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Quality Control in the Hospital Discharge Survey

This report contains a detailed description of the quality control, process control, and editing techniques employed in the National Center for Health Statistics continuing Hospital Discharge Survey.

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SYMBOLS

Data not available	---
Category not applicable	...
Quantity zero	-
Quantity more than 0 but less than 0.05	0.0
Figure does not meet standards of reliability or precision (more than 30 percent relative standard error)	*

QUALITY CONTROL IN THE HOSPITAL DISCHARGE SURVEY

Kenneth W. Harris, *Statistical Methods Staff,* and Keith L. Hoffman, *Division of Health Resources Utilization Statistics*

INTRODUCTION

This report describes the quality control procedures used in the Hospital Discharge Survey, and it presents some statistics on the magnitude of errors associated with data collection and data processing.

Data have been collected from the Hospital Discharge Survey on a continuing basis since its inception in 1964. As an integral part of the comprehensive health statistics system maintained by the National Center for Health Statistics, the Hospital Discharge Survey produces statistics on the utilization of short-stay hospitals in the United States and on the characteristics of patients who use these services.

Data obtained from the survey are based primarily on information abstracted from a sample of patient medical records. That information, especially demographic and medical data, is coded by clerks and then converted to magnetic tape. Thus errors may occur at several stages: (1) when information is first recorded by attending physicians and other hospital personnel, (2) when the sample of discharges is selected, (3) when information from the medical records is abstracted, and (4) when the abstracted data are coded. Recording errors made by the attending physician and other hospital personnel are difficult to measure and are therefore excluded from the Hospital Discharge Survey quality control program. Before the procedures of the quality control program can be fully understood, however, it is necessary to understand the design and procedures of the Hospital Discharge Survey.

Description of the Survey

The scope of the Hospital Discharge Survey (HDS) is limited to patients discharged from short-stay, nonfederal, noninstitutional hospitals with six beds or more in 50 States and the District of Columbia.[1] An establishment is considered a hospital if all of the following conditions are met: (1) it maintains at least six beds for use by inpatients; (2) it is licensed as a hospital by the State in which it is located; (3) it provides inpatient medical care under the supervision of a licensed doctor of medicine or doctor of osteopathy; (4) it provides nursing service 24 hours a day under the supervision of a registered nurse; and (5) it maintains medical records for each patient admitted and for newborns. A short-stay hospital is a hospital in which the average length of stay is less than 30 days.

The survey is based on a stratified two-stage sampling design. In the first stage, a sample of hospitals is obtained through a controlled selection technique from 28 size-by-region classes. Then a sample of discharges is selected from each of the sample hospitals.

For each selected discharge episode, an abstract (transcription record) is prepared containing the age, sex, race or color, and marital status of the patient, as well as the discharge status, length of hospitalization, final diagnoses, and operations performed. During 1974, approximately 225,000 discharge records were abstracted. The objectives and design of the HDS are explained at length in an already published report.[2]

The major phases of the HDS are: (1) obtaining the participation of hospitals; (2) selecting samples of discharges within hospitals, which requires completion of the Sample Listing Sheet (exhibit 1, appendix IV); (3) abstracting information from hospital records for the sample discharges, which requires completion of the Medical Abstract (exhibit 2, appendix IV); (4) processing the statistical information in the U.S. Bureau of the Census Data Collection Centers (DCC's); and (5) processing the statistical information in the National Center for Health Statistics (NCHS) Data Preparation Branch, Research Triangle Park, N.C.

Hospitals selected for the HDS, which is endorsed by the American Hospital Association (AHA), are contacted to solicit their cooperation and to negotiate an agreement with the hospital administrator for hospital services to be provided in the survey, i.e., to set up the sampling and data collection procedures. After obtaining the administrator's approval, the implementation of the survey is discussed with the person in charge of the medical records department.

Two procedures are used in sampling and data collection in the HDS. The *primary* procedure, used by about 70 percent of all participants, requires the hospitals to use their own personnel to abstract the information. The *alternate* procedure requires a Bureau of the Census field representative to do this.

Before the collection of patient data begins, at least one more visit is made to hospitals using the primary procedure to train their personnel in properly performing the work required of them in connection with the survey. The visit also serves as a means of assuring that the work done by the hospital is understood and is of acceptable quality. Hospitals using the alternate procedure are handled differently. The Census representatives doing the work at these hospitals receive extensive initial training and participate in additional periodic training sessions.

After the survey materials are reviewed and edited at the Census DCC's, they are routed to the NCHS Data Preparation Branch where additional edits and final preparation of the data are performed.

Control of the Survey Process

The purpose of the HDS quality control program is to minimize errors in the survey results and to provide data to evaluate the extent of bias caused by hospital personnel, Census representatives, and coders. Control is exercised over the three phases of data collection—sample selection, abstracting nonmedical data, and abstracting medical data.

In addition to the various editing procedures used in data processing, a three-way independent verification system is used to measure the quality of the coding operation and to provide decision mechanisms for reprocessing unacceptable work and to retrain those coders producing such work. These procedures will be covered in greater detail later in the report.

Nonsampling errors can occur at any stage of a survey. They may result from a number of factors including faulty concepts, inadequate instructional material, misinterpretation of instructions, and illegibility of recorded data. All quality control features of the HDS attempt to minimize these errors and to maintain the quality of all survey processes.

Quality control is achieved by setting standards and by measuring performance. Performance is measured in the HDS by error rates of specific clerical and coding operations, pass-fail editing procedures, and so forth. These measurements are usually specified in terms of minimum performance standards required to maintain acceptable quality levels, thus assuring a specified accuracy in the survey results.

CONTROL OF DATA COLLECTION

Introduction

The quality control activities in the data collection operation are process controls rather than product controls, which means that little, if any, work is redone because of poor quality. Instead, every effort is made to identify and correct causes of poor quality so that future work will meet established quality standards. This in-

cludes provision for retraining hospital personnel or Census representatives responsible for providing abstracted hospital patient data to NCHS and for the original training of new hospital personnel or Census representatives.

Collection Phases

The three phases of the data collection operation performed in each hospital are described below.

Sample selection.—Each hospital participating in the Hospital Discharge Survey submits abstracts of a sample of its records on a monthly basis. The sampling rate for each hospital is a function of the number of beds contained in the hospital and region, ranging from a low of 1 percent for hospitals with 1,000 beds or more to a high of 40 percent for hospitals with 6-49 beds in specific regions (table A).

Table A. Sampling rates used in the Hospital Discharge Survey

Number of beds	Rates for selecting hospitals	Rates for selecting discharges	Overall sampling rate
1,000 and over	1	1/100	1/100
500-999	1/2	2/100	1/100
300-499	1/3	3/100	1/100
200-299	1/5	5/100	1/100
100-199	1/10	1/10	1/100
50-99	1/20	2/10	1/100
6-49[1]	1/20 1/30 1/40	2/10 3/10 4/10	1/100

[1]Sampling rate varies with geographic region.

In addition to submitting abstracts of the sample records, the hospital submits a Sample Listing Sheet which identifies the abstracts included in the sample for that month. Each hospital is assigned a set of key digits (included in the Sample Listing Sheet) to be used in selecting the records to be abstracted. Most hospitals use a sequential numbering system for their medical records. Generally, the medical record numbers for sample records to be abstracted should all end in the key digits assigned to that particular hospital.

Nonmedical abstracting.—Abstracting nonmedical data involves transcribing the following 10 items of data from the patient's medical record onto the HDS Medical Abstract.

A. Patient Identification
   1. Hospital number
   2. HDS number
   3. Medical record number
   4. Date of admission
   5. Date of discharge

B. Patient Characteristics
   1. Date of birth
   2. Age (complete *only* if date of birth is not given)
   3. Sex
   4. Race or color
   5. Marital status
   6. Discharge status

   Items 3-6 are each answered by checking one box of several choices.

Medical abstracting.—Abstracting medical data involves listing all diagnoses and operations found on the patient's medical record.

Sample Size Considerations

Due to cost and manpower constraints, it is not feasible, or necessary, to institute a quality control procedure on 100 percent of the data. Therefore, in determining the sample size needed for evaluating the quality of the abstracting (transcription) operations in the Hospital Discharge Survey, data gathered during earlier studies were used. The results of these studies provided input for calculating necessary sample sizes for measuring the quality of the data collection operation within an expected quality range. Consistent with these determinations, and to facilitate the actual process of pulling records, the sample plan selected consists of 40 abstracts per hospital per year. The for-

mula used for calculating the sample size and an example of its use can be found in appendix I.

