

Population and Sampling Specifications

Introduction

Population

Defining the population is the first step to estimate a hospital's performance. A population is generally defined as a collection of patients sharing a common set of universally measured characteristics, such as an ICD-10 principal diagnosis or procedure code. The Initial Patient Population and diagnosis codes meet this description for the national quality measures. For the purpose of measuring national quality measures, the term "Initial Patient Population" is defined below:

An "Initial Patient Population" refers to all patients (Medicare and non-Medicare) who share a common set of specified, administratively derived data elements, with a length of stay less than or equal to 120 days (*Admission Date* minus *Discharge Date* less than or equal to 120 days). This may include ICD-10-CM diagnosis codes or other population characteristics such as age. For example, the population for the **Sepsis** measure includes all patients with an *ICD-10-CM Principal or Other Diagnosis Code* as defined in Appendix A, Table 4.01 and a Patient Age (*Admission Date* minus *Birthdate*) greater than or equal to 18 years.

Cases identified as being in the Initial Patient Population for the measure set, strata, or sub-population are eligible to be sampled. For the definition of the Initial Patient Population(s) for each measure set, refer to the appropriate Initial Patient Population discussion in the Measure Information section of this manual.

Sampling

Sampling is a process of selecting a representative part of a population in order to estimate the hospital's performance, without collecting data for its entire population. Using a statistically valid sample, a hospital can measure its performance in an effective and efficient manner. Sampling is a particularly useful technique for performance measures that require primary data collection from a source such as the medical record. Sampling should not be used unless the hospital has a large number of cases in the Initial Patient Population because a fairly large number of sample cases are needed to achieve a representative sample of the population. For the purpose of sampling national quality measures, the terms "sample" and "case" are defined as below:

- The "sample" is the fraction of the population that is selected for further study.
- A "case" refers to a single record (or an episode of care [EOC]) within the population. For example, during the first quarter a hospital may have 100 patients who had a principal diagnosis associated to the STK-4 measure. The hospital's Initial Patient Population would include 100 cases or 100 patient records for this measure during the first quarter.

To obtain statistically valid sample data, the sample size should be carefully determined and the sample cases should be randomly selected in such a way that the individual cases in the population have an equal chance of being selected. Only when the sample data truly represent the whole population can the sample-based performance measure data be meaningful and useful.

Each hospital is ultimately responsible that sampling techniques applied for their hospital adhere to the sampling requirements outlined in this manual. ORYX[®] Vendors are responsible for ensuring that the sampling techniques are applied consistently across their client hospitals.

Sampling is done by national quality inpatient measure set, except for the following measure sets. Both Venous Thromboembolism (VTE) and Stroke (STK) are sampled by sub-populations. Sampling for the Global (GLB) measure sets, which includes Emergency Department (ED), Immunization (IMM), Substance Use (SUB), and Tobacco Treatment (TOB) is done once for all the cases that fall into the Global and not for each individual measure set. For The Joint Commission, hospitals must submit the same case for all applicable measure sets (i.e., ED, IMM, SUB and TOB) under the Global Initial Patient Population.

Example:

Joint Commission Data Warehouse: If a hospital has elected to submit ED, TOB and IMM to The Joint Commission, for every ED case, the hospital is encouraged to submit the same case also as a TOB case and an IMM case. The same holds true regardless of the combination of measure sets (ED, IMM, SUB, TOB) the hospital has elected to submit to The Joint Commission.

For CMS, if the hospital is submitting both ED and IMM as chart abstracted measures, the hospital is encouraged to submit the same case to the CMS Clinical Warehouse for both measure sets. For measures requiring medical record abstraction, sampling must be done using available databases that contain all discharges for the transmission quarter.

