Methods

Missing in Action: Care by Physician Assistants and Nurse Practitioners in National Health Surveys

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Objective. To assess applicability of national health survey data for generalizable research on outpatient care by physician assistants (PAs) and nurse practitioners (NPs).

Data Sources. Methodology descriptions and 2003 data files from the National Ambulatory Medical Care Survey, the National Hospital Ambulatory Medical Care Survey, the Medical Expenditure Panel Survey, and the Community Tracking Study.

Study Design. Surveys were assessed for utility for research on PA and NP patient care, with respect to survey coverage, structure, content, generalizability to the U.S. population, and validity. National estimates of patient encounters, statistically adjusted for survey design and nonresponse, were compared across surveys.

Data Collection/Extraction Methods. Surveys were identified through literature review, selected according to inclusion criteria, and analyzed based on methodology descriptions. Quantitative analyses used publicly available data downloaded from survey websites.

Principal Findings. Surveys varied with respect to applicability to PA and NP care. Features limiting applicability included (1) sampling schemes that inconsistently capture nonphysician practice, (2) inaccurate identification of provider type, and (3) data structure that does not support analysis of team practice.

Conclusions. Researchers using national health care surveys to analyze PA and NP patient interactions should account for design features that may differentially affect nonphysician data. Workforce research that includes NPs and PAs is needed for national planning efforts, and this research will require improved survey methodologies.

Key Words. Physician assistant, nurse practitioner, health surveys, health manpower

National health and health care surveys provide essential information for health care delivery system analysis and planning. However, because many are oriented toward traditional physician care, they may not accurately reflect

the growing impact of nonphysician clinicians such as physician assistants (PAs) and nurse practitioners (NPs). In this study, we assess several surveys for use in research on PAs and NPs and identify a need for new survey methodologies that can better support incorporation of PAs/NPs into research for health care delivery system analysis and planning purposes.

Owing to predicted physician shortages, economists and workforce planners are pursuing strategies to increase the U.S. physician workforce (Cooper et al. 2002; COGME 2005; Association of American Medical Colleges 2006). Because PAs and NPs provide services that often overlap substantially with those of physicians (Scheffler, Waitzman, and Hillman 1996), and because the ratio of approximately one PA or NP for every five practicing physicians is rapidly increasing (Hooker and Berlin 2002; Winget al. 2002; Bureau of Labor Statistics 2006), PAs and NPs could buffer the predicted physician shortage and reduce the number of additional physicians needed to meet the nation's needs.

Workforce planners acknowledge the need to factor the growing role of PAs and NPs into health workforce planning, but are limited by scarce research. The Council on Graduate Medical Education omitted PAs and NPs from its 2005 forecasts (COGME 2005), citing an inadequate research base. In May 2006, the American Association of Medical Colleges called for a 30 percent increase in medical school enrollment (Association of American Medical Colleges 2006) and stated that future workforce research should incorporate nonphysician clinicians. Research at the health care team, or practice, level could illuminate the overall effects of PAs and NPs on health care access, quality, utilization, and costs, as well as how PAs and NPs affect the work of physicians and, ultimately, the number of physicians needed.

While research incorporating the roles of PAs and NPs is needed for national workforce planning, health workforce research is often based on data sources with varying applicability to PAs/NPs. Professional association surveys are major sources of information about the number, locations, and specialties of providers. The American Academy of Physician Assistants (AAPA)

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publishes well-documented and well-designed projections reflecting the national population of PAs (American Academy of Physician Assistants 2005). Because NPs have several different professional associations, data regarding NPs are more fragmented and difficult to interpret (Wing et al. 2002).

Administrative data sources, such as Medicare and Medicaid billing records, provide rich data for some purposes, but have limited applicability to PAs/NPs because PA and NP services are often billed under the physician's name. Billing records often do not reflect that a PA or NP was on the team that cared for a patient (Wing et al. 2002).