Control Procedures

For the three-phased data collection operation, each participating hospital is visited on an annual basis by a Census representative. For hospitals using the alternate procedure, the Census representative is not the same person who does the original abstracting. The purpose of this visit is threefold:

1. To assess the quality of the sampling and abstracting of patients' medical records,
2. To establish and maintain quality standards for sampling and abstracting the patient's medical records, and
3. To promote better public relations with the hospital staff.

Prior to the visit, the Census representative is provided with a sealed envelope that contains copies of (1) the most recently completed Sample Listing Sheet(s) by the hospital, which must cover as many of the most recent months as necessary to get a minimum of 40 discharges, and (2) a subsample of abstracts completed by the hospital during the most recent 12-month period. If 12 months of abstracts have not been completed by the time of the visit, then the most recent months of abstracts completed are used, providing a minimum of 40 abstracts have been completed. For example, if the annual visit is scheduled for June 1975 and the latest data submitted by the hospital are for April 1975, then the envelope will contain:

1. A copy of the Sample Listing Sheet for April 1975 and for each successive preceding month's Sample Listing Sheet (March, February, etc.) until the minimum of 40 sample patient abstracts has been met.
2. Copies of abstracts systematically subsampled from the abstracts submitted by the hospital for the period May 1974 to April 1975. If May 1974 to August 1974 data are not available for use, then September 1974 to April 1975 data are used. This period must contain the minimum of 40 abstracts or the visit is delayed until sufficient data have been submitted.

Attached to the outside of the sealed envelope is an Abstract Subsample Listing of the medical record numbers for the subsample of abstracts selected (exhibit 1, appendix V). The Census representative usually sends this listing to the hospital prior to his visit so that the necessary medical records can be pulled. Therefore, the Census representative can independently follow the same procedure used by the hospital abstractor, i.e., he will complete a Sample Listing Sheet for the selected month(s) and Medical Abstracts for the selected subsample of discharges. The information transcribed on the Medical Abstracts is obtained from the face sheet of the patient's medical records.

The Census representative compares the medical record numbers on the Sample Listing Sheet(s) with those on the Sample Listing Sheet(s) of the original abstractor (from the envelope). All sampling differences are recorded on the Reconciliation Form, Section I (exhibit 2, appendix V). A difference in sampling is defined as any medical record number that does not appear on both Sample Listing Sheets.

Using the medical record number to assure correspondence, the Census representative then compares each abstract with the abstract completed by the original abstractor on an item-by-item basis. All abstracting differences are recorded on the Reconciliation Form, Section II (exhibit 3, appendix V). A difference is defined as any item which does not match exactly or is omitted. However, the HDS number is in error only if it is blank or has more than four digits.

After completing the matching operation and recording all differences on the Reconciliation Form, the Census representative uses the face sheet of the patient's medical record as the standard for adjudicating the differences. All sampling and abstracting errors attributable to the original abstractor are indicated on the Error Report (exhibit 4, appendix V). The Census representative reviews all errors with the original abstractor before leaving the hospital, using the appropriate instruction manual as reference, and

summarizes the visit by completing the Checklist for QC Visit (exhibit 5, appendix V) and the Report on Hospital Visit (exhibit 6, appendix V).

Decision Rules for Batches and Coders

As might be expected, the medical abstracting is the most difficult phase of the data collection operation. The transcription of medical terms is complicated, in some instances, because of illegibility. Generally, the Census representatives do not have specific training in medical terminology. Although they are instructed to consider anything other than word-for-word agreement as a difference, it is recognized that this rule is much too restrictive. For this reason, the Reconciliation Form and Error Report are sent to NCHS, where an expert in medical terminology makes the final determination of medical abstracting errors.

Error rates for each phase of data collection in each hospital are computed. Determination of acceptable or unacceptable quality is made through the use of an Acceptance Number Table that indicates the number of allowable errors for a range of sample sizes. Different tables are used for sample selection (table B), nonmedical abstracting (table C), and medical abstracting (table D). The sample acceptance plans were set up so that NCHS would accept the following error rates with 95-percent probability:

1. Sample selection .01
2. Nonmedical abstracting .01
3. Medical abstracting .05

Table B. Acceptance and rejection numbers for sample verification of the sample selection phase of data collection, by sample size

Number of abstracts in sample	Accept if number of error codes is equal to or less than	Reject if number of error codes is equal to or greater than
27-45[1]	1	2
46-63	2	3
64-82	3	4
83-102	4	5
103-124	5	6
125-149	6	7

[1]Expected sample range.

The 95-percent probability level for the three phases is applicable under normal conditions, i.e., when all hospitals maintain quality levels very near to the acceptable quality level. Wide variation in quality from one hospital to another would, of course, result in a considerably smaller percentage of accepted hospitals.

Table C. Acceptance and rejection numbers for sample verification of the nonmedical abstracting phase of data collection, by sample size

Number of nonmedical items in sample	Accept if number of error codes is equal to or less than	Reject if number of error codes is equal to or greater than
160-219	3	4
220-279	4	5
280-339	5	6
340-399	6	7
400-459[1]	7	8
460-519	8	9
520-579	9	10
580-639	10	11

[1]Expected sample range.

Table D. Acceptance and rejection numbers for sample verification of the medical abstracting phase of data collection, by sample size

Number of medical items in sample	Accept if number of error codes is equal to or less than	Reject if number of error codes is equal to or greater than
13-22	1	2
23-33	2	3
34-45	3	4
46-56	4	5
57-68	5	6
69-79	6	7
80-90[1]	7	8
91-102	8	9
103-113	9	10
114-125	10	11
126-136	11	12
137-148	12	13
149-159	13	14
160-170	14	15
171-182	15	16
183-194	16	17
195-206	17	18

[1]Expected sample range.

Table E. Summary of initial quality control visits to hospitals in 1973

Total number of hospitals visited	421
Number of hospitals that failed in sample selection only	45
Number of hospitals that failed in nonmedical abstracting only	3
Number of hospitals that failed in medical abstracting only	24
Number of hospitals that failed in sample selection and nonmedical abstracting	1
Number of hospitals that failed in sample selection and medical abstracting	5
Number of hospitals that failed in nonmedical abstracting and medical abstracting	2
Number of hospitals that failed in sample selection, nonmedical abstracting, and medical abstracting	0

When a hospital receives an unacceptable decision on any phase, a revisit for the phase(s) involved is scheduled as soon as sufficient data become available, i.e., data that have been completed after the initial quality control (QC) visit. The revisit is made to determine if the retraining effected during the initial QC visit has improved the quality of the work for the phase(s) involved.

Tables E-J summarize the error rates and results of the first year (1973 data) of the quality control program for data collection.

Table E shows the number of hospitals with unacceptable quality on one or more of the three phases involved in data collection during the 1973 initial quality control visit.

Tables F, G, and H summarize the findings for each phase, i.e., sample selection, nonmedical

Table F. Summary of sample selection phase of data collection in 1973

Total number of hospitals visited	421	
Number of hospitals with acceptable quality	370	
Number of hospitals with unacceptable quality	51	
Percent of hospitals with unacceptable quality	12.11	
Total number of records that should be in sample	25,502	
Number of records in error	555	
Error rate (percent)	2.18	
Total number of hospitals revisited when sample selection was not performed at an acceptable quality level	[1]43	
Number of hospitals acceptable after revisit	33	
Number of hospitals unacceptable after revisit	10	
Percent of revisited hospitals unacceptable after revisit	23.26	
	Initial visit	Revisit
Total number of records that should be in sample	2,644	2,930
Number of records in error	301	94
Error rate (percent)	11.38	3.21

[1]8 hospitals were not revisited; the 1974 initial QC visit was substituted for the revisit.

Table G. Summary of nonmedical abstracting phase of data collection in 1973

Total number of hospitals visited	421	
Number of hospitals with acceptable quality	415	
Number of hospitals with unacceptable quality	6	
Percent of hospitals with unacceptable quality	1.43	
Total number of nonmedical entries on abstracts	173,900	
Number of entries in error	868	
Error rate (percent)	0.50	
Total number of hospitals revisited when nonmedical abstracting was not performed at an acceptable quality level	[1]5	
Number of hospitals acceptable after revisit	5	
Number of hospitals unacceptable after revisit	0	
Percent of revisited hospitals unacceptable after revisit	0	
	Initial visit	Revisit
Total number of nonmedical entries on abstracts	2,030	2,640
Number of entries in error	99	6
Error rate (percent)	4.88	0.23

[1]1 hospital was not revisited; the 1974 initial QC Visit was substituted for the revisit.

