Toward national comparable nurse practitioner data: proposed data elements, rationale, and methods

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Abstract

Federal funds have supported Nurse Practitioner (NP) education and the establishment of nurse-managed centers. Yet, important questions are raised about the quality and appropriate scope of NP care. Few NP-patient encounters are documented in the largest national surveys of ambulatory care, sponsored by the National Center for Health Statistics, due to sampling frames that are based on physician practices. In addition, these national surveys lack essential outcome indicators, therefore limiting their data to descriptions of patient demographics and practice patterns. Informatics principles are applied to a proposed expansion of the National Ambulatory Medical Care Survey. Its sample would include nurse-managed centers and its variables would include quality outcome and process indicators in standardized language that are nurse-sensitive and that reflect national priorities for action on health care quality. Variables for inclusion in a draft pilot instrument are identified.

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1. Introduction

To date in the US, national data about ambulatory patients seen, medical diagnoses, and interventions delivered are captured in annual surveys sponsored through the National Center for Health Statistics. Lacking widespread electronic health records, this is the best source of data in the country on ambulatory care. Currently, the national surveys for ambulatory care sample physician offices—the NAMCS (National Ambulatory Medical Care Survey)—and hospital outpatient clinics—the NHAMCS (National Hospital Ambulatory Medical Care Survey)—and include only Nurse Practitioners (NPs) and physician’s assistants that work alongside physicians. The purposes of this paper are to propose a set of data elements for inclusion in national ambulatory survey databases and to describe the rationale and suggested methods for their inclusion.

Aggregate data for on-going quality assessment of NP care is scanty. Several systematic reviews provide evidence that NPs provide care that is equivalent to or better than physician care [1,2]. In particular, NPs have been shown to excel in patient education and case management, two interventions that are essential in promoting patient self-care for the chronic diseases that are rampant in the industrialized world. Though federal funds have supported graduate education for NPs and promoted nurse-managed centers for decades, medical groups such as the American Academy of Pediatrics continue to cite insufficient research evidence as a rationale to question “the ability of nonphysician clinicians to manage all levels and complexity of care independently” and to oppose “independent practice, independent prescriptive authority, and reimbursement parity for these nonphysician clinicians” ([3], p. 427).

However, it is now widely recognized that about 80% of medical practice is not based on well-controlled studies and that there are unexplained small-area variations in medical practice and outcomes across the US and between the US and other countries [4]. After years of resistance to “cookbook medicine,” a push for evidence-based practice has begun, based not on well-controlled studies (there are very few), but on improvements seen in population outcomes when patients receive evidence-based therapies [4]. Where relevant
population data exist, guidelines and best practices based on research evidence are developed and disseminated. Given the technical and economic difficulties currently delaying the promoting widespread implementation of electronic records in ambulatory care, a relatively simple, easy to access, national survey of patient encounters and selected outcomes will provide a wealth of useful data in the meantime.

2. National ambulatory medical care survey

The current annual NAMCS includes information about patient encounters, such as patient demographics; reason for visit; provider types; payment source; diagnosis; information related to any injury; interventions for screening, diagnosis, or therapy, including medications; and time spent with physician. The data are used by policy-makers and researchers to monitor resource use, patterns of care, diseases, and technological interventions [5]. Selected variables from the survey have been analyzed to produce a large number of publications on ambulatory practice patterns, including common diagnoses, diagnostic testing, medication management, health counseling, and referrals [6].

Because of its physician-office sampling frame, data about NP practice in the NAMCS is very scanty. Likewise, a small amount of data about NP practice is in the NHAMCS. NPs in nurse-managed centers and independent practice are excluded. Only 2.1% of the 27,369 survey forms in the NAMCS sample of 1145 participating physician’s offices in 2000 were from NP patient encounters [7]. Just over half of the NAMCS data are from primary care physician offices. Despite the low representation of NPs in the sample, there have been a few NP-relevant publications from the data that give a taste of positive differences in NP compared to physician and physician’s assistant ambulatory care.

