

# Primary Health Care in Community Health Centers and Comparison with Office-Based Practice

Esther Hing · Roderick S. Hooker ·  
Jill J. Ashman

© Springer Science+Business Media, LLC 2010

**Abstract** We examine the roles of nurse practitioners (NPs), physician assistants (PAs), and nurse midwives (CNMs) in community health centers (CHCs). We also compare primary care physicians in CHCs with office-based physicians. Estimates are from the National Ambulatory Medical Care Survey, a nationally representative annual survey of nonfederal, office-based patient care physicians and their visits. Analysis of primary care delivery in CHCs and office-based practices are based on 1,434 providers and their visits ( $n = 32,300$ ). During 2006–2007, on average, physicians comprised 70% of CHC clinicians, with NPs (20%), PAs (9%), and CNMs (1%) making up the remainder. PAs, NPs, and CNMs provided care in almost a third of CHC primary care visits;

87% of visits to these CHC providers were independent of physicians. Types of patients seen by clinicians suggest a division of labor in caring for CHC patients. NPs and PAs were more likely than physicians to report providing health education services. There were no other differences among services examined. Office-based physicians were less likely to work alongside PAs/NPs/CNMs than CHC physicians. CHC staffing is contingent on a variety of providers. CHC staffing patterns may serve as models of primary care staffing for office practices as demand for primary care services nationwide increases.

**Keywords** Community health centers · Physician assistants · Nurse practitioners · Nurse midwives · Primary care

---

This research was supported by the Centers for Disease Control and Prevention.

---

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

---

E. Hing (✉) · J. J. Ashman  
National Center for Health Statistics, 3311 Toledo Road,  
Room 3409, Hyattsville, MD 20782, USA  
e-mail: ehing@cdc.gov

J. J. Ashman  
e-mail: JAshman@cdc.gov

R. S. Hooker  
School of Public Health, University of North Texas Health  
Sciences Center, Fort Worth, TX, USA  
e-mail: rodhooker@msn.com

R. S. Hooker  
Department of Veterans Affairs, Dallas VA Medical Center,  
4500 S. Lancaster Rd (111), Dallas, TX 75216-7191, USA

## Introduction

In the US, non-physician clinicians (physician assistants (PAs), nurse practitioners (NPs) and nurse midwives (CNMs)) are underutilized in primary care practices. The reasons for this vary; from higher pay in subspecialty areas to lifestyle preferences [1]. Although PAs were introduced to bolster the primary care workforce, options have grown in both surgical and medical specialties [2]. In addition, primary care practices often cannot afford to provide non-physician clinician services since the current visit-based payment system provides disincentives to their use [3, 4], while state regulations regarding both the scope of practice and prescribing authority for NPs hinder utilizing NPs to their full potential [5]. Finally, physician training and culture has not emphasized working as part of a team; most physicians are trained to work autonomously [6, 7].

Community health centers (CHCs) are an exception in primary care. For 40 years, CHCs have delivered primary care to the uninsured, the homeless, migrant workers, and other medically underserved populations [8]. To receive Section 330 grant funds through the Public Health Service Act, CHCs, (also known as federally qualified health centers [FQHCs]), must provide comprehensive primary health care services as well as ancillary services that facilitate access to health care including case-management, translation and transportation services. This wide array of CHC services has fostered a team-based approach to managing health care among physicians, non-physician clinicians and other CHC staff [9, 10]. Examination of CHC utilization patterns may help delineate the roles served by these clinicians.

We examined care provided by primary care providers [physicians, nurse practitioners (NPs) and physician assistants (PAs)] among federally funded and look-alike CHCs. We also compared physician and visit characteristics of primary care physicians in CHCs and office-based practices. In this paper, primary care physicians include those in general and family practice, internal medicine, pediatrics, and obstetrics/gynecology. Patterns of care were examined using data from 2006 and 2007 National Ambulatory Medical Care Survey (NAMCS), a nationally representative survey of visits to non-federal office-based physicians. Reliable CHC clinician and visit estimates are made possible by the inclusion of a separate stratum of CHCs in NAMCS beginning in 2006.