Table H. Summary of medical abstracting phase of data collection in 1973

Total number of hospitals visited	421	
Number of hospitals with acceptable quality	390	
Number of hospitals with unacceptable quality	31	
Percent of hospitals with unacceptable quality	7.36	
Total number of medical entries on abstracts	43,335	
Number of entries in error	1,386	
Error rate (percent)	3.20	
Total number of hospitals revisited when medical abstracting was not performed at an acceptable level	[1]24	
Number of hospitals acceptable after revisit	20	
Number of hospitals unacceptable after revisit	4	
Percent of revisited hospitals unacceptable after revisit	16.67	
	Initial visit	Revisit
Total number of medical entries on abstract	2,419	2,769
Number of entries in error	373	134
Error rate (percent)	16.05	4.84

[1]7 hospitals were not revisited; the 1974 initial QC visit was substituted for the revisit.

abstracting, and medical abstracting, respectively. It can be seen that the overall quality attained in the two abstracting phases was well within the established standards and resulted in acceptable decisions on each phase in excess of 92 percent. Although the overall quality of the sample selection operation was not as good as anticipated (2.18 percent vs 1.00 percent), the acceptable quality rate of 88 percent was good. As the boxes on these tables show, hospitals that had unacceptable quality during the initial visit showed substantial improvement at the revisit, indicating the effectiveness of the retraining provided them.

Table J shows the number of abstracts containing at least one abstracting error. There were 2,254 items in error (868 from table G and 1,386 from table H), giving an average of 1.22 item errors for each error abstract.

Table J. Summary of abstracts in error[1] in 1973

Total number of records abstracted (for 421 hospitals visited)	17,390	
Number of abstracts containing no errors	15,546	
Number of abstracts containing one error or more	1,844	
Percent of abstracts containing one error or more	10.60	
	Initial Visit	Revisit
Total number of records abstracted (for 29 hospitals revisited)	1,114	1,295
Number of abstracts containing no errors	727	1,181
Number of abstracts containing one error or more	387	114
Percent of abstracts containing one error or more	34.74	8.80

[1]An abstract is in error when either a nonmedical or medical error is committed.

EDITING COMPLETED WORK

Census Data Collection Center's Edit

As completed work is received at DCC's, it is entered on a Receipt and Control Form (exhibit 1, appendix VI). To assure that the completed work is of high quality, information recorded on the Sample Listing Sheets and Medical Abstracts must meet a standard of completeness and accuracy. All Census representatives are required to edit their work prior to leaving the hospital. The DCC's edit all work received from primary and alternate procedure hospitals.

All errors found on the abstracts during the DCC's edit are recorded on the Error Report (exhibit 2, appendix VI). At the present time, the collection of Ledger Abstracts in the survey has been discontinued; therefore, section 7 of the Error Report is not used. Copies of all Error Reports are maintained in the hospital's file.

Abstracts containing errors of omission and/or inconsistency are designated "failed edit." The failed edit abstracts are returned to primary procedure hospitals for correction or, in the case of alternate procedure hospitals, to the Census representative for correction on the next scheduled visit to the hospital.

All complete and correct work for each hospital is transmitted to the NCHS Data Preparation Branch in an Assignment and Transmittal Folder (exhibit 3, appendix VI). The Assignment and Transmittal Folder also contains the Transmittal Notice (exhibit 4, appendix VI) and the Monthly Progress Report (exhibit 5, appendix VI). The Monthly Progress Report alerts the program supervisor to hospitals that may drop out of the survey, as indicated by their delinquent reporting status. A hospital is considered delinquent if it has more than 4 months of abstracts outstanding (exhibit 6, appendix VI).

NCHS Edit

Upon receipt of the Assignment and Transmittal Folder in the Technical Services and Operations Section (TSOS) of the NCHS Data Preparation Branch, the date of receipt is stamped on the Transmittal Notice Sample Listing Sheet and on each "back" record (corrected record not included in earlier Assignment and Transmittal Folder.) All hospital data received are immediately listed on a Receipt Log (exhibit 7, appendix VI).

A Receipt and Control Log (exhibit 8, appendix VI) is completed for each hospital for the abstracts as they are received in TSOS after the following omission, consistency, and agreement checks are performed:

1. Continuous HDS numbers
2. Missing records
3. Unavailable records
4. Terminal digits on the Sample Listing Sheet and abstracts for each hospital
5. Number in sample with the number listed on the Sample Listing Sheet
6. Hospital number, HDS number, medical record number, discharge date and admission date on the abstracts with the Sample Listing Sheet information
7. Discharge or admission month on abstracts for agreement
8. Back records for month and number received in month
9. Completeness of abstracts
10. Sample Listing Sheet for beds, discharges or admissions, and live births

If any discrepancy or error is found, a letter is sent to the Bureau of the Census requesting the needed information or stating the problem found (exhibits 9 and 10, appendix VI).

A batch of approximately 1,000 abstracts is then formed by arbitrarily combining several months of data from different hospitals. (The reason for this batch size will be explained later.) A Batch Control Record designating this data is completed for each batch (exhibit 11, appendix VI). Additional editing is done on key-to-disc equipment (used in coding of data) and the computer. This consists of a series of adequacy and consistency edits; for example, certain operations are invalid for males and would be flagged if the patient is identified as a male. Individual records with errors are identified and corrections are made as necessary.

CONTROL OF CODING IN DATA PREPARATION

Control Plan

The quality control plan used for the coding is a single-sampling plan for inspection by attributes.[3] This is a rectifying inspection for batch-by-batch sampling, in which rejected batches are retained and submitted to further inspection. The intent of the inspection program is to correct or eliminate a sufficient number of incorrect codes to attain a specified quality objective. The plan calls for 100-percent inspection of rejected batches and for replacement of incorrect codes by good ones.

This plan assures the average outgoing quality of a large number of batches but not the quality of a particular batch. Furthermore, the average outgoing quality depends on the average incoming quality. The most important characteristic of the rectifying inspection plan is the Average Outgoing Quality Limit (AOQL). As

will be demonstrated later, this was set at 6 percent for medical coding and 1 percent for nonmedical coding. This means that, on the average, the completed medical coding operation will have an error rate no greater than 6 percent and the completed nonmedical coding operation will have an error rate no greater than 1 percent. In addition, this plan was designed to yield a minimum "average total inspection" (ATI) at the most likely incoming quality level, which was estimated from previous similar coding operations. In the derivations of the cost factor, T, in appendix II, ATI equals T– 1.

The quality control plan was thus designed to insure that the error rates in the data do not exceed a specified level and to furnish information on individual coders, thus providing a mechanism for improving the quality of the coding operation. The quality control plan was further designed so that:

1. A sample of the abstracts in each batch is selected for verification.
2. The method of determining coder errors is based on a three-way independent verification procedure. This procedure provides an independent measure of the error rate, utilizing a more objective method than the dependent adjudication associated with two-way systems.
3. The data from the program are analyzed on a current basis and the results made available to the coders, supervisors, and other interested parties.

The original quality control plan for coding in the HDS started in 1968 and primarily was directed toward medical coding.[4] At that time, the punching of coded data was verified on a 100-percent basis; so quality control emphasis was at the prepunching level, i.e., medical coding. A number of changes have taken place in the quality control procedures since 1968 that include the following:

1. A reduction in the work batch size from 2,000 to 1,000 abstracts, thus permitting a quicker evaluation of the coders' performances on a more timely basis.
2. A reduction in the sampling rate, recently increased to the original rate for reasons that are specified below under Sample Size Considerations.
3. A change in the decision rules on medical coders because of the experience gained through time.
4. The combining of coding (both medical and nonmedical) and punching into one operation through the use of key-to-disc equipment.

Sample Size Considerations

Using the method described earlier in the data collection phases for determining the appropriate sample size, a sample of 40 abstracts from each batch (1,000 abstracts) was selected for measuring the quality of medical and nonmedical coding of 1973 data but was increased to the previously used 10 percent (100 abstracts) in 1974 for the following reasons:

1. The simplicity of selecting a 10-percent sample (for example, every abstract whose HDS number ends with 0) vs. the more difficult task of selecting a 4-percent sample (for example, every abstract whose HDS number ends with 15, 35, 55, and 75).
2. The reduced variability of sample error rates in a 10-percent sample vs. the more variable rates in the 4-percent sample.
3. Coder concern that the smaller sample gives a less accurate reflection of the true error rate.
4. The ability of the coding unit to absorb the additional workload without adversely affecting the timeliness of data.