Inpatient care is a growing arena for PAs and NPs, but their services are similarly difficult to extract from hospitalization records. Neither the Medical Expenditure Panel Survey (MEPS) Hospital Inpatient files (Agency for Healthcare Research and Quality 2004) nor the Nationwide Inpatient Sample (Healthcare Cost and Utilization Project [HCUP] 2006), both of which collect representative hospitalization data, include data on PAs and NPs.

Finally, national health and health care surveys provide data that are used to assess health care needs, quantify care provided, and examine patterns and effectiveness of care. They provide the most detailed information on what providers actually do during patient encounters, so may be the best source for addressing how PA and NP activities compare with and affect physician activities. We recognize that the surveys were designed for purposes other than PA/NP research, at a time when PAs and NPs comprised a much smaller portion of the health care workforce, so their utility for PA/NP related research might vary. In this investigation, we assess several of the widely used surveys to determine their applicability for research on team care and PA/NP care.

STUDY METHODS

Surveys were identified through consultation with health workforce researchers, review of agency websites, and Medline searches. Thirty-one data sources were identified, and six met the following inclusion criteria that the survey must

1. Provide estimates for the general U.S. population (rather than subgroups, such as the elderly or military personnel) based upon a national probability sample, thereby enabling comparison of survey results for a standard population.
2. Include data on PA and/or NP patient services.

3. Support annual estimates over the past decade of number of PA/NP and physician patient encounters, to enable comparison of estimates across surveys.

Details of the search methods and excluded surveys are provided in technical appendix 1. The information we used in assessing the surveys came from published descriptions of the survey methodologies supplemented with discussions with the survey administrators and analysis of results from the surveys. We used both descriptive and quantitative methods for assessing surveys.

Descriptive Assessment

Our descriptive analysis assessed

1. *Coverage*: What portion of the health care system is represented in the sample?
2. *Survey structure*:
 - a. What is the sampling unit (provider, patient, or practice)?
 - b. Is the survey design cross-sectional or longitudinal?
 - c. Are provider types of interest identified?
 - d. Is the survey completed from the health care provider or the patient perspective?
3. *Content*: What types of questions are asked? Do the questions provide information relevant to PA and NP care?
4. *Generalizability*: Do the surveys provide nationally representative samples of the amount and types of care provided by PAs and NPs?
5. *Validity*: Are PA care and NP care measured accurately?

Quantitative Assessment

Annual patient encounters by PAs, NPs, and physicians were estimated from 2003 data, using sampling weights to account for sampling design, response rates, and other procedural details (see technical appendix 2). Percentages and ratios of visits to physicians, PAs, and NP/clinical nurse midwives (CNMs) by group were computed as a means for controlling for differences in survey methodology and sampling that might yield biased estimates for all provider types. The degree of agreement of estimates from different surveys indicates to what extent methodological differences should be considered in interpreting such results. We also compared these estimates with numbers of visits expected based on professional society data and productivity research.

RESULTS

General Considerations

Three of the surveys belong to the National Center for Health Statistics' National Healthcare Surveys (National Center for Health Statistics) family of surveys, and two are components of the MEPS (Agency for Healthcare Research and Quality 2004). Although many features of the surveys within each of these two groups are similar, we analyze them separately because their sampling strategies and/or coverage differ in ways relevant for research on PAs and NPs.

Some surveys combined NPs and CNMs into a single category. We use the term "NP" to refer to this combined group.

Descriptive Assessment

Tables 1 and 2 show the descriptive assessment of the six surveys.

1. The National Ambulatory Medical Care Survey (NAMCS; National Center for Health Statistics).

Coverage: NAMCS covers *office-based practice* of nonfederally employed physicians.

Structure: NAMCS, like the two other ambulatory care surveys reviewed, is a cross-sectional survey that collects data at the patient encounter level. Physicians complete a survey regarding a sample of their patient encounters during a given week. Data collection forms are frequently modified, and the types of providers who can be identified as participating in each patient encounter have varied through the years. Since at least 1995, there have been separate categories for PAs and for NPs.

