (Table 1), major reason for visit and presence of selected chronic conditions (Table 2), and factors describing the patient's relationship to the clinic, such as whether the patient was new to the clinic, how many times the patient had been seen in the clinic over the previous 12 months, and whether the provider seen was the patient's primary care

**Table 1**  
Characteristics of patients and patient visits in CHCs by provider type, 2006–2010.  
Source: National Ambulatory Medical Care Survey

	Physician (%)	NP or PA (%)	NP (%)	PA (%)	p Values			
					Physician vs. NP or PA	Physician vs. NP	Physician vs. PA	NP vs. PA
<b>Age group</b>					< 0.01	< 0.01	0.27	0.20
Children (age 0–18)	27	24	24	23				
Young adults (age 19–45)	33	45	48	39				
Middle-aged adults (age 46–64)	28	24	22	28				
Older adults (age > 65)	12	7	6	10				
<b>Sex</b>					< 0.01	< 0.01	0.41	< 0.01
Female	62	69	74	60				
Male	38	31	26	40				
<b>Race/ethnicity</b>					0.10	0.22	–	–
Non-Hispanic white	39	47	46	50				
Non-Hispanic black	20	20	22	17				
Hispanic	34	27	27	26				
Other	8	6	5	7 <sup>a</sup>				
<b>Metropolitan statistical area</b>					< 0.05	0.06	–	–
Urban	91	79	81	75 <sup>a</sup>				
Rural	9	21	19	25 <sup>a</sup>				

<sup>a</sup> The estimates for PAs from these categories had large standard errors with relative standard error > 0.3.

**Table 2**

Diagnosis and type of care content for visits to CHCs by provider type, 2006–2010.  
Source: National Ambulatory Medical Care Survey

	Physician	NP	PA	All providers (3-way comparison)	Physician vs. NP	Physician vs. PA	NP vs. PA
<b>Major reason for visit (%)<sup>a</sup></b>				< 0.05	< 0.05	0.25	< 0.05
New problem	38.1	35.9	45.5				
Preventive care	28.7	41.5	22.8				
Chronic-routine	26.0	16.9	25.1				
Chronic-flare up	7.2	5.8	6.6				
<b>Patient with one or more chronic conditions (%)<sup>b</sup></b>	50.8	41.9	50.0	0.14	< 0.05	0.84	0.14
<b>Type of care (%)<sup>c</sup></b>							
Acute	32.5	33.0	35.5	0.36	0.73	0.16	0.33
Chronic	47.6	37.0	44.5	< 0.05	< 0.01	0.56	0.19
Dermatologic	4.6	4.9	5.5	0.60	0.79	0.31	0.49
Mental health	8.7	8.3	11.1	0.21	0.74	0.14	0.09
Prevention/pregnancy	21.5	33.9	21.1 <sup>d</sup>	–	< 0.01	–	–
Ill-defined symptoms	14.8	12.6	14.4	0.14	0.06	0.84	0.27

<sup>a</sup> The category for pre- or post-surgical care was deleted because it accounted for only 1.1% of visits and estimates were unreliable due to small numbers of observations in some cells.

<sup>b</sup> Chronic conditions included are the 10 most frequently reported chronic conditions in the sample.

<sup>c</sup> Type of care categories are based on ICD-9 codes using the categorization approach developed by Fenton<sup>30</sup>. A seventh category (vision and hearing) was deleted because it was present in only 1.6% of visits and estimates were unreliable due to small numbers of observations in some cells.

<sup>d</sup> The prevention/pregnancy category for PAs had large standard errors with relative standard error > 0.3.

**Table 3**

Measures of interactions between patient and provider.