Three-Way Independent Verification

The term "production coder" denotes the coder who codes 100 percent of the abstracts in a batch. The term "verifier" is used to denote any coder who codes only the abstracts selected for the 10-percent sample from a batch. The sample is coded independently by two verifiers. The term verifier loses its conventional meaning under any independent verification system, i.e., the verifier

does not actually verify the work of another coder but rather the verifier's work is used as an independent criterion to evaluate the accuracy of the production coder's work.

The present procedure calls for medical coding of no more than five diagnoses and three operations. When there are excess codes or the coder is unable to determine the correct code because of limitations in the coding manual, the abstract is referred to the supervisor who resolves such problems on a current basis. At the present time, referrals seldom occur. The assignment of a coder as the production coder or as one of the two verifiers is on a coder available basis. Under this scheme, each coder will receive approximately one production assignment for every two verification assignments. A coder cannot receive more than one assignment on a batch.

The basic feature of three-way independent verification is the "majority" rule. If two or more coders agree on a code, that code is accepted as "correct" and the coder disagreeing is charged with an error. If there is no coder agreement, each is charged with an error. Calculation of the error rates is explained in detail in appendix III.

Decision Rules for Batches and Coders

After the batches have been formed, assigned, coded, and error designations made for the sample, decision rules are implemented. For the nonmedical section, the decision to accept or reject a batch is determined by comparing the production coder's work for the sample in the batch to an Acceptance Number Table (table K). This table indicates the number of allowable nonmedical errors for a range of nonmedical code sample sizes.

Correspondingly, for the medical section, the decision to accept or reject a batch is determined by comparing the production coder's work for the sample in the batch to an Acceptance Number Table (table L). This table indicates the number of allowable medical errors for a range of medical code sample sizes.

The Acceptance Number Tables were set up to provide the following:

1. For nonmedical coding, accept 1-percent error rate with 95-percent probability and average outgoing quality limit of 1 percent or less.

Table K. Acceptance and rejection numbers for sample verification of nonmedical coding in data processing, by sample size

Number of codes in sample	Accept if number of error codes is equal to or less than	Reject if number of error codes is equal to or greater than
400-459	7	8
460-519	8	9
520-579	9	10
580-639	10	11
640-699	11	12
700-759	12	13
760-819	13	14
820-879	14	15
880-939	15	16
940-999	16	17
1000-1059[1]	17	18
1060-1119	18	19
1120-1179	19	20
1180-1239	20	21
1240-1299	21	22

[1]Expected sample range.

Table L. Acceptance and rejection numbers for sample verification of medical coding in data processing, by sample size.

Number of codes in sample	Accept if number of error codes is equal to or less than	Reject if number of error codes is equal to or greater than
91-102	8	9
103-113	9	10
114-125	10	11
126-136	11	12
137-148	12	13
149-159	13	14
160-170	14	15
171-182	15	16
183-199	16	17
200-219[1]	17	18
220-239	18	19
240-259	19	20
260-279	20	21
280-299	21	22
300-319	22	23
320-339	23	24
340-359	24	25
360-379	25	26
380-399	26	27
400-419	27	28
420-439	28	29
440-459	29	30
460-479	30	31
480-499	31	32

[1]Expected sample range.

2. For medical coding, accept 6-percent error rate with 95-percent probability and average outgoing quality limit of 6-percent or less. The characteristics of this sampling plan are illustrated in table M.

Table M. Characteristics of the present sampling plan[1] for medical coding in data processing, by incoming error rate (P)

P	L_P	$AOQL$		T
		$\beta = 0$	$\beta = .25$	
.00	1.000	.0000	.0000	1.200
.01	1.000	.0100	.0100	1.200
.02	1.000	.0200	.0200	1.200
.03	.999+	.0299	.0299	1.200
.04	.999+	.0399	.0399	1.201
.05	.988	.0494	.0496	1.212
.06	.943	.0566	.0574	1.260
.07	.836	.0585	.0613	1.398
.08	.663	.0530	.0598	1.708
.09	.464	.0418	.0538	2.355
.10	.285	.0285	.0464	3.709

[1]The present plan is based on a 10 percent sample of abstracts, with:
N = 1,000 abstracts = 2,000 codes
n = 100 abstracts = 200 codes
a = 17 codes

Where: N = batch size; n = sample size; a = number of acceptable errors in sample.

P = incoming error rate.

L_P = probability of accepting a batch with error rate of P for n, a.

β = proportion of errors in rejected batches remaining after rework.

$AOQL$ = average outgoing quality limit
$= PL_P + \beta P(1-L_P)$.

T = total cost associated with a work lot, including production coding, verification and recoding of rejected lots when error rate remains the same after recoding ($\beta = 1.0$)

$= [1 + 2(\text{sampling rate}) + \frac{1-L_P}{L_P}]$, the decimal portion of T exceeding 1 represents the estimated cost of recoding. See Appendix VI for derivation of formula.

Table N. Comparison of three plans showing the probability of a coder remaining qualified, by incoming error rate (P)

Incoming error rate	Probability of acceptance[1] for one decision	Probability of Surviving (At least a accepts in d decisions[2])		
		$a = 4, d = 5$	$a = 8, d = 10$	$a = 9, d = 10$
P	L_P	S_P	S_P	S_P
.00	1.000	1.000	1.000	1.000
.01	1.000	1.000	1.000	1.000
.02	1.000	1.000	1.000	1.000
.03	.999+	.999+	.999+	.999+
.04	.999+	.999+	.999+	.999+
.05	.988	.999	.999+	.994
.06	.943	.971	.984	.892
.07	.836	.807	.780	.490
.08	.663	.464	.291	.100
.09	.464	.146	.034	.006
.10	.285	.026	.001	.000

[1]L_P is based on sample size of 200 and acceptance number of 17.

[2]$S_P = \sum_{a=a}^{d} \binom{d}{a} (L_P)^a (1 - L_P)^{d-a}$--- the third plan ($a=9$, $d=10$) is the one used; the other two are included for comparative purposes.

Whenever a batch is rejected, all of the abstracts in the batch are dependently recoded for the section(s) that failed (nonmedical and/or medical). This recoding can be done by any coder other than the three original coders who coded the batch. The recoded work is again matched with the work of the two verifiers to measure its quality. This process is repeated until the production coder's work on a batch meets the acceptable quality level.

The decision rules (both nonmedical and medical) applied to a production coder's work to determine whether to accept or reject a batch are also applied to the two verifiers' work to measure the quality of individual coders. In a sequence of 10 assignments (both production coder work and verifier work), a coder must get 9 or 10 accept decisions in order to continue in the operation as a qualified coder. This utilizes the concept[5] of at least "a" accepts in a sequence of "d" decisions and is illustrated in table N. If this requirement is met, another sequence of 10 assignments is started.

Whenever a coder has two rejects within a sequence of 10 assignments, the supervisor of the coding unit initiates one of several possible actions. The supervisor may review the errors with the coder, have the coder retrained, remove the coder from the unit, or initiate some other action.

Tables O and P summarize the nonmedical and medical error rates and decisions for production coding and all coding (production coder and verifiers) for data year 1973.

Table O. Summary of nonmedical coding in data processing for data year 1973[1], by type of coding

Production coding

Total number of batches coded	[2]117
Number of batches accepted	116
Number of batches rejected	1
Percent of batches rejected	0.85

	All batches before recoding of rejected batches	Rejected batches after recoding	All batches after recoding of rejected batches
Total number of nonmedical codes	40,869	369	40,869
Number of nonmedical codes in error	80	0	72
Error rate (percent)	0.20	0.00	0.18

All coding

Total number of coding assignments	[3]352
Number of coding assignments accepted	351
Number of coding assignments rejected	1
Percent of coding assignments rejected	0.28
Total number of nonmedical codes	122,976
Number of nonmedical codes in error	277
Error rate (percent)	0.23
Number of coders	6
Number of coders requiring action	0
Action taken	
1. errors reviewed 2. retrained 3. removed 4. other-describe	None

[1] 4 percent sample used for data year 1973.

[2] Only 117 of the 224 batches of data year 1973 were nonmedical coded on the key-to-disc. The other batches were keypunched and 100 percent verified and corrected.

[3] Normally, 3 per batch (1 production coder and 2 verifiers). However, when production coding is rejected, the batch is recoded and compared with the original 2 sets of verification coding. This process is repeated until the production coding is acceptable. For the 1 batch that was rejected, it was accepted after the first recoding.