Content: NAMCS collects detailed patient encounter information, including patient demographics, insurance type, diagnoses, treatments, follow-up plans, and types of providers seen. Content areas that require the patient perspective, such as patient satisfaction and access to care, are not addressed. No information is collected on cost of care. The final item queries how much time the physician spent with the patient, but this information is not obtained for other providers. As it is not possible to ascertain which care components were provided by which providers, analysis of team care is limited.

Generalizability: The NAMCS surveys a probability sample of physicians drawn from rosters of nonfederally employed physicians provided by the American Medical Association and the American Osteopathic Association. Results cannot be generalized to national PA and NP office-based practice

Table 1: Profile of National Health and Healthcare Surveys That Document PA and/or NP Patient Services to the General Population

Survey Component Full Name (Acronym)	National Ambulatory Medical Care (NAMCS)*	National Hospital Ambulatory Medical Care Survey-Hospital Outpatient Department (NHAMCS-OPD)*	National Hospital Ambulatory Medical Care Survey-Hospital Emergency Department (NHAMCS-ED)*	Medical Expenditure Panel Survey-Household Component, Office-Based Provider Visits (MEPS-OBV)†	Medical Expenditure Panel Survey-Household Component, Hospital Outpatient Department Visits (MEPS-OPD)†	Community Tracking Study-Household Component (CTS)‡
Primary purpose	Monitor provision and use of ambulatory services			Monitor insurance and financial aspects of health care. Also health services, health status, and outcomes		Monitor effects of health system change
Coverage	Office-based	Hospital outpatient department	Emergency department	Office-based	Hospital outpatient department	All nonemergency department outpatient
Structure						
Data collection design	Cross-sectional					Longitudinal (annual interviews for 3 years)
Target population¶	Physician practices	Hospital outpatient departments	Hospital emergency departments	Longitudinal (five interviews over 2 years)§		
Sample frame	Physician practices	Hospital outpatient departments	Hospital emergency departments	Civilian, noninstitutionalized U.S. population		
Data source	Providers			U.S. households		
Data collection method	Paper survey completed by attending clinician or proxy			Key household respondent		Phone survey
Generalizability to U.S. PA/NP practice	Likely a biased underestimate	Good	Good	In-person interview. Supplemental paper surveys		Good
Validity for PA/NP research	Likely high			Questionable due to provider type misidentification		

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‡Primary Sponsor: Robert Wood Johnson Foundation.
§MEPS can be linked with the National Health Interview Survey to encompass 3 years.
¶All provider surveys exclude federal and military employees/institutions.
||All samples were probability samples of their respective populations.
PA, physician assistant; NP, nurse practitioner.

Table 2: Comparison of National Health and Health Care Survey Content for Research on PAs and NPs

<i>Survey Component Acronym</i>	<i>NAMCS</i>	<i>NHAMCS- OPD</i>	<i>NHAMCS- ED</i>	<i>MEPS- OBV</i>	<i>MEPS- OPD</i>	<i>CTS</i>
Data level available						
Encounter	Yes	Yes	Yes	Yes	Yes	No
Person	No	No	No	Yes	Yes	Yes
Household	No	No	No	Yes	Yes	Yes
Provider team	Limited	Limited	Limited	No	No	No
Identification of PA care	Yes	Yes	Yes	Yes	Yes	Grouped with NP/CNM
Identification of NP/CNM care	Yes	Yes	Yes	With all nurses	With all nurses	With PA
Patient profile						
Demographics	Yes	Yes	Yes	Yes	Yes	Yes
Socioeconomic	No	No	No	Yes	Yes	Yes
Health status	No	No	No	Yes	Yes	No
Health conditions*	No	No	No	Yes	Yes	No
Health behaviors	†	†	No	Yes	Yes	†
Insurance status	Yes	Yes	Yes	Yes	Yes	Yes
Satisfaction with care	No	No	No	Yes	Yes	‡
Health expenditures	No	No	No	Yes	Yes	Yes
Health care utilization (%)	No	No	No	Yes	Yes	Yes
Encounter profile						
Reason for visit	Yes	Yes	Yes	Yes	Yes	No
Type of care	Yes	Yes	Yes	Yes	Yes	Yes
Visit diagnoses	Yes	Yes	Yes	Yes	Yes	No
Meds prescribed	Yes	Yes	Yes	Yes	Yes	No
Diagnostics ordered	Yes	Yes	Yes	Yes	Yes	No
Procedures	Yes	Yes	Yes	Yes	Yes	No
Follow-up planned	Yes	Yes	Yes	No	No	No

*Refers to ongoing health conditions. Conditions at the time of a specific patient encounter are recorded in the encounter profile.