Note:

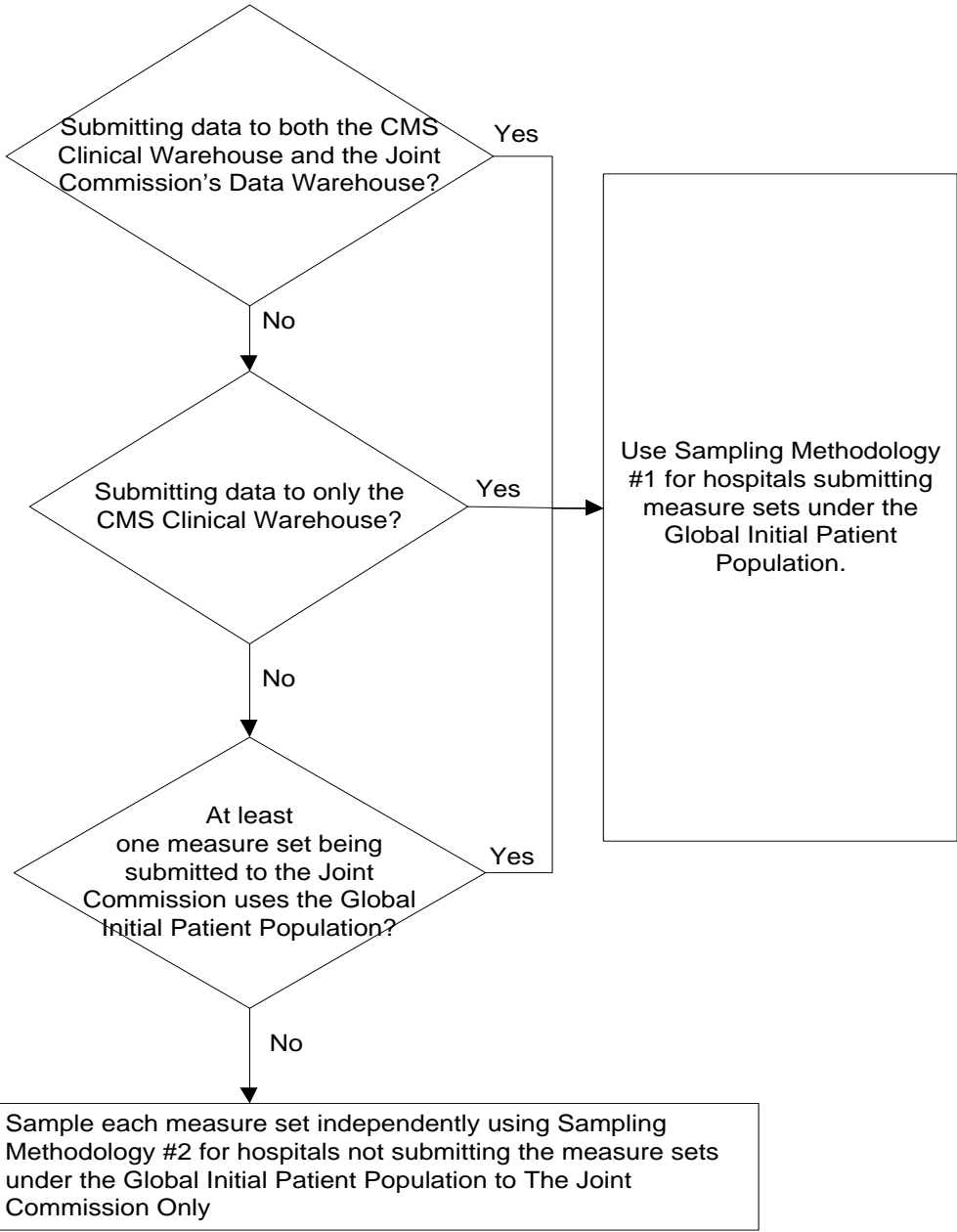
Hospitals are NOT required to sample their data. If sampling offers minimal benefit (i.e., a hospital has 80 cases for the quarter and must select a sample of 76 cases) the hospital may choose to use all cases.

Order of Data Flow

The required sampling methodology is dependent upon the measure sets being submitted to the CMS Clinical Warehouse and/or Joint Commission's Data Warehouse.

- If the hospital is submitting data to both the CMS Clinical Warehouse and the Joint Commission's Data Warehouse, use sampling methodology number one.
- If the hospital is submitting to only the CMS Clinical Warehouse use sampling methodology number one.
- If the hospital is submitting at least one measure set to the Joint Commission that uses the Global Initial Patient Population, use sampling methodology number one.