Table P. Summary of medical coding in data processing for data year 1973[1], by type of coding

Production coding

Total number of batches coded	224
Number of batches accepted	218
Number of batches rejected	6
Percent of batches rejected	2.68

	All batches before recoding of rejected batches	Rejected batches after recoding	All batches after recoding of rejected batches
Total number of medical codes	21,181	600	21,181
Number of medical codes in error	678	10	623
Error rate (percent)	3.20	1.67	2.94

All coding

Total number of coding assignments	[2]678
Number of coding assignments accepted	672
Number of coding assignments rejected	6
Percent of coding assignments rejected	0.88
Total number of medical codes	64,143
Number of medical codes in error	1,697
Error rate (percent)	2.65
Number of coders	10
Number of coders requiring action	2
Action taken	
1. errors reviewed	1
2. retrained	1
3. removed	0
4. other-describe	0

[1]4-percent used for data year 1973.

[2]Normally, 3 per batch (1 production coder and 2 verifiers). However, when production coding is rejected, the batch is recoded and compared with the original 2 sets of verification coding. This process is repeated until the production coding is acceptable. The 6 batches that were rejected were all accepted after the first recoding.

SUMMARY

This report has described the procedures being used to control the quality of data collection and data processing in the Hospital Discharge Survey. For purposes of clarity and continuity, the report also includes a description of the survey operation itself and some mention of functions and procedures which are not normally considered features of a quality control system but which, nevertheless, serve to enhance quality.

Continuing efforts are being made to improve the quality of HDS data, especially in the area of data collection, which, historically, has been the most difficult survey measurement process to control.

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APPENDIX I

THE CHI-SQUARED APPROXIMATION FOR DETERMINING SAMPLE SIZE

In determining the sample size needed for evaluating the quality of the abstracting (transcription) operations in the Hospital Discharge Survey, data gathered during earlier studies were used. The first study[6] yielded data on the number of medical and nonmedical item errors found in an abstracting operation per 1,000 abstracts. Since the number of nonmedical items per abstract is fixed (10), a nonmedical item error rate for abstracting could be computed.

The number of medical items per abstract is not fixed, but results of the second[7] and third[8] referenced studies indicated the average number of diagnoses (1.75) and operations (0.40) per abstract. Thus, knowing the average number of medical items (1.75 + 0.40 = 2.15) per abstract, an error rate for abstracting of medical items could then be computed. Computations resulted in error rates of 0.93 percent and 5.26 percent, respectively, for transcription of nonmedical and medical items.

The estimated error rates from these study data were used for initially establishing the acceptable quality level (P_1), as defined below, for the abstracting operation for medical and nonmedical items in the Hospital Discharge Survey. The acceptable quality level for the sampling of abstracts to be transcribed could not be readily determined, so several levels were considered. Selected unacceptable levels (P_2), also defined below, were used for the three operations included in the data collection process, i.e., sampling of abstracts, transcription of nonmedical items and transcription of medical items.

The following example illustrates the formula used for determining the sample sizes and acceptance numbers.

Example

Chi-squared approximation for determining sample size n and acceptance number a for specified tolerances[9, 10]:

P_0 = incoming quality level (proportion defective)

P_1 = acceptable quality level

P_2 = unacceptable quality level

α = Probability of rejection when $P_0 = P_1$

β = probability of acceptance when $P_0 = P_2$

$$R = P_2/P_1 = \chi^2_{1-\beta}/\chi^2_{\alpha}$$

$$\chi^2_{1-\beta}/2P_2 < n < \chi^2_{\alpha}/2P_1$$

and

$2(a+1)$ = degrees of freedom (df)

$P_1 = .01 \qquad \alpha = .05$

$P_2 = .10 \qquad \beta = .10$

$R = P_2/P_1 = .10/.01 = 10$

df	$\chi^2.90$	$\chi^2.05$	$\chi^2.90/\chi^2.05$
4	7.78	.711	10.94
5	9.24	1.15	8.03

χ^2 Ratio for $4df$ is closest value to R

$$\text{So } \frac{\chi^2_{\alpha}}{2P_1} = \frac{.711}{.02} = 35.55 \text{ and } \frac{\chi^2_{1-\beta}}{2P_2} = \frac{7.78}{.20} = 38.90$$

$$35.55 < n < 38.90$$

$n = 1/2\,(35.55 + 38.90)$

$n = 37.23$

$n = 37$

and

$$2(a+1) = df$$
$$2a+2 = 4$$
$$2a = 2$$
$$a = 1$$
$$n = 37, a = 1$$

This sample size and acceptance number should satisfy the constraints, i.e., accept P_1 with probability of .95 (1-α) and accept P_2 with probability of .10 (β)

From the binomial tables [L_P = probability of acceptance]:

$$n = 37, a = 1 \quad \begin{array}{cccc} \underline{P_1} & \underline{L_P} & \underline{P_2} & \underline{L_P} \\ .01 & .947 & .10 & .104 \end{array}$$

indicating $n = 37$, $a = 1$ approximates the probability levels specified.

Consistent with the determinations made using the above procedure, and to facilitate the actual process of pulling records, the sample plan selected for evaluating the quality of the data collection operation consists of 40 abstracts per hospital per year and has the following characteristics:

Abstract sample selection	Nonmedical item selection (10 items per abstract)	Medical item selection (2 items per abstract)
$n = 40, \quad a = 1$	$n = 400, \quad a = 7$	$n = 80, \quad a = 7$
$P_1 = .01, L_P = .939$	$P_1 = .01, L_P = .950$	$P_1 = .05, L_P = .953$
$P_2 = .09, L_P = .114$	$P_2 = .03, L_P = .086$	$P_2 = .14, L_P = .112$

where L_P at P_1 approximates 1-α and L_P at P_2 approximates β.

The average number of abstracts submitted by each hospital per month is 44, so a sample consisting of 40 abstracts represents slightly less than 1 month's data.

APPENDIX II

COMPUTATION OF COST FACTOR, T

Let C = the cost of production coding of a work lot (100 percent)

$.10C$ = the cost of coding a 10 percent sample of the work lot

P = incoming error rate (proportion defective)

L_P = probability of accepting a work lot having error rate of P

$1\text{-}L_P$ = probability of rejecting a work lot having error rate of P. If 100 percent recoding of rejected lots removed all errors, the cost factor, T, would be computed as follows:

$$T = C + 2(.10C) + [(1\text{-}L_P)C] =$$
$$C[1.20 + (1\text{-}L_P)]$$

The values of T found in table M are computed from the formula

$T = C\left(1.20 + \frac{1\text{-}L_P}{L_P}\right)$, where the assumption is made that the error rate of rejected lots after 100 percent recoding is unchanged. In fact, the error rate is expected to decrease by at least 50 percent but computation of T using that criteria would be quite involved. The formula being used provides a good estimate of the cost for initial error rates up to the 5-6 percent level and overestimates the cost for initial error rates above that level.

Since the two independent codings are performed one time only:

$$E(T) = 1.20\,C(L_P) + 2.20\,C(1\text{-}L_P)L_P +$$
$$3.20\,C(1\text{-}L_P)^2L_P + 4.20\,C(1\text{-}L_P)^3L_P +$$
$$\text{---} +$$
$$= L_P\,[1.20C + 2.20\,C(1\text{-}L_P) +$$
$$3.20\,C(1\text{-}L_P)^2 + 4.20\,C(1\text{-}L_P)^3 +$$
$$\text{---} +]$$
$$= CL_P\,[1.20 + 2.20(1\text{-}L_P) + 3.20(1\text{-}L_P)^2 +$$
$$4.20(1\text{-}L_P)^3 + \text{---} +]$$

Let

$$a = 1.20 \text{ and } F_P = 1\text{-}L_P$$

Then

$$E(T) = CL_P\,[a + (a+1)F_P +$$
$$(a+2)F_P^2 + (a+3)F_P^3 + \text{---} +]$$
$$= CL_P\,[a[1 + F_P + F_P^2 + F_P^3 + \text{---} +] +$$
$$F_P[1 + 2F_P + 3F_P^2 + \text{---} +]]$$

The expression in the first bracket is of the form $1 + X + X^2 + \text{---} +$
This geometric series is equal to $\frac{1}{1\text{-}X}$ when $X < 1$

It can also be shown that the expression in the second bracket is a geometric series equal to $\frac{1}{1\text{-}X}\left(\frac{1}{1\text{-}X}\right)$

So $E(T) = CL_P\,\{a\,[1/1\text{-}F_P] + F_P\,[1/1\text{-}F_P]^2\}$

$$= CL_P\left\{\frac{1.20}{1\text{-}F_P} + \frac{F_P}{(1\text{-}F_P)^2}\right\}$$
$$= CL_P\left\{\frac{1.20}{1\text{-}(1\text{-}L_P)} + \frac{1 - L_P}{[1\text{-}(1\text{-}L_P)]^2}\right\}$$
$$= CL_P\left\{\frac{1.20}{L_P} + \frac{1\text{-}L_P}{L_P^{\,2}}\right\}$$
$$= \frac{CL_P}{L_P}\left[1.20 + \frac{1\text{-}L_P}{L_P}\right]$$
$$E(T) = C\left[1.20 + \frac{1\text{-}L_P}{L_P}\right]$$

APPENDIX III

CALCULATION OF DIFFERENCE (ERROR) RATES

The "error rates" are actually difference rates, but it is reasonable to assume that the two phenomena are highly correlated, and hereafter, the difference rates will be referred to as "error rates."