†Contains information on smoking status, but no other health behaviors.

‡Contains questions regarding satisfaction, but only for physician care.

% Health care utilization refers to patient encounters per year.

PA, physician assistant; NP, nurse practitioner; CNMs, clinical nurse midwives; NAMCS, National Ambulatory Medical Care Survey; NHAMCS, National Hospital Ambulatory Medical Care Survey-Hospital; CTS, Community Tracking Study; MEPS, Medical Expenditure Panel Survey.

because the NAMCS samples physicians, rather than all providers. For the selected physicians, NAMCS obtains data from patient encounters sampled from a physician’s schedule during an assigned week. PAs and NPs who work

alongside individual physicians and share those physicians' daily rosters of patients are likely to be represented, but PAs and NPs who have their own daily patient rosters within group practices will not be included (Machlin et al. 2001; Woodwell 2005). Because the majority of PAs work in group practices (American Academy of Physician Assistants 2004) and because independent NP practices are not sampled (Jenkins 2003), the NAMCS probably underestimates visits to NPs and PAs. Furthermore, the PAs and NPs represented in NAMCS may be a biased sample because PAs and NPs who share physicians' daily rosters may function less autonomously or have less clinical experience than those who attend their own rosters of patients.

Validity: NAMCS is completed by care providers shortly after patient encounters, so content areas associated with medical expertise, such as medical diagnoses, treatments, and the types of provider who attended the visit, are likely to be accurate.

2. The National Hospital Ambulatory Care Survey-Outpatient Department Survey (NHAMCS-OPD; National Center for Health Statistics).

Coverage: The NHAMCS-OPD covers nonfederal *hospital outpatient departments*.

Structure, content, and validity of the NHAMCS-OPD are similar to NAMCS.

Generalizability: Because NHAMCS-OPD samples patient encounters from rosters of *institutions*, rather than *physicians*, it likely provides a more nationally representative sample of PA and NP care than does NAMCS. Survey results should generalize to PA and NP practice in nonfederal outpatient departments.

3. The National Hospital Ambulatory Care Survey-Emergency Department Survey (NHAMCS-ED); (National Center for Health Statistics).

Coverage: The NHAMCS-ED, covers nonfederal *hospital emergency departments*.

Structure, content, and accuracy of the NHAMCS-ED are similar to NAMCS.

Generalizability: Because the NHAMCS-ED, like NHAMCS-OPD, samples institutions (rather than physicians), it should generalize nationally to PAs and NPs who practice in nonfederal emergency departments.

4. MEPS-Household Component-Office-Based Provider Visits (MEPS-OBV; Agency for Healthcare Research and Quality 2004).

Coverage: MEPS-OBV covers *office-based settings* and thus provides a patient perspective counterpart to the office-based provider perspective of the NAMCS.

Structure: While NAMCS and NHAMCS survey health care providers, MEPS and the other household surveys collect information from a key household respondent regarding the health experience of all household members. MEPS collects longitudinal survey data in five rounds spaced over a 2-year interval from a representative subset of a national probability sample of the noninstitutionalized civilian population drawn for the National Health Interview Survey (NHIS; National Center for Health Statistics). MEPS data can be linked with NHIS data to support longitudinal analysis for a total of 3 years, providing data at the individual, household, and patient encounter levels.

Content: Most MEPS survey items use generic provider terms, so responses may be applied to all provider types. MEPS collects substantial information on each patient and each health care encounter and provides a detailed patient perspective on health and health care. Inclusion of NPs/CNMs in a category with other nurses precludes separate analysis for NPs/CNMs.

