

# Designing the National Hospital Care Survey

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## Abstract

The National Center for Health Statistics has launched the National Hospital Care Survey (NHCS), which integrates the National Hospital Discharge Survey (NHDS) and the National Hospital Ambulatory Medical Care Survey (NHAMCS). NHDS and NHAMCS are the principal sources of nationally representative samples of utilization of hospital inpatient (NHDS) and ambulatory departments (NHAMCS), including outpatient and emergency departments as well as hospital and freestanding ambulatory surgery centers.

NHCS will be implemented in two phases. The first phase, currently underway, is to recruit a new sample of 500 hospitals. Participating hospitals will be asked to submit Uniform Bill (UB)-04 administrative claims data for all inpatients. The second phase will occur in January 2013 and will integrate NHAMCS with the inpatient component.

NHCS will continue to provide the nationally representative estimates and trends that NHDS and NHAMCS currently provide. However, the new survey has some strategic advantages. This paper will describe the process and challenges of integrating two surveys with similar frames but different objectives and the opportunities presented by the integration.

**Key Words:** inpatient care, ambulatory care, survey integration

## 1. Introduction

The National Center for Health Statistics (NCHS), Centers for Disease Control and Prevention (CDC) gathers statistics on the use, access, quality, and cost of health care provided in the United States. Historically, NCHS has conducted three national surveys annually across six ambulatory and hospital-based settings: physician offices, inpatient wards, emergency departments (EDs), outpatient departments (OPDs), hospital ambulatory surgery locations (ASLs), and freestanding ambulatory surgery centers (FS-ASCs). In an effort to streamline data collection across health care settings and to strive toward collecting health care utilization data by electronic means, NCHS is launching a new survey, the National Hospital Care Survey (NHCS), which integrates the National Hospital Discharge Survey (NHDS) and the National Hospital Ambulatory Medical Care Survey (NHAMCS).

The NHCS will have two components, an inpatient component and an ambulatory component; and will be phased in over several years. In 2011, recruitment of a new national probability sample of 500 hospitals for the NHCS began. During the first two years of the survey hospitals will be asked to provide Uniform Bill (UB)-04 administrative claims data for all inpatients, as well as hospital level data through a facility questionnaire. In fall 2012, a pretest will be

conducted to assess the feasibility of incorporating the ambulatory component into NHCS. If successful, both the inpatient and ambulatory components of NHCS will be conducted in 2013.

NHCS will replace NHDS and NHAMCS but will continue to provide nationally representative data on utilization of hospital care and healthcare statistics on inpatient care as well as care delivered in EDs, OPDs, and ASCs. However, the new survey has some strategic advantages. NHCS will collect protected health information to allow linkage across hospital settings and to other data sources such as the National Death Index and Medicare data. In addition, NHCS will gather UB-04 data electronically and as hospitals adopt electronic health records (EHRs), NCHS will be poised to link these data to UB-04 data.

This paper describes the design of NHCS and the challenges of integrating two national surveys with similar frames but different objectives.

## **2. Background**

The new NHCS integrates NHDS and NHAMCS. NHDS, conducted continuously from 1965 through 2010, is the Nation's principal source of data on inpatient utilization of general, short-stay, non-institutional, non-Federal hospitals, and is the principal source of nationally representative estimates on the characteristics of discharges, lengths of stay, diagnoses, surgical and non-surgical procedures, and patterns of care in hospitals in various regions of the country. NHAMCS has been conducted annually since 1992 and is designed to collect data on the utilization and provision of ambulatory care services in hospital emergency and outpatient departments. Findings are based on a national sample of visits to these departments based on non-institutional, non-Federal, general, and short-stay hospitals. In 2009 and 2010, hospital based and FS-ASCs were added.