## Study Data and Methods

### Data Source

NAMCS is conducted by the Centers for Disease Control and Prevention's (CDC's) National Center for Health Statistics (NCHS) and uses a three-stage probability sample design involving geographic primary sampling units (PSUs), physician practices within PSUs, and patient visits within physician practices. Sampled physicians were selected from the American Medical Association (AMA) and the American Osteopathic Association (AOA) Masterfiles. Starting in 2006, NAMCS included an additional stratum of 104 CHCs in the sample. At CHCs, physicians as well as non-physician clinicians (PAs, NPs, and CNMs) were randomly selected [11, 12]. To minimize the possibility of including CHC physicians twice, any physician sampled from the AMA/AOA frame identified as working in a CHC at the time of the survey was removed from the sample.

All sampled providers were asked to complete 30 patient forms for a systemic random sample of office visits occurring during a randomly assigned one-week period. During 2006–2007, 4,667 physicians from both frames were eligible to participate in the survey and 2,812 responded for an average physician response rate of 60.3 percent, unweighted [11, 12]. The response rate among all CHC providers was 87.2 percent, unweighted [13]. During 2006–2007, 65,963 patient record forms were completed from both frames [11–13].

This paper examines care provided by primary care physicians and non-physician clinicians in CHCs (clinicians  $n = 421$  and patient visits  $n = 10,079$ ). Visit characteristics studied include patient demographics (age, sex, and race/ethnicity); source of payment; whether the patient had previous visits to the clinic; major reason for the visit; presence of selected chronic conditions; provision of diagnostic/screening services, health education, non-medication treatment, and medications prescribed; final disposition of the visit; and duration of physician visits. Estimates by patient race/ethnicity were computed using only visits with known race and ethnicity since 30.4 percent of visits were missing this information.

Characteristics of primary care physicians at CHCs and office-based practices ( $n = 1,294$ ) and visits ( $n = 28,925$ ) are compared. Characteristics examined include: physician characteristics (age, sex, ownership or employment status) and practice characteristics [availability of non-physician clinicians in practice, accepted payment sources for new patients, availability of evening or weekend hours, availability of same day appointments (only 2007), and the difficulty of referring patients with different payment sources (only 2006)]. Physicians that were missing information on the payment sources that they accept for new patients were excluded from the estimate calculations. The percent of physicians missing information on payment sources accepted for new patients ranged from 0.1 to 12.2% for CHC physicians and from 2.4 to 13.3% for office-based physicians.

Sampling weights were used to obtain national estimates of clinicians and their visits averaged over 2006 and 2007. Standard errors were computed using Taylor-series approximations with SUDAAN software, which take into account the complex sample design of NAMCS [14]. Statistical significance was based on a two-tailed  $t$  test at the .05 level of significance. The Bonferroni correction was used to establish the critical value for statistically significant differences between CHC clinicians. In the results that follow, terms such as “greater than” or “less likely” indicate that the difference is statistically significant.

## Study Results

### CHC Clinicians in 2006–2007

In 2006–2007, an estimated 11,800 CHC primary care clinicians (physicians, PAs, NPs, and CNMs) were scheduled to see patients (Table 1). Physicians comprised the majority of CHC clinicians (69.3%); 9.5% were PAs, 18.3% were NPs and 3.0% were CNMs.

The distribution of CHC visits mirrors the distribution of clinicians; 70.2% of visits were with a physician, 7.6% saw a PA, 20.9% saw a NPs and 1.3%t saw a CNM. Of the 29.8% non-physician clinician visits, 87.7% were seen without a physician present (Table 1). CHC physicians had an estimated 19,889,000 visits per year, or 2,425 visits per physician. Non-physician clinicians had an estimated 8,449,000 visits per year or 2,347 visits per provider. Because both the percentage of CNMs and the percentage of their visits were unreliable, only estimates of NPs and PAs in CHCs are discussed in the remainder of this paper.