Generalizability: Applicability of MEPS is limited with respect to nursing, as all nurses are combined into one category. For example, a visit to a licensed practical nurse for a blood pressure check and a visit to an NP for management of hypertension are indistinguishable, although they represent very different levels of care. Only the section of the survey that asks respondents to identify their "usual source of care" provides separate categories for PA, NP, and CNM. To date, however, these subgroups have been small, with < 100 out of over 20,000 respondents per year identifying PA, NP, or CNM as their usual source of care.

At the patient encounter level, respondents are first asked if they saw a physician, and, if not, are only then asked about other providers. As only visits attended by PAs and nurses without a physician in attendance are represented, and as NPs are not identified, MEPS encounter level data may be generalized only to *PA care* of the civilian noninstitutionalized population when a *physician was not seen*. Because encounters not involving a physician may be less complex than those that do involve a physician, survey results are likely biased for assessment of all nonphysician care.

Validity: MEPS administrators report that MEPS personnel who visit practices to verify expenditure data often notice that encounters with non-physicians are misreported by respondents as attended by physicians (Beauregard 2005). MEPS personnel do not correct the misidentification, and have not quantified the extent of this problem. Patient difficulty in accurately reporting provider type, which has also been noted by PAs and NPs (Lampert

1990), is likely the most important weakness for using household surveys in research comparing different provider types.

Like other household surveys, MEPS collects information from consumers, rather than providers, of health care. This strategy has the advantage of capturing patient perceptions, but the information collected may be of variable accuracy, especially for technical medical information. Another concern is that, household respondents may not have been present during some encounters and may depend on second-hand reports about encounters occurring several months earlier.

5. MEPS-Household Component-Hospital Outpatient Department Visits (MEPS-OPD; Agency for Healthcare Research and Quality 2004). The MEPS-OPD is identical to the MEPS-OBV except that its coverage reflects *hospital outpatient department* visits rather than office-based visits. For research on PAs and NPs, the same limitations apply.

6. Community Tracking Study (CTS; Center for Studying Health System Change 2005).

Coverage: CTS covers *all settings*, with outpatient care identified separately. Categories that were presented separately in the ambulatory care surveys and in MEPS (office-based, hospital outpatient department, and emergency department) are combined into one category in CTS.

Structure: The primary aim of the CTS is to study the effects of health system change. It is a longitudinal telephone survey that interviews the same respondents annually for 3 years. Data are collected at the individual and household levels, but not at the patient encounter level. PAs, NPs, and CNMs are included together in a single category, so separate analyses of these three provider types are not possible. Treating these three professions as a group may obscure significant differences.

Content: Content areas that include PAs and NPs are limited to the total number of visits over the year, and whether these visits were for a routine check-up or ongoing care for a chronic problem. Annual estimates may be calculated from the aggregate report of number of annual visits to PAs/NPs, even though encounter level data are not collected.

Generalizability: The CTS may be considered nationally representative of patients who have telephone service who saw PAs and NPs. However, respondents are explicitly instructed to omit information regarding nonphysicians for most survey items, so use of CTS for representative research on PAs/NPs is extremely limited.

Validity: Concerns about validity for studying PAs/NPs using CTS data are similar to the other household studies and include inaccuracies due to a single household respondent, time elapsed between care provision and data reporting, and inaccuracies in reporting of medical information and provider type.

Quantitative Assessment of Surveys

The annual number of patient encounters by provider type, estimated from 2003 data, shows marked variability across surveys (Table 3). For office-based settings, the proportion of visits attended by physicians ranged between 97 and 98 percent in NAMCS (column 1) and MEPS (column 4) office-based settings, with PA and NPs seeing 1–2 percent of patients each. In the CTS outpatient settings, which we assess to be fairly representative for PA/NP care, physicians attended 92 percent of visits, while NPs and PAs together attended 8 percent.¹

In *hospital outpatient departments*, the national estimates for patient visits seen by physicians ranged from 55 million (MEPS, column 5) to 75 million (NHAMCS, column 2) and visits to PAs ranged from 0.6 million (MEPS) to 6.9 million (NHAMCS). The percentages of total NHAMCS visits seen by PAs and NPs were 7.8 percent each (for a total of 15 percent for PAs and NPs combined). NP visit percentages cannot be determined from the comparable MEPS hospital outpatient survey, but the percent of PA visits in that survey was only 1 percent. The difference in hospital outpatient department ratios of physician to PA visits between MEPS (98:1) and NHAMCS (11:1) is dramatic.