- If the hospital is submitting data to only The Joint Commission:
 - If the hospital is submitting at least one measure set that uses the Global Initial Patient Population, use sampling methodology number one.
 - If the hospital is not submitting any of the measure sets that use the Global Initial Patient Population, sample each measure set independently using sampling methodology number two.



1. Hospitals Submitting Measure Sets Under the Global Initial Patient Population to Both the CMS Clinical Warehouse and The Joint Commission's Data Warehouse

For the submission of the Global Initial Patient Population and associated measure sets (i.e., ED, IMM, TOB, and/or SUB) the following data flow or process steps should be used to identify the data for all measure sets or stratum that are transmitted to the CMS Clinical Warehouse and Joint Commission's Data Warehouse. These process steps are:

Identify Global Cases To Be Abstracted (ED, IMM, SUB, TOB)

- Identify the Global Initial Patient Population. The Global Initial Patient Population is used for the ED, IMM, TOB, and SUB measure sets. This data pull utilizes administrative data such as admission date and discharge date. This identification process must be completed prior to the application of data integrity filter, measure exclusions, and the application of sampling methodology. For specific Global Initial Patient Population definitions, refer to the Global Initial Patient Population discussion in the Measure Information section of this manual. This data pull is completed once for each hospital. This is not performed for each measure set that utilizes the Global population.
 - If the hospital is sampling, use the Global Initial Patient Population identified above and pull the sample of medical records for the ED, IMM, TOB, and/or SUB measure sets using the Sample Size Requirements defined in the Global Initial Patient Population Information section of this manual. Note: This is completed once for each hospital. This is not performed for each measure set that utilizes the Global population.
- Collect or abstract from the identified medical records the general and measure specific data elements that are needed for the measure set. Run the data through the algorithms for the measure sets under the Global Initial Patient Population (ED, IMM, SUB and/or TOB). The count of the number of cases used in this step is collected in the Global Initial Patient Population and Sample Size data elements.
- If the hospital is only submitting the measure sets under the Global Initial Patient Population (i.e., ED, IMM, SUB or TOB), the process is complete.

Identify Cases To Be Abstracted For The Remaining Measure Sets, Strata, and Sub-populations (SEP, STK, VTE)

- Identify the Initial Patient Population for the other measure sets (SEP), strata or sub-populations (VTE and STK). This data pull utilizes administrative data such as ICD-10 diagnosis and procedure codes, admission date, and birthdate. All ICD-10 diagnosis and procedure codes included in the Initial Patient Population definition must be applied. This identification process must be completed prior to the application of data integrity filter, measure exclusions, and the application of sampling methodology. For specific measure set definitions, refer to the Initial Patient Population discussion in the Measure Information section of this manual. The number of cases in the Initial

Patient Population of each measure set, strata, and sub-population are collected in the appropriate Initial Patient Population Size data elements.

- If the hospital is not sampling, collect or abstract from the identified medical records the general and measure specific data elements that are needed for the measure set(s), strata or sub-populations. The count of the number of cases used in this step is collected in the Sample Size data elements.
- If the hospital is sampling, use the Initial Patient Population (N) identified above and pull the sample of medical records for the measure set, strata or sub-population using the “Sample Size Requirements” in the appropriate sampling discussion in the Measure Information section of this manual.
- Using the Global Initial Patient Population identified above, identify and count the number of cases that are also in the other Measure Sets (e.g., SEP), strata or sub-populations (e.g., VTE and STK) Initial Patient Population(s). Determine the number of cases that need to be sampled (n) from the cases in the other measure set(s) or stratum(s) Initial Patient Population (N). Use the “Sample Size Requirements” in the appropriate sampling discussion in the Measure Information section of this manual.
 - If there are enough Initial Patient Population cases in the Global sample pull to meet the specific initial patient population and sampling requirements for the measure set(s), strata, or sub-populations, then no additional sampling is required. Collect or abstract from the identified medical records the general and measure specific data elements that are needed for the measure set(s), strata, or sub-populations. The count of the number of cases used in this step is collected in the Sample Size data elements.
 - If there are not enough Initial Patient Population cases in the Global sample pull to meet the specific initial patient population and sampling requirements for the measure set(s), strata or sub-populations, complete the sample by pulling additional cases from the other measure set(s), strata or sub-populations Initial Patient Population(s). Use the “Sample Size Requirements” in the appropriate Sampling discussion in the Measure Information section of this manual. Collect or abstract from the identified medical records the general and measure specific data elements that are needed for the measure set(s). The count of the number of cases used in this step is collected in the Sample Size data elements.