3. NP studies from NAMCS data

An analysis of primary care office visits in the NAMCS averaged over the years 1995–1999 revealed that NP-only visits documented more therapeutic and preventive services (including counseling/education and nonmedication therapy), than did physician assistant (PA)-only and PA or NP and physician visits [8]. Analysis of the NAMCS data from 1997, 1998, and 1999 primary care encounters showed a significant odds ratio of 8.22 for NPs over physician’s assistants in providing growth and development counseling [9]. NHAMCS data from hospital outpatient settings in the same years showed significant odds ratios ranging from 1.68 to 3.23 for NPs over physician assistants in providing preventive services of diet/nutrition counseling, injury prevention counseling, prenatal instructions, family planning education, and HIV/STD transmission counseling [9].

Practice patterns of 44 Tennessee NPs in a total of 680 encounters were studied by Moody et al. [10] with a survey form adapted from the NAMCS. The most frequent diagnoses [ICD 9-CM coded] were hypertension, otitis media, acute upper respiratory infection, and diabetes mellitus. The most frequent NP intervention was client teaching/counseling and was related to nutrition (19%), exercise (12%), growth and development (8%), smoking cessation (7%), weight reduction (5%), and family planning (5%). The most frequently prescribed medications were amoxicillin, ibuprofen, naproxen, premarin, cimetidine, and azithromycin [10]. Comparing their results with NAMCS results from physician practices, the researchers found that NPs more frequently provided lifestyle counseling for nutrition, exercise, smoking cessation, weight reduction, and family planning [10].

While the NAMCS provides important data on the recipients and process of care, it lacks outcome measures that are essential to verify the quality and the effect of the interventions that are documented. Additionally, it lacks variables that could build knowledge about NP practice by capturing the unique work of NPs and highlighting the differences in NP specialty practices. Its design could be a skeleton that is fleshed out with a few additional variables that describe high priority quality outcomes, nursing diagnoses, and nursing interventions.

4. Variables from quality and outcomes research

Priorities for national action on health care quality have recently been selected by the Institute of Medicine [11]. The majority of the priorities pertain to preventive care, a special focus of NPs in ambulatory care. Priorities include care coordination, self-management/health literacy, cancer screening, early diabetes mellitus, early hypertension, immunization, ischemic heart disease, screening for major depression, pregnancy and childbirth, tobacco dependence, and obesity. The national preventive care quality priorities provide a blueprint for the selection of key variables of interest to NPs.

Current variables in the NAMCS include patient and provider demographics and provider interventions. Outcomes are not included, yet outcome measures are highly valued to assess the effectiveness of healthcare. Process and outcome variables that derive from evidence-based guidelines for priority health issues may be used to expand the NAMCS. These include assessment of pain, self-care, and depression; physiological measures such as weight, blood pressure, cholesterol level, and glycosolated hemoglobin level; and patient education for disease process, nutrition, medication action,
and the like [12,13]. In general, these fit with the list of variables recommended by Clochesy [14] for NP outcomes research within Donebedian’s structure-process-outcome framework. Adding important outcome variables to a national cross-sectional survey would produce useful aggregate data beyond that in the current NAMCS. Process and outcome data documented by clinicians would potentially be more complete and accurate than NCQA (National Committee for Quality Assurance) data that comes from billing records [15].

Using an expanded NAMCS in a longitudinal survey design would allow further investigation of the natural history of disease, co-morbidity effects, diagnostic and treatment adjustments, and effectiveness, and the like. Internal use of such an instrument to document identified patient encounters over time could produce aggregate data for quality audits and lead to quality improvement interventions within an ambulatory practice. This could begin to fill the gap between current paper and pen encounter documentation and future electronic health records. Previously, only focused research studies, such as those described below, could serve to aggregate patient care over time. Many of the measures used in these studies are relevant to an expanded NAMCS.