The NHCS will also incorporate the Drug Abuse Warning Network (DAWN) which began in the early 1970s and is designed to collect data on drug-related emergency department visits. Findings are based on a national sample of visits to these departments in non-institutional, non-Federal, general and short-stay hospitals. The Substance Abuse and Mental Health Services Administration (SAMHSA), which conducted DAWN from 1992-2011, has collaborated with NCHS to have this information collected through NHAMCS. Once NHAMCS is integrated into NHCS, drug related information will be collected as part of the ambulatory component, which will expand the scope of ED data available to help inform public policy and prevention and treatment activities.

## **3. NHCS Objectives**

NHCS has several objectives. NHCS will continue to provide nationally representative utilization statistics for hospital discharges, ambulatory medical care, and for ambulatory surgery. NHCS will use a new independent national probability sample of hospitals to ensure that the sample continues to be nationally representative. Non-identifiable micro-data public use files of inpatient discharges and ED, OPD, and ASC visits will also continue to be released in a timely fashion so that the data can be used by health policy researchers, the public and the research community.

In addition, NHCS intends to move toward electronic data collection for both inpatient and ambulatory components of the NHCS, utilizing EHRs. Since EHRs are not widely adopted, interim sources of electronic data will be used. As a first step, NHCS will gather UB-04 administrative claims data electronically and as hospitals adopt EHRs, NCHS will be poised to link these data to the UB-04 data.

As separate surveys, NHAMCS has the capability to permit special studies but NHDS did not. NHCS will provide a flexible platform which will permit collection of special data for both inpatient and ambulatory components as needs arise for policy and research demands. For example with the collection of all the UB-04 data for all hospital discharges, discharge sampling will be possible, stratifying by diagnosis or discharge status, which will allow the survey to oversample specific diagnoses to perform special studies.

Finally, NHCS will collect protected health information (PHI) to allow linkage of patient data across hospital settings and other data sources such as the National Death Index (NDI) and the Medicare and Medicaid claims databases. With the collection of PHI, NHCS will be able to “follow” patients during an episode of care by linking records within the same hospital. An individual can be traced from the initial visit to the ED, to admission to the hospital, discharge from the hospital and finally, for any treatment in the OPD. Linkage to the NDI will allow researchers to conduct a wide range of outcome studies (e.g., 30 day mortality after discharge from a hospital) designed to investigate the association of a number of factors related to health care mortality. By linking NHCS data with Medicare and Medicaid data, researchers will be able to study changes in health status and health care utilization for low income families, the elderly, and the disabled.

#### **4. Sample Design**

The target universe of NHCS is inpatient discharges and visits made to EDs, OPDs, and ASCs of non-institutional, non-Federal hospitals in the 50 states and the District of Columbia that have six or more staffed beds. Average length of stay is not used as an exclusion criterion as was done in the NHDS, thus expanding the frame beyond short-stay hospitals. No geographic primary sampling units (PSUs) are used in this design, and there are no certainty hospitals defined a priori.

First, a stratified list sample of 1,000 hospitals was selected, then, that sample was split into two samples: a base sample of 500 hospitals and a reserve sample of 500 hospitals. The base and reserve samples are each divided into 16 nationally representative panels. The base sample was fielded in 2011. The reserve sample will be held until needed.

#### **5. Collection of Protected Health Information (PHI)**

With the exception of the medical record number which was used for sampling, NHDS and NHAMCS did not collect PHI. The NHCS will collect PHI for all components. The list of PHI patient items includes the following: name, birth date, address, zip code, dates of admission and discharge (for the inpatient component), date of visit (for the ambulatory components), procedure dates, social security number (where available), medical record number (where available),

patient control number, and Medicare health insurance benefit/claim number. The PHI items for physicians include attending NPI (National Provider Identifier) number and operating NPI number.

PHI will allow linkage to the NDI, providing better information on outcomes of hospitalization. Another benefit of PHI is that it will track whether a patient returned to the hospital after discharge by looking back in the UB-04 records. Therefore, NCHS will be able to determine whether the patients had been in the hospital prior to the admission date of the sample discharge. Collection of PHI will allow linkage among survey components.