The two verifiers' work on the 10 percent sample of abstracts and the corresponding abstracts from the production coders' work are matched on a computer. As mentioned earlier, a maximum of five diagnoses and three operations can be coded from each abstract. The following error designation rules apply to the first listed diagnostic and operative codes and all nonmedical codes:

Rule 1. If all three coders agree on the code, then none of the coders is assigned an error.

Rule 2. If any two of the three coders have the same code and the other coder has a different code, then the coder in disagreement is assigned an error.

Rule 3. If all three of the coders have different codes, then each of the coders is assigned an error. In some systems, a three-way disagreement is eliminated from the sample. When three-way differences are rare, neither method substantially effects the results.

Then, the error rate on nonmedical codes for the j^{th} coder is estimated by dividing the total number of nonmedical coding errors assigned to coder j by the total number of nonmedical codes. Likewise, the error rate on first listed diagnostic and operative codes for the j^{th} coder is estimated by dividing the total number of first listed diagnostic and operative coding errors assigned to coder j by the total number of first listed diagnostic and operative codes.

In computing the all listed diagnostic and all listed operative coding error rates, a preferred set has to be generated. For this, let N_{i1}, N_{i2} and N_{i3} be the number of codes on the i^{th} abstract in the sample from a batch as listed by the first verifier, second verifier and production coder, respectively. N_{im} is the median of the three numbers N_{i1}, N_{i2} and N_{i3}. Then the preferred set of codes is generated in two steps:

Step 1. A set of codes is formed by including all those codes that are listed by two or more of the coders. This set is called the agreement set and N_{ia} is the number of codes in this set. In forming this set, the actual order of the codes is not considered.

Step 2. If $N_{ia} \geq N_{im}$, then the agreement set is the preferred set and the preferred set, say N_{ip}, is equal to N_{ia}. If $N_{ia} < N_{im}$, then it is necessary to add $(N_{im} - N_{ia})$ "dummy" codes to the agreement set to form the preferred set. In this case $N_{ip} = N_{im}$.

For example, suppose the coders listed the following diagnostic codes for the i^{th} abstract in the sample:

First Verifier	*Second Verifier*	*Production Coder*
5000	5010	5000
4950	4950	4951
8432	8410	8400
7421		

In this case $N_{i1} = 4$, $N_{i2} = 3$ and $N_{i3} = 3$ and $N_{im} = 3$. The agreement set is (5000 and 4950) and $N_{ia} = 2$. Since $N_{im} > N_{ia}$ and $N_{im} - N_{ia} = 1$,it follows that one "dummy" code must be added to the agreement set to form the preferred set. The preferred set is (5000, 4950 and 9999), where 9999 is the "dummy" code. Also, $N_{ip} = 3$.

Errors are assigned to the coders by the following two rules:

Rule 1. If $N_{ij} > N_{ip}$, then coder j is given an error for every code he listed that is not in the preferred set.

Rule 2. In $N_{ij} \leq N_{ip}$, then coder j is given an error for every code in the preferred set, including the dummy codes, that he failed to list.

Applying Rule 1 to the example above, the first verifier is given two errors because 8432 and 7421 are not in the preferred set. Using Rule 2, the second verifier is given two errors for failing to list 5000 and the "dummy" code 9999. Also, using Rule 2, the production coder is given two errors for failing to list 4950 and 9999. It should also be noted that the second verifier is given a first listed coding error for listing 5010 instead of 5000.

Then, the all listed diagnostic and operative coding error rate for coder j is estimated by dividing the total number of errors assigned to coder j for diagnostic and operative codes by the total number of diagnostic and operative codes in the preferred sets for all abstracts in the sample.

APPENDIX IV

FORMS USED IN SURVEY

HSM-88-5
(3-71)

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
HEALTH SERVICES AND MENTAL HEALTH ADMINISTRATION
NATIONAL CENTER FOR HEALTH STATISTICS

FORM APPROVED:
O.M.B. NO. 68-R0620

SAMPLE LISTING SHEET
Hospital Discharge Survey

A. HOSPITAL	B. STATISTICAL DATA	C. SAMPLING
NAME	TOTAL BEDS (excluding bassinets)	MONTH
	TOTAL ADMISSIONS (excluding newborn)	KEY
NUMBER	LIVE BIRTHS	NUMBER IN SAMPLE
LIST USED	TOTAL DISCHARGES (including newborn)	SAMPLE SELECTED BY DATE

HDS NUMBER	DATE OF DISCHARGE OR (ADMISSION)	MEDICAL RECORD NUMBER	OTHER IDENTIFICATION *(if needed)*	DATE ABSTRACTED OR (OUT-OF-SCOPE REASON)
1	2	3	4	5

Page _____ of _____

GPO 937-616

Exhibit I. Sample Listing Sheet

HSM-88-1
9/70

Form Approved
O.M.B. No. 68-R0620

CONFIDENTIAL - All information which would permit identification of an individual or of an establishment will be held confidential, will be used only by persons engaged in and for the purposes of the survey and will not be disclosed or released to other persons or used for any other purpose.

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Health Services and Mental Health Administration
National Center for Health Statistics

MEDICAL ABSTRACT — HOSPITAL DISCHARGE SURVEY

I. Patient Identification

1. Hospital number..... _____
2. HDS number..... _____
3. Medical record number..... _____
4. Date of admission _____ (Month) _____ (Day) _____ (Year)
5. Date of discharge _____ (Month) _____ (Day) _____ (Year)

II. Patient Characteristics

1. Date of birth: _____ (Month) _____ (Day) _____ (Year)
2. Age (complete ONLY if date of birth not given): _____ (Units) { 1 ☐ years, 2 ☐ months, 3 ☐ days }
3. Sex: 1 ☐ Male 2 ☐ Female
4. Race or color: 1 ☐ White 2 ☐ Negro 3 ☐ Other nonwhite 4 ☐ "Nonwhite" 5 ☐ Not stated
5. Marital status: 1 ☐ Married 2 ☐ Single 3 ☐ Widowed 4 ☐ Divorced 5 ☐ Separated 6 ☐ Not stated
6. Discharge status: 1 ☐ Alive 2 ☐ Dead

III. Diagnoses and Operations

1. Final diagnoses: _____
   ☐ see reverse side
2. Operations: _____
   ☐ see reverse side

Completed by _____ Date _____

FOR NCHS USE ONLY

Diagnoses _____ _____ _____ _____ _____

Operations _____ _____ _____

Exhibit 2. Medical Abstract

APPENDIX V

FORMS USED IN CONTROL OF DATA COLLECTION

ABSTRACT SUBSAMPLE LISTING

Page____ of____

Hospital No. _____ Survey Data Period _____

Total Abstracts Received
for Survey Data Period _____ Random Start(s) _____ Subsampling Interval _____

Total Subsample Abstracts _____

	HDS No.	Medical Record No.	Batch No.
5			
10			
15			
20			
25			
30			

Sample Selection Month(s)

_____

_____

_____

_____

Exhibit 1. Abstract Subsample Listing

Form Approved: O.M.B. No. 68-R1335

FORM HDS-17 (1-15-73)

U.S. DEPARTMENT OF COMMERCE
SOCIAL AND ECONOMIC STATISTICS ADMINISTRATION
BUREAU OF THE CENSUS

RECONCILIATION FORM

HDS QUALITY CONTROL

a. Data Collection Center | Date prepared

b. Hospital name and number

c. Original abstractor

d. Field supervisor

Section I – SAMPLE LISTING SHEET | **Survey month**

Medical record numbers not listed on both sheets (1)	Number in column (1) listed by: A – Abstractor FS – Field Supervisor (2)	Charge error to: A – *Abstractor* FS – *Field Supervisor* *(Specify reason)* (3)	Should be included in sample: Y – Yes N – No (4)

e. TOTAL NUMBER SAMPLING ERRORS BY ABSTRACTOR ⟶

f. Additional information and comments

Copy distribution: WHITE, YELLOW and PINK – Chief, Field Division GOLDENROD – DCC File copy USCOMM-DC