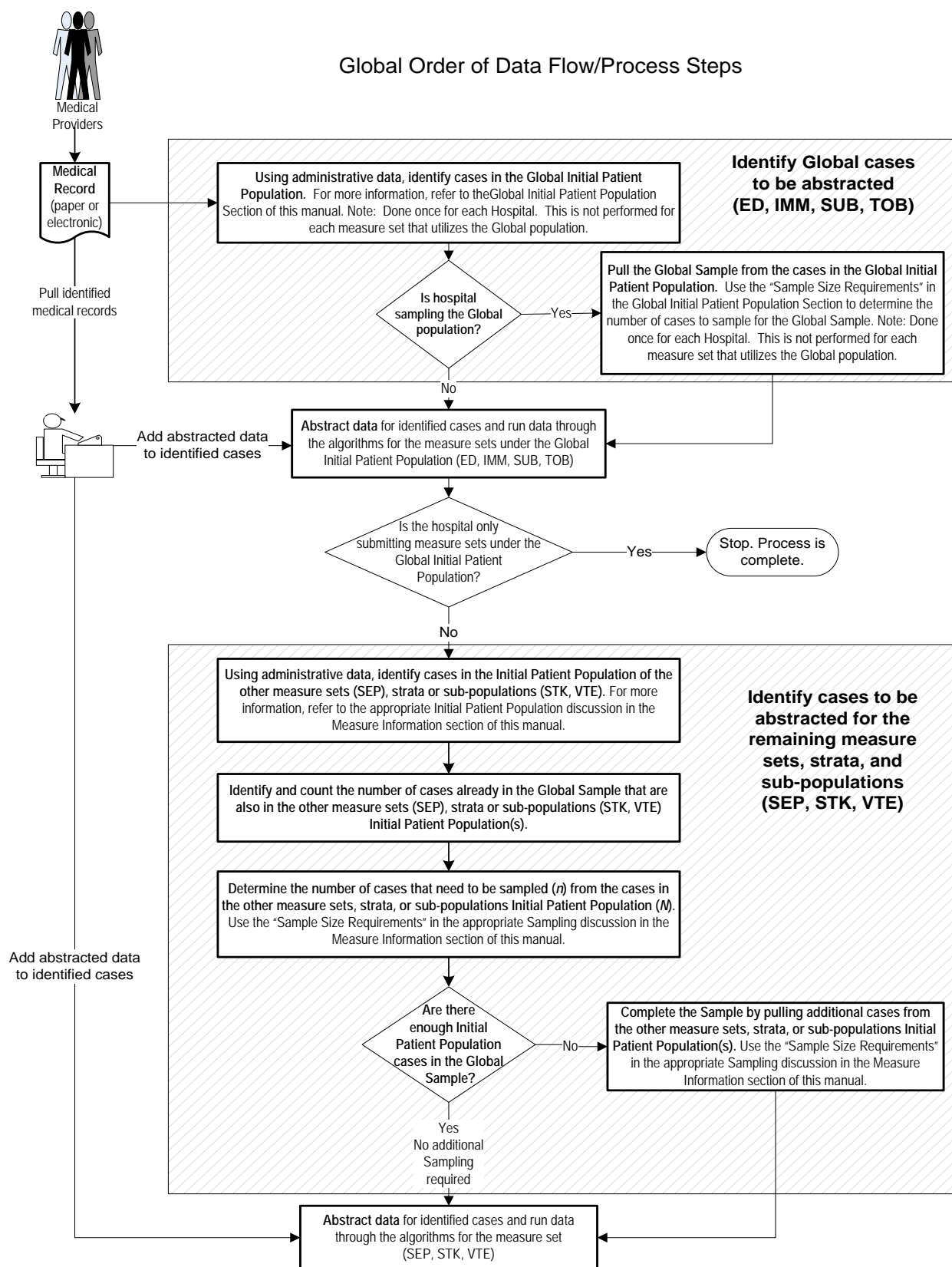
Example:

For 4th quarter the Global Initial Patient Population is 1550 and 100 for SEP. If the hospital is sampling, the minimum number of cases that would be required to be sampled would be 306 for Global (ED, IMM, TOB, and/or SUB) and 30 for SEP.

The hospital would pull 306 cases for the Global sample. From those 306 cases the hospital would determine how many of those cases were also SEP cases that met the initial patient population. If there are enough SEP cases in the Global sample pull to meet the minimum sampling requirements for that measure set, then no additional sample pull is needed.

If there are not enough cases in the Global sample pull to meet the SEP measure set minimum sampling requirements then an additional sample pull is needed. For example, from the Global sample pull there were 20 SEP cases identified that met the initial population criteria for the SEP measure set. As the minimum sample requirements for SEP is 30, 10 additional SEP cases would need to be pulled from the SEP Initial Patient Population.

Global Order of Data Flow/Process Steps



2. Hospitals Not Submitting the Measure Sets Under the Global Initial Patient Population to The Joint Commission Only

For hospitals not submitting the measure sets under the Global Initial Patient Population to The Joint Commission only, an independent sample pull should be used to pull the sample for the applicable measure sets (i.e., SEP, STK and VTE).

Each measure set, stratum, or sub-population has a unique definition of Initial Patient Population and sample size requirement. However, the same data flow or process steps can be used to identify the data that is transmitted to the Joint Commission's Data Warehouse. These process steps are:

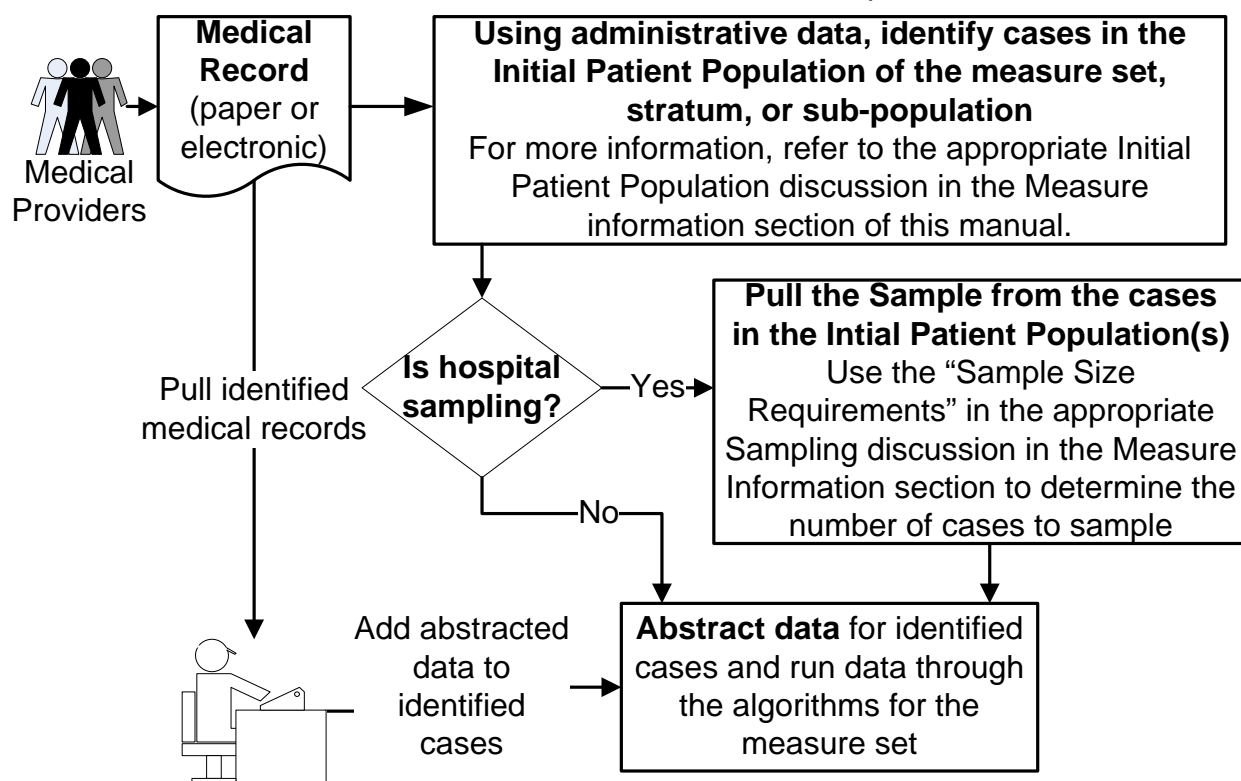
- First, identify the Initial Patient Population for the measure set. An Initial Patient Population is defined for each measure set, stratum, and sub-population and the count is collected in the Initial Patient Population Size data elements. This data pull utilizes administrative data such as ICD-10 diagnosis and procedure codes, admission date, and birthdate.