**Table 1** Number and percentage of providers and visits in community health centers, by type of provider, 2006–2007

Type of provider	Number	Percent
	Number of providers <sup>b</sup>	
All providers	11,800	100.0
Physician	8,200	69.3
Non-physician clinician	3,600	30.7
NP	2,200	18.3
PA	1,100	9.5
CNM	400 <sup>a</sup>	3.0 <sup>a</sup>
	Number of visits in thousands <sup>b</sup>	
All providers	28,338	100.0
Physician	19,889	70.2
Non-physician clinician <sup>c</sup>	8,449	29.8
NP	5,927	20.9
PA	2,153	7.6
CNM	400 <sup>a</sup>	1.3 <sup>a</sup>

*SOURCE* National Ambulatory Medical Care Survey, 2006–2007

*Notes:* PA is physician assistant, NP is nurse practitioner, CNM is nurse midwife

<sup>a</sup> This figure does not meet National Center for Health Statistics (NCHS) standard of reliability or precision (that is, has a coefficient of variation greater than 30 percent)

<sup>b</sup> Averaged over 2006–2007

<sup>c</sup> At an estimated 1,037,00 visits, both a physician and non-physician clinician was seen at the patient visit (12.3 percent of all non-physician clinician visits)

### CHC Visits by Type of Clinician

#### *Patient Characteristics*

A higher percentage of visits to NPs than to physicians were made by women (72.7% compared with 62.0%) and by patients aged 18–39 years (40.2% compared with 27.8% of physician visits) (Table 2). Physicians saw a higher percentage of patients aged 65 years and older (11.9%) than NPs (5.5%). There were no differences in the age distribution of patients seen by physicians and PAs. Nearly half of CHC visits were made by patients with a chronic condition. The most frequent chronic conditions reported were: hypertension, hyperlipidemia, diabetes, and depression. A higher percentage of visits to a physician (9.8%) rather than a NP (5.9%) were made by patients with arthritis. There were no other provider differences in the percent of visits made by patients with chronic conditions.

#### *Type of Visit*

The percentage of visits for preventive care was not significantly different for physicians, PAs and NPs (Table 3). Acute conditions accounted for a higher percentage of visits to PAs (48.0%) than to physicians (33.9%). There was not a statistically significant difference between visits for a chronic condition among NPs, PAs, and physicians.

#### *Services Ordered or Provided at Visit*

The frequency of diagnostic/screening services, non-medication treatment and prescribing medication was similar across physicians, NPs, and PAs. Health education services, however, were documented more frequently at NP (57.4%) and PA (63.6%) visits than at physician visits (44.8%). The “return with appointment” disposition was more frequent among physician than PA visits (72.3 and 58.5%, respectively), whereas a higher percentage of PA than physician visits had a disposition of “return as needed” (35.5 and 21.7%, respectively). Perhaps “return as needed” was more frequent for PAs than physicians because PA visits were more likely to be for acute problems that may not require additional follow-up visits.

### Comparisons of CHC and Office-Based Physicians

The major difference between physicians in CHCs and office-based practices was in the availability of non-physician clinicians (Table 4). A higher percentage of CHC (87.7%) than office-based (43.9%) physicians reported at least one non-physician clinician in their practice. Among physicians reporting any non-physician clinicians, the