Source: National Ambulatory Medical Care Survey

	Physician	NP	PA	All providers (3-way comparison)	Physician vs. NP	Physician vs. PA	NP vs. PA
<b>Has the patient been seen before in this clinic?</b>							
Yes (%)	88	88	88	0.95	0.75	0.97	0.80
<b>Number of times patient has been seen in the past 12 months</b>				< 0.01	< 0.01	0.18	0.30
With 1 visit (%)	12	13	12				
With 2–3 visits (%)	27	32	32				
With 4–6 visits (%)	31	26	29				
With > 7 visits (%)	30	29	27				
<b>Are you this patient's primary care provider?</b>							
Yes (%)	76	59	71	0.07	< 0.05	0.41	0.34

provider (Table 3). When sample size was adequate, we analyzed rural-urban differences. Some estimates for PA visits (“other” category of race/ethnicity and the urban/rural status) did not meet National Center for Health Statistics standards for reliability (relative standard error > 0.3), but are presented for completeness. Patient visit characteristics collected in the NAMCS survey include up to three recorded visit diagnosis ICD-9 codes. Type of services ordered or provided during the visit was determined using a previously published algorithm that utilizes visit ICD-9 codes.<sup>30</sup> This algorithm groups diagnoses into seven categories: acute, chronic, dermatologic, mental health, pregnancy and prevention, ill-defined symptoms, and vision and hearing. Each visit could involve more than one type of service. We collapsed response categories where appropriate to address small cell sizes.

Sampling weights were used to compute national estimates for all analyses. To account for the NAMCS multi-stage complex sample design, standard errors were calculated using Taylor-series approximation with SUDAAN software. A weighted least-squares regression analysis was used to determine the significance of trends in number of visits by provider type.<sup>31</sup> All other analyses combined all five years of data. Chi-square tests of association were used to compare patient and visit characteristics across provider types. We made minor alterations to some analysis categories to address small cell sizes.

This study was declared exempt from review by the Duke University Medical Center Institutional Review Board.

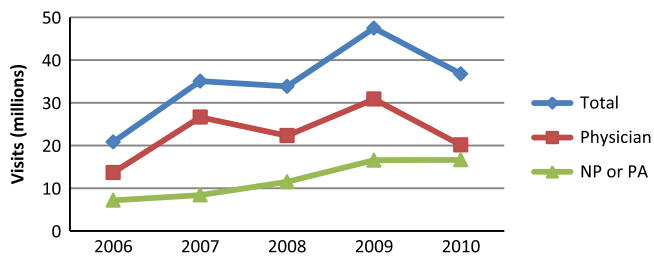
### 3. Results

#### 3.1. Trends in numbers of providers and visits

National estimates over the entire five-year period showed that CHC providers were comprised of 69% physicians, 21% NPs, and 10% PAs. The distribution of visits seen by each provider type was similar (65%, 23%, and 11%, respectively), with NPs and PAs together accounting for over one third of patient visits. Fig. 1 shows a general increasing trend in numbers of annual visits over the time period studied, but there is a noticeable, although nonsignificant, drop in total visits between 2009 and 2010. Over the five-year period, the percentage of visits seen by an NP or PA increased ( $p < 0.05$ ).

#### 3.2. Patient demographics

Patient demographic characteristics of CHC visits varied by provider type (Table 1). The proportion of visits for patients in each age group varied across provider types. A higher percentage of visits to NPs (48%) than to physicians (33%) or PAs (39%) were made by young adults. Conversely, a lower proportion of visits to NPs were made by middle-aged and older adults, with physicians and PAs having similar proportions of visits by patients in these older age groups. A larger proportion of NP visits were with women (74% of NP patient visits), compared to physician or PA



**Fig. 1.** Estimated number of Community Health Center Visits by Provider Type, 2006–2010. For trend analyses:  $p < 0.05$  for NP or PA trend. Source: National Ambulatory Medical Care Survey

visits (62% and 60%, respectively). More visits to PAs and NPs (combined) were with patients in rural CHCs (21%) than visits to physicians (9%;  $p < 0.05$ ). Patient race/ethnicity was similar across provider types.