Although NHCS collects PHI, hospitals may participate while still strictly adhering to the requirements of Federal privacy legislation, including the Health Information Portability and Accountability Act (HIPAA). HIPAA's Privacy Rule permits disclosure of PHI without patient authorization for 1) public health purposes and 2) research that has been approved by an IRB. Both of these conditions apply to NHCS.

## **6. Developmental Research Conducted**

### **6.1 Inpatient Pilot Study**

Key developmental research was conducted to test the electronic data collection for the inpatient component of NHCS. From October 2010 through June 2011, a pilot study was conducted to develop and test procedures used to collect and transmit electronic UB-04 data, in 837 format, from hospitals to a secure NCHS server accurately and securely. The results from the pilot study showed that the billing department in the hospital is the most familiar with UB-04 data. In contrast, the department of health information management was central to data collection efforts for NHDS and NHAMCS. The most important finding from the pilot study was that hospital systems could output UB-04 data in 837 format and then transmit files securely to the CDC Secure Data Network (SDN). NCHS staff could download the files to the NCHS secure server and were able to process the 837 files. The PHI was safeguarded by the CDC's SDN.

### **6.2 Ambulatory Pretest**

In fall 2012, a pretest of the ambulatory component will be conducted using a convenient sample of 32 hospitals already participating in the inpatient component of NHCS and in 15 FS-ASCs not currently participating in NHAMCS. Integration of NHAMCS ambulatory data from hospitals and from FS-ASCs into NHCS, including new sampling and data collection methods, will be tested. Integrating DAWN into NHCS, including new sampling and data collection methods, remote reporting and collection of data from EHRs, as well as questions related to drug- and mental illness-related ED visits will be examined. The collection of nationally representative visit data on the provision of colonoscopy to both symptomatic and asymptomatic patients seen in ASLs and FS-ASCs will also be tested.

The results of the pretest will be used for the following purposes:

- Modify or delete new ED questions;
- Establish sampling procedure(s) for selecting ED, OPD, and ASL visits;
- Determine the method(s) of medical record abstraction for visits;

- Compare drug-related ED visits identified by reviewing all cases via remote reporting with the drug-related ED visits identified by ICD-9-CM codes using the UB-04 data;
- Compare patient sign-in sheets and visits identified from the UB-04 data to determine if there are visits made to the ambulatory departments that do not have an associated billing claim with them;
- Modify the reason for visit, cause of injury, diagnosis, and medication lookup tables;
- Assess the feasibility of obtaining information on colorectal cancer screening during ambulatory surgery visits where a colonoscopy is performed; and
- Test the colorectal screening questions.

## **7. Hospital Recruitment**

In May 2011, the inpatient component of NHCS began. All 500 sampled hospitals were contacted and screened for NHCS eligibility. To be eligible for inclusion in NHCS, a hospital must have six or more staffed beds for inpatients, a state license and not be federally owned. After the determination that a hospital was eligible, an induction letter, signed by the Director, NCHS, was sent to the appropriate hospital contact identified during the screening call. After the induction letter was sent, contractor staff followed up with a telephone call to identify and establish contacts at the hospital and set up an in-person meeting, if necessary, with the hospital contact described above and other relevant hospital personnel.

Hospitals participating in the NHCS will be paid \$500 to cover the cost of the initial set-up of the UB-04 electronic data transmission and an additional \$500 after completion of each full year of participation. An online continuing education course was developed to acquaint health information management professionals with NHCS and demonstrates the value of participating in the survey and describes what participation involves. The course was aimed particularly at health information management professionals who work in hospital settings. The course was accredited by the American Health Information Management Association and the Healthcare Information and Management Systems Society for 1 hour and 1.5 hours, respectively, of continuing education credit. Finally, each participating facility will receive a summary report with selected statistics of the data they have provided.