**Table 2** Patient characteristics of community health center visits according to type of provider, 2006–2007

Patient characteristic	Physician	NP	<i>P</i> -value**	PA	<i>P</i> -value**
Age	100.0	100.0		100.0	
Under 18 years	28.5	22.5	.27	29.8	.89
18–39 years	27.8	40.2	.04	25.4	.57
40–64 years	31.8	31.8	–	33.0	.84
65 years and over	11.9	5.5	<.01	11.8	.98
Sex					
Female	62.0	72.7	<.01	55.9	.10
Male	38.0	27.3	<.01	44.1	.10
Race/ethnicity					
Non-Hispanic White	39.4	48.3	.35	56.5	.14
Non-Hispanic Black	26.1	18.8	.30	18.4	.45
Hispanic	23.1	27.6	.64	16.5	.41
Other	11.4	5.4	.21	8.6	.72
Primary expected payment source					
Private insurance	13.3	13.6	.92	24.6	.07
Medicare	11.5	5.9	<.01	6.8	.05
Medicaid or SCHIP	45.3	37.2	.12	35.5	.21
Uninsured	15.9	16.5	.88	11.5 <sup>a</sup>	
Other	5.2	16.6	.07	5.3 <sup>a</sup>	
Unknown	8.8	10.1	.71	16.3 <sup>a</sup>	
Has one or more chronic condition	50.7	42.6	.12	48.7	.75
Selected chronic conditions					
Hypertension	25.1	19.4	.08	22.7	.67
Hyperlipidemia	13.8	11.9	.43	13.6	.95
Diabetes	12.8	11.7	.58	11.0	.53
Depression	10.6	12.5	.51	10.8	.94
Arthritis	9.8	5.9	.02	6.8	.09
Asthma	7.1	6.6	.72	6.8	.75
Obesity	8.7	10.0	.51	6.8	.16
COPD	3.5	3.5	–	6.5 <sup>a</sup>	

SOURCE National Ambulatory Medical Care Survey, 2006–2007

Notes: PA is physician assistant, NP is nurse practitioner. Medicaid includes patients dually eligible for Medicare and Medicaid, SCHIP is State Children's Health Insurance Program, COPD is chronic obstructive pulmonary disease

– Quantity zero

<sup>a</sup> This figure does not meet National Center for Health Statistics (NCHS) standard of reliability or precision (that is, has a coefficient of variation greater than 30 percent)

\*\* *P*-value associated with a *t* test of the difference in the percentage of visits relative to physician visits

average number available was higher in CHCs (3.4) than office-based practices (2.5).

CHCs were more likely than office-based practices to accept new patients (97.7 and 93.3%, respectively). They were more likely than office-based practices to accept charity or no charge patients (81.3 and 38.8%, respectively); Medicaid recipients (97.3 and 66.1%, respectively); and Medicare recipients (96.4 and 75.5%, respectively). Physicians that were missing information on the payment sources that they accept for new patients were excluded from the estimate calculations. CHC physicians were more

likely to have evening or weekend hours (50.0%) than office-based physicians (38.2%). Although it appears that CHCs set aside time for same day appointments more frequently than office practices, the difference was not statistically significant. CHC physicians were more likely to report having difficulty referring uninsured (66.4%) and Medicaid patients (56.0%) for specialty care than office-based physicians did (35.5 and 36.1%, respectively).

Many patient differences were found between visits to physicians in CHCs and office-based practices (Fig. 1). A majority of visits to office-based practices (70.9%) were

**Table 3** Visit characteristics of community health center visits according to type of provider, 2006–2007

Visit characteristics	Physician	NP	P-value**	PA	P-value**
Percent of visits					
All visits	100.0	100.0		100.0	
Established patient	89.3	89.4	.96	87.1	.46
Major reason for visit					
Preventive care	32.1	38.2	.29	21.8	.11
Chronic condition (routine or flare-up)	30.9	24.5	.11	28.9	.70
Acute Condition	33.9	34.0	.98	48.0	.01
Pre-/post-surgery/unknown	3.0	3.3 <sup>a</sup>		1.4 <sup>a</sup>	
Selected services ordered or provided					
Diagnostic or screening service	97.9	97.5	.61	98.3	.64
Health education	44.8	57.4	.01	63.6	.01
Non-medication treatment	9.2	11.3	.54	11.1	.36
Medication prescribed	76.6	71.8	.39	75.6	.86
Disposition of the visit					
No follow-up	4.8	5.0	.90	4.9	.95
Specialty referral	11.0	10.4	.73	10.7	.90
Return at specified time	72.3	63.0	.10	58.5	.01
Return if needed	21.7	30.6	.13	35.5	<.01