Meta-analyses of NP care show that NP interventions and outcomes are equivalent to or better than those of physicians [1,2]. Horrocks et al. [1] published a meta-analysis of 34 varied studies of nurse practitioner practice. Measures they examined included: patient satisfaction, health status, quality of life, number of diagnostic investigations done, time spent with the patient, advice on self-care, identification of physical abnormalities, interpretation of X-rays, economic impact, and early detection of disease. Many, but not all, of these measures are in the current NAMCS. No major differences were found between nurse practitioner care and that of doctors on the outcome and process variables studied. Perhaps variables that identify interventions for diagnoses unique to nursing would show a difference.

Brown and Grimes [2] published a meta-analysis of 38 varied studies comparing nurse practitioner and physician care. Measures they examined included: patient compliance (with medications, keeping appointments, and recommended behavior change), ordering lab tests, symptom relief, patient satisfaction, quality of care, appropriate medications ordered, functional status, number of visits, ER use, number of hospitalizations, time spent with patient, health promotion, patient knowledge, referrals, and consultations. Again, there is much overlap with the current NAMCS. Outcomes were mostly equivalent between nurse practitioners and physicians. However, nurse practitioners’ patients showed better outcomes than physicians’ in compliance, satisfaction, and resolution of disease. This fits with the claim of many nurses that nursing interventions in tune with the patient’s knowledge, behavior, and resources are most successful. Again, interventions linked to nursing diagnoses would possibly show where the difference with physicians lies.

Mundinger et al. [16] published a randomized controlled trial that assigned 1316 Spanish-speaking Dominican immigrants on Medicaid to NPs or physicians. Outcome measures included: patient satisfaction (after initial appointment and at 6 mo), health status (using the Short Form 36), physiologic test results after 6 months (glycosolated hemoglobin for diabetes, peak flow for asthma, blood pressure for hypertension), and service utilization for 1 year (6 months prior, 6 months and 1 year after; number of primary care visits; number of ER visits; number of hospitalizations). Care by the two provider types was found to have essentially identical outcomes in the variables studied. This study demonstrates the use of discrete, guideline-based variables for diabetes, asthma, and hypertension outcomes. Information on the process of NP care that produced these outcomes would be most interesting and could be provided by a tool such as an expanded NAMCS that includes both outcome measures and essential nursing data.

5. Essential nursing data

Essential data elements for nursing care stem from the Nursing Minimum Data Set. They include: nursing diagnosis, nursing interventions, nursing outcome, intensity of nursing care, and nurse provider identification [17]. As a complement to acute care nursing-sensitive indicators, the American Nurses Association has published non-acute care nursing-sensitive indicators [18]. Measures include: client satisfaction; pain management; frequency, intensity, and duration of symptoms; consistency of communication with one nurse provider; staff mix with number of direct care hours or encounters; number of clients per year receiving education on tobacco use prevention and/or cardiovascular disease prevention provided or coordinated by a nurse; caregiver activity; identification of primary caregiver; activities of daily living; and psychosocial interaction. This list provides a beginning recognition of several important nursing variables that are not contained in the studies cited previously. In particular, pain management, consistency of communication with one nurse provider, the identification of a patient’s primary caregiver, and the caregiver’s activity are new additions. Many variables relevant to effective nursing care, such as the ANA non-acute indicators, are not commonly documented in clinical encounters, billing records, or national surveys. Potentially, nursing indicators may be added to legal reporting requirements; ANA has begun
to push for state legislation to collect their acute care nursing-sensitive indicators for quality assessment in acute care settings [19].

Nursing terminologies have been developed to facilitate documentation of nursing care [20]. The Home Health Care Classification (HHCC) system [21] and the Omaha nursing classification system [22] codify nursing diagnoses, and interventions. Both terminologies are in the public domain and may be freely used. They represent similar concepts in nursing care and are being incorporated into an evolving comprehensive terminology for health care—SNOMED-CT [23]. Nursing diagnoses sometimes overlap with medical ICD9 CM codes so nurse practitioners tend to use both. NP interventions link to both medical and nursing diagnoses. The 160 HHCC interventions are modified by 4 types of action: assess/monitor, care/perform, teach/instruct, and manage/refer. Omaha interventions are in 4 categories: health teaching, guidance, and counseling; diagnostic, and therapeutic procedures; case management; and surveillance with 63 detailed intervention targets. Adding selected standardized terms for nursing diagnoses, interventions, and outcomes to the NAMCS might provide a rich source of data on NP care.