These results, like those of Machlin and colleagues for 1996 data, show divergent estimates of patient care provided by physicians and PAs/NPs across surveys. We obtained similar results when we replicated these estimates using 2002 data (see technical appendix 2). Differences in methodologies clearly affect the results. While ratios of physician to PA care controlled for the impact of methodology differences that would affect physician and nonphysician care estimates equally, they also put the differences in survey representation of PA/NP care into stark relief.

DISCUSSION

Our investigation details several problems with using these national health surveys for research on PAs and NPs. The CTS explicitly excludes

Table 3: Quantitative Evaluations Comparing 2003 National Visit Projections across Surveys

	NAMCS Office-Based (1)	NHAMCS Hospital Outpatient Department (2)	NHAMCS Emergency Department (3)	MEPS Office-Based (4)	MEPS Hospital Outpatient Department (5)	CTS Outpatient Encounters (Millions) (6)
Physician encounters in millions (95% CI)	864 (777-953)	75.1 (61.3-88.8)	105.2 (94-115)	970.4 (925-1,016)	54.9 (48.5-61.4)	988 (819-1,158)
PA total encounters in millions (95% CI)	12.9 (6.6-19.2)	6.9 (2.3-11.5)	7.5 (5.4-9.4)	12.7 (10.6-14.8)	0.56 (0.26-0.86)	N/A
With physician	6.4 (3.0-9.8)	0.6 (0.2-0.9)	3.9 (2.6-5.1)			
Without physician	6.5 (2.0-11)	6.3 (1.7-10.9)	3.6 (2.0-5.1)			
NP/CNM encounters in millions (95% CI)	10.4 (4.7-16.1)	6.9 (4.1-9.7)	2.05 (1.4-2.6)			N/A
With physician	6.4 (2.1-10.7)	1.2 (0.7-1.7)	0.9 (.56-1.2)	87.8 (all nurses)* (77.5-98.1)	14.2 (all nurses)* (9.7-18.6)	
Without physician	4.0 (0.6-7.4)	5.7 (3.0-8.3)	1.1 (.68-1.6)			
PA/NP/CNM total encounters (millions)	23.3 (14.1-32.5)	13.7 (12.9-14.5)	9.4 (7.2-11.6)	N/A*	N/A*	83 (70-96)
With physician	12.8 (7.1-18.5)	1.8 (1.6-2.0)	4.7 (3.4-6.0)			
Without physician	10.5 (4.1-16.9)	11.9 (11.2-12.7)	4.7 (2.9-6.4)			
% visits to [†]						
Physicians	97.4%	84.4%	91.7%	98.7% [‡]	99% [‡]	92.3%
PAs	1.5%	7.8%	6.5%	1.3% [‡]	1% [‡]	N/A
NP/CNM	1.2%	7.8%	1.8%	N/A*	N/A*	N/A
PA/NP/CNM	2.7%	15.4	8.2	N/A*	N/A*	7.7%
Visit ratio						
Physician:PA	67:1	11:1	14:1	76:1	98:1	N/A
Physician:NP/CNM	84:1	12:1	15:1	N/A	N/A	N/A
Physician:PA/NP/ CNM	37:1	5.5:1	11:1	N/A	N/A	12:1

*Includes all nurses, so is not directly comparable to figures from other studies.

[†]For % calculation, provider types other than physician, PA, NP, and CNM were excluded from the denominator.

[‡]For % calculations for the MEPS studies, only visits to PAs and physicians are included in the denominator, as a number for NP/CNM visits excluding other nurses cannot be obtained.