SOURCE National Ambulatory Medical Care Survey, 2006–2007

Notes: PA is physician assistant, NP is nurse practitioner

<sup>a</sup> This figure does not meet National Center for Health Statistics (NCHS) standard of reliability or precision (that is, has a coefficient of variation greater than 30 percent)

\*\* P-value associated with a *t*-test of the difference in the percentage of visits relative to physician visits

made by patients who were Non-Hispanic White whereas only 39.4% of visits to CHC physicians were made by Non-Hispanic White patients. The percentage of physician visits made by patients 65 years and over was higher in physician offices (18.7 percent) than in CHCs (11.9 percent). A larger proportion of CHC than office-based physician visits were made by patients relying on Medicaid/State Children’s Health Insurance Plan (SCHIP) (45.3 and 15.6%, respectively). Private insurance (57.2%) was the most frequent payment source for visits to office-based practices whereas only 13.3 percent of CHC visits were made by patients with private insurance. A higher proportion of CHC than office-based visits were made by patients with chronic diabetes (12.8 percent compared with 9.7% of office-based visits) and depression (10.6 percent compared with 7.7% of office based visits).

The likelihood of treating patients for an acute condition was higher in physician offices (41.7 percent) than in CHCs (33.9 percent) (Table 5). The percentage of visits by established patients was similar in both settings. CHC physicians were more likely than office-based physicians to order diagnostic/screening services. Return appointments and specialty referral were more frequent at CHC visits, and “no follow-up” and “return as needed” dispositions were more frequent at office-based visits.

**Discussion**

This study revealed that CHCs employ significantly more PAs, NPs, and CNMs than office-based physician practices

and that patient and visit characteristics differ across CHC providers. Although a majority of CHC visits were to physicians, almost a third of visits were to non-physician clinicians, suggesting CHCs rely on PAs and NPs to provide care. The vast majority of visits to non-physician clinicians were without a physician present. This pattern of non-physician clinician visits among CHCs has not changed since 2001 [15]. NPs were the clinician of record for a higher proportion of women and patients aged 18–39 years than physicians, whereas physicians were more likely than NPs to treat patients with chronic conditions, suggesting a division of labor to some extent in caring for CHC patients. Provision of health education services was more likely to be documented at visits to NPs and PAs than to physicians. This finding supports historical studies indicating NPs are more orientated toward providing health promotion and education than physicians [16–18]. In this study, PAs were more likely to treat patients having an acute condition than physicians and NPs. This treatment pattern has been identified in other national studies and may be related to PAs’ disease-focused medical training, similar to that of physicians, in contrast to NPs’ training in prevention-focused care [19]. The higher representation of NPs than PAs in CHCs is consistent with previous studies that found that most PAs work outside of primary care, while 50–80 percent of NPs work in primary care [16–18].

The availability of non-physician clinicians was higher in CHCs than in office-based practices. CHCs experienced more difficulties than office-based practices making referrals for specialty care, particularly for uninsured and Medicaid patients. One study found that CHCs experience

**Table 4** Comparison of community health center and office-based primary care physicians, 2006–2007

Physician or practice characteristic	Community health center	Physician office	<i>P</i> -value for difference
	Percent of physicians		
	100.0	100.0	
Percent reporting one or more non-physician clinician in the practice	87.7	43.9	<.01
	Average		
Number of non-physician clinicians at location where most patients are seen	3.4	2.5	<.01
Percent of physicians			
Percent accepting new patients	97.7	93.3	.03
Percent accepting new patients by payment source			
No charge or charity	81.3	38.8	<.01
Worker's compensation	75.6	46.5	<.01
Capitated private insurance	75.9	59.4	<.01
Medicaid	97.3	66.1	<.01
Medicare	96.4	75.5	<.01
Noncapitated private insurance	91.6	84.9	.04
Self pay	96.5	89.2	<.01
Physician sees patients during evening or weekend hours	50.0	38.2	.04
Practice sets aside time for same day appointments (2007 only)			
Yes	77.4	69.6	.36
No	19.5	24.4	.56
Unknown	3.2	6.1	.15
	Average		
Percent of daily visits that are same day appointments (2007 only)	32.2	24.3	.25
	Percent of physicians		
Referral difficulties by payment source (2006 only)			
Uninsured	66.4	35.5	<.01
Medicaid	56.0	36.1	.03
Medicare	15.4	11.0	.33
Private insurance	11.5 <sup>a</sup>	13.7	.70