## **8. Data collection**

Eventually the NHCS intends to move to an all electronic data collection for both the inpatient and ambulatory components. However, since EHRs are not widely adopted, interim sources of electronic data need to be used. The UB-04 is administrative claims required by CMS and most commercial payers. Since May 2007, hospitals have been required to report Medicare claims to CMS using the UB-04 in 837 HIPAA file format. Included on the UB-04 claims are physician and patient identifiers and data on patient demographics, diagnoses, procedures, and revenue codes.

In 2011 and 2012, participating hospitals are asked to electronically submit their UB-04 inpatient claims. The preferred format for the UB-04 files is the X12 837 format. Either an 837i (institutional) or 837r (data reporting) file is acceptable in version 4010 or 5010. Starting

January 2012, version 5010 is now required by the CMS, so this version is now an acceptable version for NHCS for the 2012 data collection.

Initially, participating hospitals were transmitting their electronic file with UB-04 data quarterly on all discharges to the CDC SDN. In September 2011, a contractor was selected to assist with data collection. Since then, all inpatient data have been transmitted to the contractor's secure transfer system. These data are being compiled, processed and sent to NCHS via CDC SDN. For additional special studies that use medical record abstraction to collect clinically specific data, discharges will be selected from the hospitals by ICD-9-CM codes appearing on the UB-04, and medical records abstractors will abstract data from the selected records onto encrypted, password protected laptop-based PC data collection tools.

In addition to providing all inpatient claims, in 2013, the ambulatory component will be incorporated into NHCS. Hospitals will be asked to provide information on visits to their EDs, OPDs, and ASLs. Data collection strategies for the ambulatory component are still being planned. Explorations are underway to examine if UB-04 data claims can be used for the ambulatory component as well. Clinical and medication information, not contained in the UB-04, will be collected by medical record abstraction into a laptop-based PC data collection tool by contractor staff. Other options being explored are remote reporting for hospitals with this capability and extracting data from EHRs in hospitals where this is feasible.

Facility level information will be collected each year. For 2011 and 2012, hospital level characteristics will be related to discharge level data within the hospital. New data elements, such as the percent of payments to the hospital from Medicaid, will allow the study of the relationship between hospital characteristics and care provided at the discharge level. In 2013, there will be a combined facility questionnaire that addresses both inpatient and ambulatory hospital care.

## **9. Challenges to integration**

The integration of NHDS and NHAMCS has posed several challenges. In terms of statistical issues, the NHCS hospital sample is designed to meet many objectives. After much discussion at NCHS, it was decided that visits to EDs would have lead priority. Additionally, not all 500 sampled hospitals are eligible for both the ambulatory and inpatient components. Some of the sampled hospitals are specialty hospitals and do not have EDs or OPDs. Consequently, the number of in-scope hospitals will be different for the inpatient and ambulatory components.

The incorporation of DAWN has provided several challenges particularly with respect to the sample size for ED visits. Typically, NHAMCS sampled approximately 100 ED visits. To be able to provide reliable estimates for drug-related incidents, it is expected that the sample size for ED visits will need to be at least doubled or possibly tripled. Abstracting 200-300 records on-site may prove to be too burdensome for many hospitals. To this end, NCHS is exploring several options including remote abstraction, accepting UB-04 outpatient claims data or EHR data for the ambulatory component. In addition, methodological work is being undertaken to use ICD-9-CM codes to help identify drug-related cases.

Recruitment has proven to be difficult. Hospitals are busy places providing health care services to patients. The time period 2011-2013 is especially hectic for hospitals as they adopt EHR systems, plan for the conversion from ICD-9-CM to ICD-10-CM as well as plan for a new version of the UB-04 to be implemented in early 2012. Adding participation in NHCS is just too much for some hospitals to bear right now. They are not refusing but are asking to be re-contacted in 6-8 months.