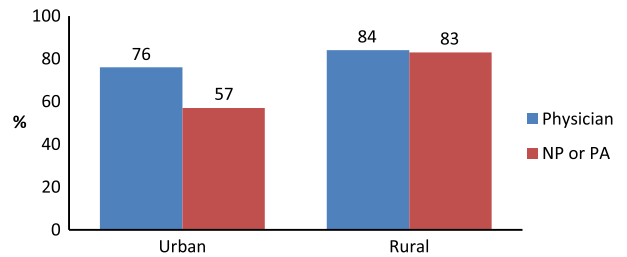
### 3.3. Diagnosis and type of care

With regard to reason for visit, patient diagnoses and content of care (Table 2), characteristics of visits to physicians and PAs were often more similar to each other than to those of NPs. Our analysis of the “major reason for visit” survey item showed that a larger portion of NP visits (42%) was for preventive care, compared to 29% of physician visits and 23% of PA visits. A smaller portion of NP visits (17%) was for routine chronic care than physician and PA visits (26% and 25%, respectively;  $p < 0.05$ ). We examined whether these differences were due to the patient age differences discussed earlier and found that the differences in patterns of reason for visits persisted in young adults and middle-aged adults but not in children. For children, a large proportion of visits to all provider types were for preventive care, and fewer visits were for chronic problems (data not shown). PAs more often saw patients for new problems (45% vs. 38% for physicians and 36% for NPs).

Analysis using reported ICD-9 codes showed that the type of care delivered was consistent with the reported major reason for visit findings. A smaller proportion of NP visits was with patients with chronic disease (37% for NPs, 48% for physicians, 45% for PAs;  $p < 0.05$ ) and a larger proportion of NP visits for pregnancy or preventive care (34% for NPs vs. 22% for physicians,  $p < 0.01$ ). Results for the percentage of patients with one or more chronic conditions were also consistent with this pattern. The proportion of patients with at least one chronic condition was 51% for physicians and 42% for NPs ( $p < 0.05$  for the physician-NP comparison).

### 3.4. Measures of interactions between patient and provider

Three variables pertaining to the patient's interaction with the clinic or providers were examined (Table 3). Visits to physicians, NPs, and PAs did not differ with regards to whether the patient was new to the clinic. Compared to both NPs and PAs, physicians saw a larger proportion of patients who had the most visits to the CHC in the previous year ( $p < 0.01$ ). A larger proportion of physicians (76%) than NPs (59%) identified themselves as the primary care provider for patients who visited them ( $p < 0.05$ ). Due to sample size constraints, we combined NPs and PAs into one group for our sub-analysis of rural and urban differences in whether providers reported that they were the primary care provider for patients seen (Fig. 2). In urban CHC settings, physicians saw 18% more patients for whom they reported being the primary care provider than NPs/PAs did (76% vs. 57%), but in rural CHCs both groups reported similar prevalence of serving as the primary care provider (about 80% of visits).



**Fig. 2.** Percent of CHC visits in which the provider is the patient's primary care provider, rural vs. urban, 2006–2010. Urban subset  $p < 0.01$ , rural subset  $p = 0.42$ . Source: National Ambulatory Medical Care Survey

## 4. Discussion

Nurse practitioners and physician assistants are common in CHCs, accounting for over one third of the medical visits provided from 2006 to 2010. This finding is consistent with national estimates of the proportion of primary care providers that are NPs or PAs (29%<sup>32</sup>) and comparable to the proportion of visits they provided in other primary care settings, such as the Veterans Administration, where they attended about 30% of primary care visits in 2010.<sup>33</sup> The proportion of visits accounted for by NPs and PAs increased over the period studied. This likely reflects the fact that numbers of NPs and PAs have been growing more quickly than numbers of primary care physicians, leading to the overall trend of increasing proportions of NPs and PAs in the primary care workforce.<sup>34,35</sup> In addition, CHCs may find it easier to attract NPs and PAs than physicians, especially in rural areas.<sup>13,14,36</sup> Since CHCs are expected to grow with the implementation of the Affordable Care Act,<sup>37</sup> more providers, including NPs and PAs, will be needed to staff the care settings.<sup>38</sup>

For most patient and visit characteristics compared across the three provider groups, similarities exceeded the differences found, suggesting they have similar demand for services, clinical responsibilities and capacities. All three provider types typically served as primary care providers for the patients they saw, and this was especially pronounced in rural areas. Since primary care provision requires a broad range of service types, as well as coordination of care, this finding indicates that NPs and PAs provide care across a wide skill set.