*SOURCE* National Ambulatory Medical Care Survey, 2006–2007

<sup>a</sup> This figure does not meet National Center for Health Statistics (NCHS) standard of reliability or precision (that is, has a coefficient of variation greater than 30 percent)

difficulties in referrals for diagnostic tests, medical specialists, hospital admissions, high-tech and other specialized services not provided by the CHC [20].

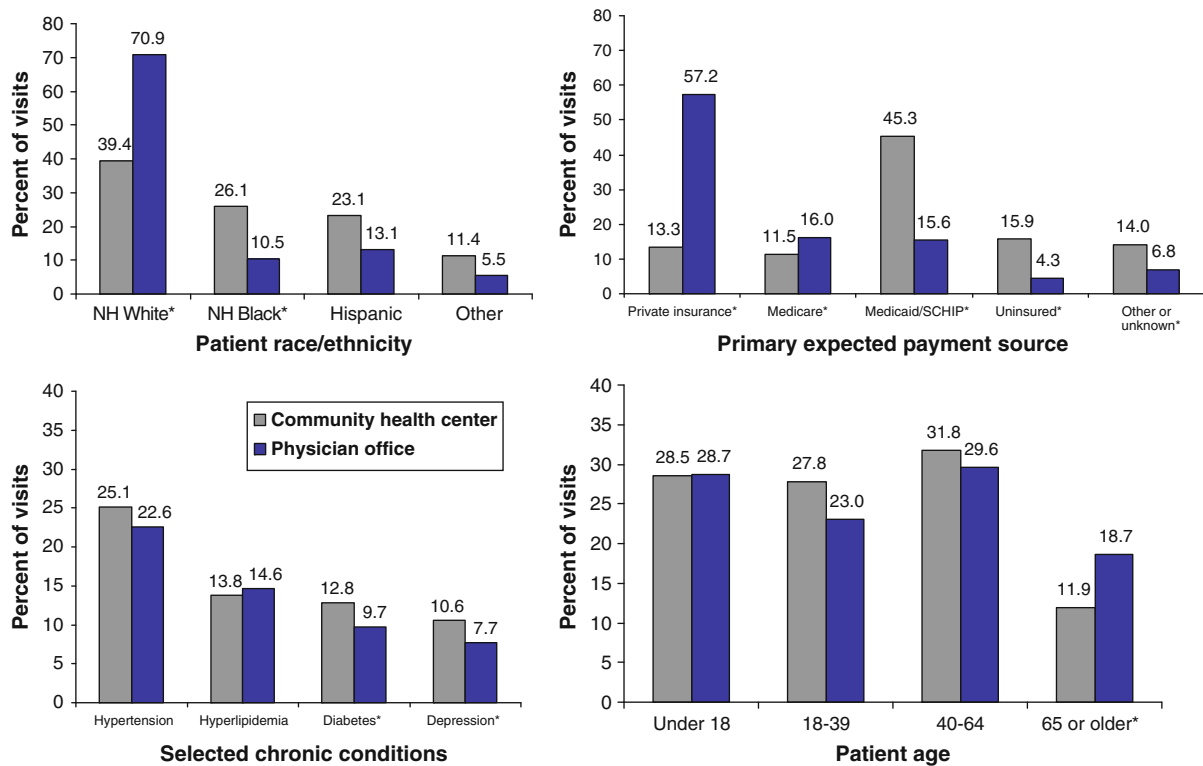
### Limitations of Study

This study was unable to cross compare office-based visits with CHCs regarding PAs and NPs because NAMCS did not sample non-physician clinician visits in office-based practices [21]. Further research is needed to examine the characteristics of patients and visits to non-physician clinicians in office-based practices. Although several aspects of care provided by CHC physicians were compared to care

provided by CHC non-physician clinicians and office-based physicians, we were not able to observe all aspects of care that may be related to quality and outcomes. Nor were we able to observe differences in severity of conditions among patients seen by office-based physicians and CHC physicians and non-physician clinicians. Research that compares quality of care across settings and provider types is needed.