Exhibit 2. Reconciliation Form, Section I — Sample Listing Sheet for QC Visit

Form approved: O.M.B. No. 68-R1335 Sheet _____ of _____

FORM HDS-17 (Continued) (1-15-73)

RECONCILIATION FORM CONTINUED
HDS QUALITY CONTROL

U.S. DEPARTMENT OF COMMERCE
SOCIAL AND ECONOMIC STATISTICS ADMIN.
BUREAU OF THE CENSUS

a. Hospital number

b. Survey data period

Section II – MEDICAL ABSTRACT

Medical record number (1)	Item number (2)	Abstractor's entry (3)	Field supervisor's entry (4)	Correct entry: A – Abstractor FS – Field supervisor Neither – Explain in item d (5)	Charge error to: A – Abstractor FS – Fld. supv. (6)

c. TOTAL NUMBER ABSTRACTING ERRORS BY ABSTRACTOR ——→

d. Additional information and comments

Copy distribution: WHITE, YELLOW and PINK – Chief, Field Division GOLDENROD – DCC File copy

USCOMM-DC

Exhibit 3. Reconciliation Form, Section II-Medical Abstract for QC Visit

Form Approved: O.M.B. No 68-R1335

FORM HDS-18 (1-15-73) — U.S. DEPARTMENT OF COMMERCE, SOCIAL AND ECONOMIC STATISTICS ADMIN., BUREAU OF THE CENSUS

a. Data Collection Center | Date prepared

b. Hospital name and number

c. Original Abstractor

d. Field Supervisor

ERROR REPORT

HDS Quality Control

Section I – SAMPLE LISTING SHEET

Survey month

	Number
1. Total number of records that should be in sample (excluding Q's)	
2. Number of records omitted	
3. Number of records incorrectly included in sample	
4. Number of records in error (line 2 plus line 3)	

Section II – MEDICAL ABSTRACT

Survey data period

	Number
1. Number of records abstracted (original sample)	
2. Number of abstracts containing no errors	
3. Number of abstracts containing one or more errors	

Part A – PATIENT IDENTIFICATION AND CHARACTERISTICS

Item number (a)	Number of omissions (b)	Number of incorrect entries (c)	Total errors (d)
I-1			
I-2			
I-3			
I-4			
I-5			
II-1			
II-2			
II-3			
II-4			
II-5			
II-6			
Total (I-1 thru II-6)			

Part B – DIAGNOSES AND OPERATIONS

Item number (a)	Total entries (b)	Number of omissions (c)	Number of incorrect entries (d)	Total errors (e)
III-1				
III-2				
Total (III-1 and 2)				

Additional information and comments:

Copy distribution: WHITE, YELLOW and PINK – Chief, Field Division GOLDENROD – File copy

Exhibit 4. Error Report for QC Visit

CHECKLIST FOR QC VISIT

DCC _____

Hospital Number _____

Hospital Name _____

Date of Visit _____

Name of Field Supervisor _____

CHECKLIST		
	Check made	Comments
1. Verify the completeness of the discharge (admission) list being used for sampling.		
2. Independently sample the discharge (admission) list for the most recent data month sampled for QC.		
3. Complete a medical abstract for each sample case selected by the DPB in North Carolina.		
4. Compare the Sample Listing Sheets and Sample Medical Abstracts with the facsimiles of the original abstractor's work.		
5. Record the differences on the Reconciliation Sheet.		
6. Report the errors on the Error Report.		
7. Review all errors with the abstractor using the Hospital Manual for reference.		
8. Send to DCC, Attention: HDS, no later than four days after visit to hospital: a. Facsimiles b. Field Supervisor's abstracts c. Sample Listing Sheets d. Error Report e. Reconciliation Form f. Checklist and Report summarizing the results of your visit.		

Exhibit 5. Checklist for QC Visit

REPORT ON HOSPITAL VISIT

Hospital Number _____

Hospital Name _____

Date of Visit _____

1. Date initial letter was sent.	
2. Date of telephone call for appointment.	
3. Date of Visit.	
4. Date of rescheduled appointment.	
5. Difficulties encountered at hospital.	
6. Suggested rate of payment (if administration raises this question).	

7. Additional information, comments and suggestions:

Comments on back ☐

Exhibit 6. Report on Hospital Visit

APPENDIX VI

FORMS USED IN EDITING COMPLETED WORK

FORM HDS-16A (2-11-72)

HDS RECEIPT AND CONTROL
MEDICAL ABSTRACTS

U.S. DEPARTMENT OF COMMERCE
SOCIAL AND ECON. STAT. ADMIN.
BUREAU OF THE CENSUS

Data year 19 ____

1. Hospital name and address	2. Hospital No.	3. Panel	4. Terminal digits
		5. Bed size	6. Sample list used
		7. Procedure	8. Census representative

Data month	Date rec'd (a)	Completed by		Number in-scope (d)	Number received			Number missing (h)	Trans. to NCHS		Failed edit		
		Hosp. (b)	Census (c)		Current (e)	Back (f)	TOTAL (g)		Number (i)	Date (j)	No. (k)	Date (l)	Ret'd to R.O. (m)
Jan.													
Feb.													
Mar.													
April													
May													
June													
July													
Aug.													
Sept.													
Oct.													
Nov.													
Dec.													

Exhibit 1. DCC's Receipt and Control

FORM HDS-7 (1-17-72) U.S. DEPARTMENT OF COMMERCE SOCIAL AND ECONOMIC STATISTICS ADMIN. BUREAU OF THE CENSUS

ERROR REPORT
HOSPITAL DISCHARGE SURVEY

1. Data Collection Center

2. Date

3. Hospital name and number

4. Census representative

5. Edited by:

6. Medical Abstract — Number edited

Item No. (a)	Omissions (b)	Total (c)	Incorrect or inadequate entries (d)	Total (e)
I–1				
2				
3				
4				
5				
II–1				
2				
3				
4				
5				
6				
III–1				
2				
Name				
Date				
TOTALS →				

7 Ledger Abstract — Number edited

Item No. (a)	Omissions (b)	Total (c)	Incorrect or inadequate entries (d)	Total (e)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
Name				
Date				
TOTALS →				

8. Survey month(s)

9. HDS numbers
First
Last

Remarks

WHITE – Census Representative YELLOW – Data Collection Center PINK – Chief, Field Division USCOMM-DC

Exhibit 2. DCC's Error Report

FORM HDS-9A
(2-11-72)

U.S. DEPARTMENT OF COMMERCE
SOCIAL AND ECONOMIC STATISTICS ADMINISTRATION
BUREAU OF THE CENSUS
ACTING AS COLLECTING AGENT FOR THE
U.S. PUBLIC HEALTH SERVICE

ASSIGNMENT AND TRANSMITTAL FOLDER

MEDICAL ABSTRACTS

HOSPITAL DISCHARGE SURVEY

USCOMM-DC

Exhibit 3. DCC's Assignment and Transmittal Folder (4 pages)

1. Hospital name		2. Record of shuttle 19_____							
		Transmitted		Visit in					
Hospital number	Telephone number	From	To	JAN	MAR	MAY	JULY	SEPT	NOV
Address (*City, State, ZIP code*)		Regional Office	Census Representative						
		Census Representative	Regional Office						

3. HOSPITAL PERSONNEL – *(Ask for each person listed).* **Is *(name)* still *(title)*?**

Make appointment with (a)	Full name (b)	Title (c)	(d) Make corrections in columns b and c or give details below in item 7 for each "No."											
			JAN		MAR		MAY		JULY		SEPT		NOV	
			Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
4. Is this still a *(ownership)*_____ hospital?														
5. Is the bed size still_____?														