All ICD-10 diagnosis and procedure codes included in the appropriate Initial Patient Population definition must be applied. This identification process must be completed prior to the application of data integrity filter, measure exclusions, and the application of sampling methodology.

For specific measure set, strata, and sub-population definitions, refer to the appropriate Initial Patient Population discussion in the Measure Information section of this manual.

- Second, if the hospital is sampling, use the Initial Patient Population identified above and pull the sample of medical records for each measure set, stratum, or sub-population using the Sample Size Requirements defined in the appropriate Measure Information section of this manual.
- Third, collect or abstract from the identified medical records the general and measure specific data elements that are needed for the measure set. The count of the number of cases used in this step is collected in the *Sample Size* data elements.
 - If the hospital is not sampling, use the medical records identified in the first data pull.
 - If the hospital is sampling, use the medical records from the cases in the identified sample.

Order of Data Flow/Process Steps



Sample Size Requirements

Hospitals that choose to sample have the option of sampling quarterly or sampling monthly. The sample size requirements for each of these options are described in turn. Hospitals need to use the next highest whole number when determining their required sample size. See below for rounding examples. For each measure sets sample size requirements, refer to the appropriate measure set's Measure Information section in this manual.

Hospitals choosing to sample the Global population must use the same sample for all measure sets that utilize the Global population (e.g., ED, IMM, SUB, TOB). Hospitals choosing to not sample the Global population must use the entire population for all measure sets that utilize the Global population (e.g., ED, IMM, SUB, TOB).

Hospitals selecting sample cases for measure sets that are not stratified (e.g., SEP) must ensure that its Initial Patient Population(s) and sample size(s) meet the conditions stated in the measure set's Sample Size Requirements.

For hospitals selecting sample cases for stratified measure sets or measure sets with sub-populations (e.g., VTE and STK), a modified sampling procedure is required. Hospitals selecting sample cases for these sets must ensure that each individual stratum's Population/sub-population and sample size meets the conditions stated in the measure set's Sample Size Requirements.

Regardless of the option used, hospital samples must be monitored to ensure that sampling procedures consistently produce statistically valid and useful data. Due to exclusions, hospitals selecting sample cases MUST submit AT LEAST the minimum required sample size. The sample size tables for each option automatically build the number of cases needed to obtain the required sample sizes.

Hospitals that sample, should sample by their *CMS Certification Number (CCN)*. For most organizations, there is a one to one correspondence between their CCN and the Joint Commission's *Health Care Organization Identifier*. Sampling by CCN may cause those organizations that have chosen to be accredited such that they have multiple CCN combined under one *Health Care Organization Identifier* to over sample from the Joint Commission's perspective. Organizations reporting data to CMS must sample at the level of the individual CCN. All data that are sampled (by *CMS Certification Number*) must be transmitted to both CMS and The Joint Commission.