Additionally, it is not clear that hospitals clearly understand that they are being recruited for both the inpatient component which starts in 2011 and the ambulatory component, which begins in 2013. Moreover, 2010 was the last data collection year for NHDS. NHAMCS, however, is still in the field in 2011 and 2012. There is hospital overlap between the NHAMCS sample of hospitals and the new sample for the NHCS, which has caused much confusion for the overlapping hospitals.

Although hospitals are required to submit UB-04 claims to CMS in the 837i file format, submission of the UB-04 claims 837i file format to NCHS has been challenging. First, many hospitals use clearinghouses to process and submit their claims to CMS and other providers. In many instances, the \$500 payment for each year of data collection is not enough to offset the cost the clearinghouse charges for constructing a file for NHCS. Second, some hospitals who process their own UB-04 claims do not know how to output the data from their systems for submission to NHCS. Third, hospitals with many patients handle volume by archiving their claims data daily, which makes obtaining the data for this study difficult or costly. With the technological capabilities of the NHCS data collection contractor, automation of data transmission provides a resolution to the barrier of archived data. Finally, some hospitals that are able to output digital data in-house are not necessarily able to output in 837 format. Although not preferred, other file formats such XML, Excel, and ASCII formats have been accepted. For any and all issues, NCHS staff have provided technical support via email or teleconference. Being a new survey, often direct contact with the point of contact at a hospital is vital to solving issues.

## **10. Benefits of the NHCS**

As with any new project there are challenges that must be overcome. However, the integration provides many opportunities. The NHCS will continue to provide national health-care statistics that NHDS and NHAMCS currently provide. Current NHDS and NHAMCS data items will continue to be collected which will allow trend analyses to continue. NHCS should continue to be an extremely valuable public health resource by providing trended data on hospital use, including diagnoses and procedures of particular interest (e.g., Cesarean section rates, use of coronary stents).

The NHCS also has some distinct advantages. First, more information at the hospital level will be collected. This information includes, but is not limited to, the hospital's infrastructure for health information technology and volume of care provided by the facility. Thus, analyses of the effect of facility characteristics on the quality of care provided will be possible.

Second, data collected from UB-04s on inpatient discharges will be collected from all inpatient discharges, not just a sample. In 2013, when the hospital ED, OPD and ASCs are integrated into the survey and visits are sampled from EDs, OPDs and ASCs, care provided to ambulatory

patients admitted to the hospital can be examined. The collection of PHI will allow the linkage of episodes of care provided to the same patient in the ED and/or OPD and/or ASC and as an inpatient, as well as sampled cases to the National Death Index and Medicare and Medicaid data, as available, to measure post-discharge mortality and other health-related outcomes. Obtaining all UB-04 data from a hospital will also allow the sampling of hospital discharges with specific diagnoses and procedures for special studies that use medical record abstraction to collect more clinically specific data.

NHCS makes a radical departure from current surveys by moving to a totally electronic system for collection of core data while providing a flexible platform to allow primary data collection for strategic samples of cases. In 2011 and 2012, the UB-04s will be electronically transmitted for the inpatient component of the NHCS. As hospitals adopt electronic health records (EHRs), NCHS will be poised to accept electronic files for both the inpatient and ambulatory components of NHCS.

NCHS also plans to move toward a richer collection of emergency department data by incorporating DAWN into the ambulatory component of NHCS. The advantages of incorporating DAWN into the ED sub-component of NHCS include logistic and information gains to DAWN as well as operational efficiencies of a combined effort for NCHS and SAMHSA. This additional initiative will focus on data from ED visits related to the nonmedical use of prescription and over-the-counter medications, illegal drug use, suicide attempts, accidental poisonings, and mental illness.

## **11. Conclusion**

CDC's NCHS has taken an important step to enhance the quality and scope of hospital and FS-ASC data by launching NHCS. This new survey will help address a broad range of policy and research questions that will be important for making health care and health policy decisions in the future. At the same time, NCHS is laying the groundwork for the incorporation of EHR data into the NHCS data collection, as it becomes more widespread.