### Implications for Care Provided at Office-Based Practices

This study starts to fill the gap in nationally representative estimates of non-physician clinicians in primary care [21].



**Fig. 1** Percentage of visits to primary care physicians in community health centers and physician offices, 2006–2007. \* Difference between type of office and patient characteristic is statistically

significant ( $P < 0.05$ ). Notes: NH is Non-Hispanic, SCHIP is State Children’s Health Insurance Program. SOURCE National Ambulatory Medical Care Survey, 2006–2007

**Table 5** Characteristics of visits to primary care physicians at community health centers and physician offices, 2006–07

Visit characteristics	Community health center	Physician offices	P-value for difference
Percent of visits			
All visits	100.0	100.0	
Established patient	89.3	90.6	.21
Major reason for visit			
Preventive care	32.1	27.7	.08
Chronic condition (routine or flare-up)	30.9	26.7	.14
Acute Condition	33.9	41.7	<.01
Pre-/post-surgery/unknown	3.0	3.9	.21
Selected services ordered or provided			
Diagnostic or screening service	97.9	96.0	<.01
Health education	44.8	39.7	.19
Non-medication treatment	9.2	10.2	.48
Medication prescribed	76.6	76.9	.86
Disposition of the visit			
No follow-up	4.8	7.8	.01
Specialty referral	11.0	8.4	<.01
Return at specified time	72.3	58.1	<.01
Return if needed	21.7	33.1	<.01
Average			
Duration of visit in minutes	18.7	18.8	.91

SOURCE National Ambulatory Medical Care Survey, 2006–2007

We found that non-physician clinicians provided proportionally more care at CHCs when compared to office-based practices. Within CHCs, non-physician clinicians were more likely to document provision of health education services than physicians. These patterns of care are consistent with other observations that found CHCs outperformed other practice settings in providing preventive services [21–24].

The study findings that PA/NPs were employed in office-based practices only half as often as in CHCs is consistent with previous studies [22]. Lower use of non-physician clinicians in office-based practices has been linked to state regulations limiting the scope of NP practice and prescribing authority; financial and policy incentives drawing physicians, NPs, and PAs to non-primary specialties rather than to primary care; and reimbursement policies based on face-to-face physician visits with lower or no payment for non-physician visits [5, 7]. Despite these trends, recent studies concluded that primary care practice teams that made greater use of NPs and PAs relative to physicians had overall lower team costs per visit [3]. CHCs may provide a model for primary care staffing in an era of predicted shortages. In addition, changes in reimbursement policies that make greater use of non-physician clinicians could reduce the burden on primary care physicians, for example, through teaching patients how to manage chronic conditions, and conducting preventive care outreach [3].