One example of electronic collection of essential nursing data is the student clinical log at Columbia University that is implemented using a hand-held computer [24]. A subset of 11 HHCC diagnoses and 30 teaching interventions are available for selection by primary care NP students. The subset of terms were shown to describe NP care in a previous study by Bakken et al. [25]. Having a short list to pick on a portable application guides students in using standardized nursing terminology. The remainder of medical diagnoses, procedures, medications, and patient disposition data collected from student encounters are quite similar to those in the NAMCS. NP program directors review plans of care associated with documented medical and nursing diagnoses. Future enhancements of the application may include guideline prompts and selected outcome measures.

### 6. Proposed data elements

Based on the literature reviewed, the following variables are recommended for addition to the existing NAMCS survey instrument: (a) patient information on languages spoken, highest grade completed, use of chronic medications as prescribed, current pain, depression, alcohol/substance use, caring for self, and having a caregiver; (b) HHCC nursing diagnoses from the Bakken [24] study; (c) diagnostic/screening services of weight, height, blood pressure measurement, fecal occult blood screen, foot exam, hemoglobin A1C and last result, last result of cholesterol measurement, and

<table>
<thead>
<tr>
<th>Variable name</th>
<th>Source</th>
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<tbody>
<tr>
<td>Quality indicator</td>
<td>Outcome research</td>
</tr>
<tr>
<td>Patient language spoken</td>
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</tr>
<tr>
<td>Highest grade completed</td>
<td>X</td>
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<tr>
<td>Use of chronic medications as prescribed</td>
<td>X</td>
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<tr>
<td>Current pain</td>
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<tr>
<td>Depression</td>
<td>X</td>
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<tr>
<td>Alcohol/substance use</td>
<td>X</td>
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<tr>
<td>Caring for self</td>
<td>X</td>
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<tr>
<td>Having a caregiver</td>
<td>X</td>
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<tr>
<td>Selected HHCC nursing diagnoses</td>
<td>X</td>
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<tr>
<td>Weight/height/BMI</td>
<td>X</td>
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<tr>
<td>Blood pressure measurement</td>
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<td>Fecal occult blood screen</td>
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<td>Diabetic foot exam</td>
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<td>Hemoglobin A1C measurement</td>
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<td>Cholesterol measurement</td>
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<td>Peak flow</td>
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<tr>
<td>Counseling for alcohol/substance abuse</td>
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<td>Counseling for caregiver coping support</td>
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<tr>
<td>Teaching re: disease process</td>
<td>X</td>
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<tr>
<td>Teaching re: diabetic care</td>
<td>X</td>
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<tr>
<td>Teaching re: medication action/side effects</td>
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<tr>
<td>Counseling re: pain control</td>
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<td>Counseling re: reproductive care</td>
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<td>Teaching re: safety precautions</td>
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<td>Teaching re: prevention of sexually transmitted disease</td>
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peak flow; and (d) counseling/education/therapy interventions (using ANA non-acute indicators and HHCC terms) of alcohol/substance use, caregiver coping support, disease process, diabetic care, medication action/side effects, pain control, reproductive care, safety precautions, and sexually transmitted disease prevention. (See Table 1 for the variables and their source.) Please see Fig. 1 for a draft version of the proposed tool, to be known as the NANPCS, National Ambulatory Nurse Practitioner Care Survey.

7. Pilot test of a national ambulatory NP care survey

Currently, a pilot study is in process using the proposed NANPCS in several nurse-managed centers. Up to 15 NPs at 3–5 nurse-managed centers will complete surveys on 20–30 patient encounters during a week’s time. Select variables in standardized terminology were added to the NAMCS, from the literature on quality, outcomes research, and essential nursing data. The HHCC variables match the nursing diagnoses and in-
interventions that are used in the handheld application described above.