PA, physician assistant; NP, nurse practitioner; CNMs, clinical nurse midwives; NAMCS, National Ambulatory Medical Care Survey; NHAMCS, National Hospital Ambulatory Medical Care Survey; CTS, Community Tracking Study; MEPS, Medical Expenditure Panel Survey.

nonphysicians from most survey items, and MEPS does not distinguish services provided by an NP from those provided by other types of nurses. NAMCS estimates of nonphysician care are likely to be inaccurate because the approach of sampling on physicians will omit nonphysicians with independent patient daily rosters and those with independent practices. MEPS estimates are also likely biased underestimates due to provider misidentification and omission of nonphysician encounters in which a physician was also seen. Examination of Table 3 results, in light of other national data, provides additional evidence. Because there is roughly one PA and one NP practicing for every 10 physicians² (Hooker and Berlin 2002), and because PAs and NPs see between 50 and 95 percent of the number of patients seen by physicians weekly (Hooker and Cawley 2003; Bureau of Labor Statistics 2006), we would expect PAs and NPs to each attend 5–9 percent of all visits. Estimates from the NAMCS and MEPS are <1.5 percent each for PAs and NPs, while estimates from the NHAMCS and CTS are nearer the expected 5–9 percent. Professional association data also suggest that NAMCS and MEPS underestimate nonphysician encounters. Estimates based on AAPA data (American Academy of Physician Assistants 2005; see technical appendix 3) indicate that, in 2002, PAs provided about 47 million office-based visits, a figure triple the estimates from NAMCS (12.9 million) and MEPS (12.7 million). The underestimation and bias of NAMCS and MEPS for PA/NP care is particularly unfortunate because these two surveys provide the most detailed data (from the provider and the patient perspective, respectively) on patient interactions in the most common health care settings in the United States.

The most salient problems with use of these surveys for PA/NP research are (1) sampling strategies oriented toward individual physician care and (2) provider type misidentification. New sampling strategies should be designed to capture PAs/NPs more fully, especially as the numbers and activities of these new players are increasing. To address provider misidentification, verification studies on a subsample of respondents could estimate the magnitude and direction of this error. Strategies to improve identification of provider type, such as medical record review, could be implemented.

CONCLUSIONS

With a predicted physician shortage, an aging and increasingly diverse population, limited resources, and rising health care costs, accurate information about the health care workforce is fundamental for developing strategies

to meet future health care delivery needs. Our analysis of existing national health care surveys shows that research based on several widely used surveys may inadequately account for the contributions of PAs and NPs and create a distorted picture of the actual health care provided. Without modifications to existing surveys or new surveys designed to fully reflect the activities of PAs and NPs, policy makers may underestimate their current and potential contributions and their influence on numbers of physician needed.

National health care surveys should illuminate the roles of PAs and NPs in patient care at both the individual provider and health care team levels. Toward this end, we advocate modifying existing national surveys rather than creating additional profession-specific surveys. Surveys that include only the activities of one profession cannot provide a full understanding of the interplay among the different health professions. Modification of existing surveys will allow comparison and correlation of PA/NP data with existing data and could support analyses of the effects of PAs and NPs on the health care delivery system in general and on the activities of physicians in particular. These team care analyses are critical if we are to address pressing questions about the numbers and ideal mix of providers needed to meet future U.S. needs.

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NOTES

1. Although the CTS includes all outpatient care, it is roughly comparable with the office-based settings because hospital outpatient and emergency department visits comprise a much smaller share of total visits.
2. Although more NPs than PAs have been trained, only 65 percent of NPs work as NPs, and more NPs than PAs work part-time (Hooker and Berlin 2002). In 2002, there were roughly 60,000 PA; 60,000 NP; and 600,000 physician positions.

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SUPPLEMENTARY MATERIAL

The following supplementary material for this article is available:

Technical Appendix 1: Details of Survey Selection.

Technical Appendix 2: Calculation of Projected National Estimates from Included Surveys.

Technical Appendix 3: Calculation of Expected Number of Outpatient Visits to PAs Using AAPA Data.

This material is available as part of the online article from <http://www.blackwell-synergy.com/doi/abs/10.1111/j.1475-6773.2007.00700.x> (this link will take you to the article abstract).

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