## References

- Kilo, C. M., & Wasson, J. H. (2010). Practice redesign and the patient-centered medical home: History, promises, and challenges. *Health Affairs*, 29(5), 773–778.
- Morgan, P. A., & Hooker, R. S. (2010). Choice of specialties among physician assistants in the United States. *Health Affairs*, 29(5), 887–892.
- Casalino, L. (2010). A Martian's prescription for primary care: Overhaul the physician's workday. *Health Affairs*, 29(5), 785–790.
- Grumbach, K., & Bodenheimer, T. (2004). Can health care teams improve primary care practice? *JAMA*, 291(10), 1246–1251.
- Pohl, J. M., Hanson, C., Newland, J. A., & Cronenwett, L. (2010). Unleashing nurse practitioners' potential to deliver primary care and lead teams. *Health Affairs*, 29(5), 900–905.
- Chesluk, B. J., & Homboe, E. S. (2010). How teams work—or don't—in primary care: A field study on internal medicine practices. *Health Affairs*, 29(5), 874–889.
- Margolius, D., & Bodenheimer, D. (2010). Transforming primary care: From past practice to the practice of the future. *Health Affairs*, 29(5), 779–784.
- Taylor, J. (2004). *The fundamentals of community health centers. National health policy forum background paper*. Washington, DC: The George Washington University.
- Hurley, R., Felland, L., & Lauer, J. (2007). *Community health centers tackle rising demands and expectations. Issue brief No. 116*. Washington, DC: Center for Studying Health System Change.
- Rosenbaum, S., Finnegan, B., & Shin, P. (2009). *Community health centers in an era of health system reform, economic downturn: Prospects, challenges*. Washington, DC: Kaiser Commission on Medicaid and the Uninsured.
- National Center for Health Statistics. Public-use file documentation. 2006 National Ambulatory Medical Care Survey. Hyattsville, MD. 2008. Available from: [ftp://ftp.cdc.gov/pub/Health\\_Statistics/NCHS/Dataset\\_Documentation/NAMCS/](ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Dataset_Documentation/NAMCS/) (last accessed 12/10/2009).
- National Center for Health Statistics. Public-use file documentation. 2007 National Ambulatory Medical Care Survey. Hyattsville, MD. 2009. Available from: [ftp://ftp.cdc.gov/pub/Health\\_Statistics/NCHS/Dataset\\_Documentation/NAMCS/](ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Dataset_Documentation/NAMCS/) (last accessed 12/10/2009).
- National Center for Health Statistics. Public-use file documentation. 2006–2008 National Ambulatory Medical Care Survey Community Health Center Data. In preparation.
- Shah, B. V. (2005). *SUDAAN User's Manual*. Research Triangle Park, NC: Research Triangle Institute.
- O'Malley, A. S., Forest, C. B., Politzer, R. M., et al. (2005). Health center trends, 1994–2001: What do they portend for the federal growth initiative? *Health Affairs*, 24(2), 465–472.
- Hooker, R. S., Cawley, J. F., & Asprey, D. P. (2010) *Physician assistant: Policy and practice*, 3e. FA Davis. Philadelphia.
- U.S. Department of Health and Human Services, National Center for Health Workforce Analysis. (2000). *The registered nurse population. March 2000: Findings from the national sample survey of registered nurses*. Rockville, MD: U.S. Government Printing Office.
- Hooker, R. S. (2006). Physician assistants and nurse practitioners: The United States experience. *MJA*, 185(1), 4–7.
- Cook, N. L., Hicks, L. S., O'Malley, A. J., et al. (2007). Access to Specialty care and medical services in community health centers. *Health Affairs*, 26(5), 1459–1468.
- Morgan, P. A., Strand, J., Ostbye, J., & Albanese, M. A. (2007). Missing in action: Care by physician assistants and nurse practitioners in national health surveys. *HSR*, 42(5), 2022–2037.
- Rosenblatt, R. A., Andrilla, C. H., Curtin, T., & Hart, L. G. (2006). Shortages of medical personnel at community health centers: Implications for planned expansion. *JAMA*, 295(9), 1042–1049.
- Rodriguez, H. P., Rogers, W. H., Marshall, R. E., & Safran, D. G. (2007). Multidisciplinary primary care teams: Effects on the quality of clinician-patient interactions and organizational features of care. *Medical Care*, 45(1), 19–27.
- Dor, A., Pylypchuck, Y., Shin, P., & Rosenbaum, S. (2008). Uninsured and medicaid patients' access to preventive care: Comparison of health centers and other primary care providers. *Research Brief #4*. Geiger Gibson/RCHN Community Health Foundation.
- Druss, B. G., Marcus, S. C., Olfson, M., et al. (2003). Trends in care by non-physician clinicians in the United States. *NEJM*, 348(2), 130–137.