Where variation among physicians, NPs, and PAs existed, PA patient and visit characteristics were usually more similar to those of physicians than to those of NPs. A larger portion of visits to NPs than to physicians or PAs were with women and young adult patients. NP visits were more often for preventive care and less often for chronic care than visits to physicians or PAs. This finding was consistent using different NAMCS measures, including the major reason for the visit, the reported visit ICD-9 codes, and the indication of whether the patient had at least one chronic condition. The finding that NP visits were proportionately more for preventive care is consistent with the nursing profession's emphasis on health promotion. The finding that they saw proportionately fewer patients for chronic disease care is not congruent, however, with nursing's emphasis on management of psychosocial and lifestyle factors important to long-term chronic disease management. The finding that PA patient visit attributes mirror those of physicians may reflect the universal requirement for physician supervision of PAs, which may lead PAs to work more closely with physicians.

In interpreting the finding that PAs were more likely to see patients for new problems, it is important to consider that this analysis did not take illness complexity into account. Complexity of new problems can range from low (e.g. common cold) to high (e.g. stroke or kidney failure). Although many CHCs use PAs in a manner similar to physicians, a non-predominant pattern of PA

use is for same day appointments.<sup>39</sup> Most patients seen for same day appointments would be expected to have new problems.

Other differences in the characteristics of patients and patient visits to physicians, NPs and PAs merit attention. Consistent with extensive literature documenting the role of PAs and NPs in rural underserved areas,<sup>11–14</sup> we found that NPs and PAs (combined) saw larger proportions of patients in rural clinics than physicians did and that a higher proportion of rural than urban NPs/PAs served as the primary care provider. These findings demonstrate that NP/PA roles can vary according to local factors. In addition to whether a clinic is rural or urban, other local factors might affect how clinical work is divided among provider types. For example, a younger and more female population would have higher need for preventive services and less need for chronic disease care than an older population, and might be more likely to employ NPs. Locales with physician shortages or with plentiful NP or PA training programs might hire more NPs or PAs, compared to physicians. And only states that grant independent practice to NPs will see significant numbers of nurse-managed clinics.<sup>21</sup>

#### 4.1. Strengths

Our study examined nationally representative data. The NAMCS CHC stratum represents the CHC population of NPs and PAs in the U.S. Because data are abstracted from medical charts or filled out by a clinician or administrator, NAMCS has a high degree of accuracy on medical information, such as patient diagnoses.

#### 4.2. Limitations

This is a cross-sectional observational study; the observed associations should not be interpreted as causal. This study of aggregated national data cannot reveal local variations in use of NPs and PAs. Sample size constraints limited the ability to further examine variations among subgroups. The CHC provider data does not distinguish among NP type (pediatric, adult, family, geriatric, etc.), which may affect the patient parameters we have examined.

### 5. Conclusion

There is considerable overlap among the characteristics of patients and patient visits to physicians, NPs, and PAs in CHCs, suggesting that the three types of providers have demand for similar services, share common clinical responsibilities, and have similar patient care capacities in the CHC setting. Where differences existed, physicians and PAs tended to be more similar to each other than to NPs.

### 6. Implications

These findings provide details about NP and PA patient care activities across a nationwide primary care-oriented system where they constitute a significant portion of providers and care for a vulnerable population. To meet challenges of expected primary care workforce shortfalls,<sup>7,19</sup> many practices are devising team-based approaches to include PAs and NPs. Our finding that NPs and PAs currently perform a wide variety of roles in CHCs could inform these models by suggesting that these two professions have wide flexibility to meet locally-defined needs. The prevalent use of both provider types as primary care providers indicates that they are used to address the full range of primary care needs. Additional research is needed to determine the effect of different team roles on primary care quality and efficiency.

### Disclaimer

The findings and conclusions in this paper are those of the authors and do not necessarily represent the views of CDC.

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