The NANPCS pilot uses a web-based survey similar to what is being done on a much larger scale by the Leapfrog Group of large, self-insured employers [26]. The Leapfrog Group has developed criteria for hospitals and health care systems to review patient records for medication errors. Selected data elements from each participating provider are entered into a web-based form, analyzed at a central location, and compared to other (anonymous) health care agencies. This method could be used for the NANPCS or for an expanded NAMCS that

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Fig. 1. (continued)
includes NANPCS variables to allow providers to compare their patient demographics, most common diagnoses and interventions, adherence to clinical guidelines with benchmarks, and patient outcomes. Very quick feedback can be given after data are recorded to show comparisons with benchmarks and with other sites. This may help overcome resistance to computerized data collection in the course of everyday practice.

Previous discussions of implementing electronic data collection and electronic patient records have noted such resistance from health care providers who are thinking "care of individuals" versus health services researchers and public health experts who are thinking "aggregate data" [27–29]. Without widespread use of electronic health records—probably at least a decade away [30]—large sample studies of NP care will be best accomplished by surveys such as the proposed NANPCS or an expanded NAMCS. To date, NP collaborations for practice-based research networks have formed in the Midwest, New England, and the Philadelphia area [31].
Such surveys, available on the web, on disk, and/or paper, could be applied by these and other groups [32]. Indeed, the New England research network, "APRNet," has reported using an adapted version of the NAMCS to describe NP practice [31].

8. Proposal for a national ambulatory NP care survey

In order to obtain national data on NP care, several steps are needed. The proposed NANPCS should be validated, a streamlined survey method should be tested, and a method of national sample recruitment and survey distribution should be established. The preferred method would be for the established infrastructure at the National Center for Health Statistics to expand the data elements in the NAMCS instrument and integrate a large number of NPs into its annual sample. This would entail a political process of persuasion and negotiation with the National Center for Health Statistics and the bureaucracy that surrounds it. Revision of the current NAMCS survey could serve multiple needs with the download of select data elements into other required documents. Examples include the HCFA 1500 standard billing form, and the Center for Disease Control's national emergency disease surveillance system. Using standardized data elements fits the national health information infrastructure effort to track and trend quality of care and outcomes for efforts such as Healthy People 2010 and provide for data mining in a variety of research projects. National standardized data has tremendous potential to contribute to error recognition and reduction and to improve patient safety [33]. To demonstrate the value of this approach, as a first step in this direction, NP professional groups must produce initial survey results. A potential collaboration with regional research networks, such as APRNet and the Michigan Academic Consortium, and faculty practices enrolled as members of the National Organization of NP Faculties (NONPF), could generate NP survey users. National professional organizations, such as the American Medical Informatics Association, the American Nurses Association, and NONPF could be approached to advocate for such essential electronic data collection.

9. Conclusion

An expanded NAMCS that incorporates NANPCS items will enhance the national database for assessing
quality of care among a range of providers. Allowing free internet access to the survey instrument will provide many outpatient practices with a precursor to electronic health records and with essential data elements for billing and other reports. Patient outcomes may be associated with provider interventions to add to our knowledge of what works in healthcare. The tool will unite informatics and evidence-based care by using standardized data elements that stem from research in diagnoses, interventions, and outcomes [34]. It is anticipated that the NP encounters captured in a national survey will represent predominantly low-income, minority, underserved patients, given the predominant sites of NP practice. Survey data that enhance our understanding of effective care for the underserved may promote such unique providers as NPs. Given the millions of federal dollars that have supported and expanded NP education as well as funded the start-up of many nurse-managed centers over the past decades [35], it seems a logical next step to proceed with a national evaluation of NP practice by substantially increasing the representation of NPs in the sampling frame of an expanded NAMCS.

References