6. APPOINTMENTS

Appointment date (a)	Complete by the 30th of – (b)	Sample for (c)	HDS numbers assigned sample		Abstract for (f)	Number abstracts transmitted (g)			Number missing (h)	By *(abstractor)* (i)
			First (d)	Last (e)		1 Current	2 Back	3 Total		
	JAN	NOV and DEC			SEPT and OCT					
	MAR	JAN and FEB			NOV and DEC					
	MAY	MAR and APR			JAN and FEB					
	JULY	MAY and JUNE			MAR and APR					
	SEPT	JULY and AUG			MAY and JUNE					
	NOV	SEPT and OCT			JULY and AUG					

7. CHANGES, PROBLEMS, QUESTIONS		8. INSTRUCTIONS, ANSWERS	
Date	Comments	Date	Comments

FORM HDS-9A (2-11-72)

9. RECORDS NOT AVAILABLE

HDS No. (a)	Dis-charge date (b)	Medical record No. or name (c)	Other identification (if needed) (d)	Date abstracted (e)	HDS No. (a)	Dis-charge date (b)	Medical record No. or name (c)	Other identification (if needed) (d)	Date abstracted (e)

☐ See reverse side →

Hospital number

Hospital name and address

Census representative

9. RECORDS NOT AVAILABLE – Continued									
HDS No. (a)	Dis-charge date (b)	Medical record No. or name (c)	Other identification (if needed) (d)	Date abstracted (e)	HDS No. (a)	Dis-charge date (b)	Medical record No. or name (c)	Other identification (if needed) (d)	Date abstracted (e)

HSM-88-3
(9-2-70)

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
HEALTH SERVICES AND MENTAL HEALTH ADMINISTRATION
NATIONAL CENTER FOR HEALTH STATISTICS

FORM APPROVED:
O.M.B. NO. 68-R0620

TRANSMITTAL NOTICE

Hospital Discharge Survey

HOSPITAL NAME AND ADDRESS	DATE OF TRANSMITTAL
	HOSPITAL NO.

Type of abstracts transmitted: Medical ☐ or Ledger ☐

This shipment includes:

Abstracts for _____ (Month) 19____ . . . . . (Number) _____

Back records . . . . . (Number) _____

Total . . . . . (Number) _____

BACK RECORDS SUBMITTED				RECORDS NOT AVAILABLE			
HDS NO.	MEDICAL RECORD NUMBER	HDS NO.	MEDICAL RECORD NUMBER	HDS NO.	MEDICAL RECORD NUMBER	HDS NO.	MEDICAL RECORD NUMBER

CHANGES: *Check all items below and indicate any changes from previous reporting period.*

YES NO

☐ ☐ NEW ADMINISTRATOR
FULL NAME: _____
TITLE: _____

☐ ☐ NEW MEDICAL RECORD LIBRARIAN:
FULL NAME: _____
TITLE: _____

☐ ☐ NEW CONTROLLER
FULL NAME: _____
TITLE: _____

☐ ☐ CHANGE IN OWNERSHIP OR CONTROL: FROM TO

REMARKS *(including a list of supplies and/or forms, if needed):*

_____
Signature and title of transmitter

WHITE, CANARY – NCHS Processing PINK – Regional office files

Exhibit 4. Transmittal Notice

FORM HDS-15
(7-11-79)

U.S. DEPARTMENT OF COMMERCE
SOCIAL AND ECONOMIC STATISTICS ADMIN.
BUREAU OF THE CENSUS

HDS MONTHLY PROGRESS REPORT

Data Collection Center		Month
Number	Name	

Hospital (a)			Medical abstracts					COMMENTS
			Procedure (b)	Last date month received (c)	Date received (d)	Number missing for data year (e)		For each delinquent hospital, cite steps taken to make hospital current. For each refusal hospital, cite steps taken to reinstate the hospital. *(Use two or more lines per hospital if necessary)* (f)
Number	Name	Panel				19___	19___	

USCOMM-DC

Sheet _____ of _____

Exhibit 5. DCC's Monthly Progress Report

Determination of Delinquent Hospitals

Reporting Month (1)	Data Month Required (2)
January	August
February	September
March	October
April	November
May	December
June	January
July	February
August	March
September	April
October	May
November	June
December	July

A hospital is delinquent if the last data month received precedes the data month listed in Column (2) for the respective reporting month in Column (1).

Exhibit 6. Determination of Delinquent Hospitals

8/17/72

TECHNICAL SERVICES & OPERATIONS SECTION
HOSPITAL DISCHARGE SURVEY
Receipt Log

Date Received	Hospital Number	Control Month(s)	No. Medical Records Rec'd	Pro-cessed (✓)	Date Reported

Exhibit 7. NCHS Receipt Log

DDP — DATA PREPARATION BRANCH
Hospital Discharge Survey
Receipt and Control Log
Medical

Hospital No. _____ Panel No. _____ List Used _____ DCC _____

Name _____ Terminal Digits _____

Data Month	Ending HDS No.	Date Rec'd	Number		Date		Ship. Incl.		Notes
			In Sample Records	Received	Accepted	Referred (to)	B.R. No.	Suppl. No.	
Jan.									
Feb.									
March									
April									
May									
June									
July									
August									
Sept.									
Oct.									
Nov.									
Dec.									
B.R.									
B.R.									

Exhibit 8. NCHS Receipt and Control Log

UNITED STATES GOVERNMENT

Memorandum

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
HEALTH RESOURCES ADMINISTRATION
NATIONAL CENTER FOR HEALTH STATISTICS

TO : **Chief, Health Statistics Branch, DSD**
Bureau of the Census

DATE:

FROM : **Chief, Data Prepartation Branch**

SUBJECT: **Hospital Discharge Survey**

RE: Hospital _____

WE have received your _____ **shipment of abstracts for the Hospital Discharge Survey. Please note the item(s) checked below:**

1. An error in HDS numbering was found. Please start your _____ **records with HDS number** _____.

2. The attached abstracts with the HDS numbers listed below have missing data. Please complete and return these abstracts at your earliest convenience.

HDS No.	Medical Record No.	HDS No.	Medical Record No.

3. The following abstracts were not received and were not listed as "not available." Please complete abstracts for these HDS numbers and enclose them with your next shipment of abstracts.

HDS No.	Medical Record No.	HDS No.	Medical Record No.

We appreciate your assistance in this matter. Thank you for your continuing cooperation in the Hospital Discnarge Survey.

Donald E. Boesch

HELP ELIMINATE WASTE HEW COST REDUCTION PROGRAM

Exhibit 9. First NCHS Letter to Bureau of the Census

UNITED STATES GOVERNMENT

Memorandum

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
HEALTH RESOURCES ADMINISTRATION
NATIONAL CENTER FOR HEALTH STATISTICS

TO : **Chief, Health Statistics Branch, DSD**
Bureau of the Census

DATE:

FROM : **Chief, Data Preparation Branch**

SUBJECT: **Hospital Discharge Survey**

RE: Hospital _____

Item B was not completed for the control month(s) listed below:

		Month	
☐	**Total Beds**	_____	_____
		_____	_____
		_____	_____
☐	**Total Discharges (Including Newborns)**	_____	_____
		_____	_____
		_____	_____
☐	**Total Admissions (Excluding Newborns)**	_____	_____
		_____	_____
		_____	_____
☐	**Live Births**	_____	_____
		_____	_____
		_____	_____

Please fill in the information in the space(s) provided above and return to us as soon as possible.

Donald E. Boesch

HELP ELIMINATE WASTE HEW COST REDUCTION PROGRAM

HSM 88-12

Exhibit 10. Second NCHS Letter to Bureau of the Census

T S & O SECTION
HOSPITAL DISCHARGE SURVEY
BATCH CONTROL RECORD

Data Year _____ Batch No. _____
Medical ☐ List Used 1 ☐ Admission
Ledger ☐ 2 ☐ Discharge

HOSPITAL NUMBER	CONTROL MONTH	RECORD COUNT	HOSPITAL NUMBER	CONTROL MONTH	RECORD COUNT	HOSPITAL NUMBER	CONTROL MONTH	RECORD COUNT

Total Records in Batch _____

Exhibit 11. NCHS Batch Control Record

☆ U. S. GOVERNMENT PRINTING OFFICE : 1976 210-981/27

VITAL AND HEALTH STATISTICS PUBLICATION SERIES

Formerly Public Health Service Publication No. 1000

Series 1. Programs and collection procedures.—Reports which describe the general programs of the National Center for Health Statistics and its offices and divisions, data collection methods used, definitions, and other material necessary for understanding the data.

Series 2. Data evaluation and methods research.—Studies of new statistical methodology including: experimental tests of new survey methods, studies of vital statistics collection methods, new analytical techniques, objective evaluations of reliability of collected data, contributions to statistical theory.

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Series 2-Number 68

NCHS

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
Public Health Service
Health Resources Administration
5600 Fishers Lane
Rockville, Md. 20852