A hospital may choose to use a larger sample size than is required. Hospitals whose Initial Patient Population size is less than the minimum number of cases per quarter/month for the measure set, stratum, or sub-population, cannot sample. Hospitals that have five or fewer GLB (ED, IMM, SUB, TOB), STK and/or VTE discharges (both Medicare and non-Medicare combined) are not required to submit patient level data to the CMS Clinical Warehouse and Joint Commission's Data Warehouse. Hospitals that have five or fewer SEP discharges (both Medicare and non-Medicare combined) are not required to submit patient level data to the CMS Clinical Warehouse. Refer to the Sample Size Requirement tables provided in each measure set's Measure Information section to determine the minimum number of cases that need to be sampled for each population.

Quarterly Sampling Examples

Quarterly Example 1: Measure set is Not Stratified

Hospitals selecting sample cases for measure set ABC, which is not stratified, must ensure that its Initial Patient Population and quarterly sample size meet the following conditions:

**Quarterly Sample Size
Based on Hospital's Initial Patient Population for the ABC Measure Set**

Average Quarterly Initial Patient Population "N"	Minimum Required Sample Size "n"
≥ 1551	311
391 - 1550	20% of the Initial Patient Population
78 - 390	78
6 - 77	No sampling; 100% of the Initial Patient Population is required
0 - 5	Submission of patient level data is encouraged but not required: <ul style="list-style-type: none"> • CMS: if submission occurs, 1 – 5 cases of the Initial Patient Population may be submitted • The Joint Commission: if submission occurs, 100% Initial Patient Population required

Examples

- A hospital's ABC Initial Patient Population is 77 patients during the first quarter. Using the above table, no sampling is allowed – 100 percent (%) of the population is required.
- A hospital's ABC Initial Patient Population is 100 patients during the second quarter. Using the above table, the required sample size is seen to be a minimum of 78 ABC patients for this quarter.
- A hospital's ABC Initial Patient Population is 401 patients during the third quarter. Using the above table, the required sample size is seen to be 20 percent (%) of the population, or 81 cases for the quarter (twenty percent of 401 equals 80.2 rounded to the next whole number equals 81).
- A hospital's ABC Initial Patient Population is 1551 patients during the fourth quarter. Using the above table, the required sample size is seen to be a minimum of 311 ABC patients for this quarter.
- A hospital's ABC Initial Patient Population is 5 patients during the first quarter. Using the above table, submission of patient level data is not required. If the hospital chooses to submit patient level data:
 - CMS: the quarterly sample size would be 1 – 5 cases for the quarter
 - The Joint Commission: the required quarterly sample size would be 100 percent (%) of the patient population or 5 cases for the quarter.

Quarterly Example 2: Measure set is stratified

For hospitals selecting sample cases for measure set XYZ which contains 8 strata, a modified sampling procedure is required. Hospitals selecting sample cases for these sets must ensure that each individual stratum’s population and quarterly sample size meets the following conditions.

Select within each of the seven individual measure stratum and the 8th XYZ stratum.

**Quarterly Sample Size
Based on Hospital’s Initial Patient Population for the XYZ Measure Set**

Average Quarterly Stratum Initial Patient Population “N”	Minimum Required Stratum Sample Size “n”
≥ 471	48
161 - 470	10% of the Initial Patient Population
16 - 160	16
< 16	No sampling; 100% of the Initial Patient Population is required

Examples

- The XYZ Initial Patient Population sizes for a hospital are 5, 50, 15, 140, 35, 201, 3, and 481 patients respectively per stratum for the quarter. Since the total Initial Patient Population for XYZ is 930, the hospital must submit patient level data. The required quarterly sample sizes for each stratum would be 5, 16, 15, 16, 16, 21, 3, and 48.
 - The 1st, 3rd, and 7th strata are less than the minimum required quarterly sample size, so 100 percent (%) of each of these strata is sampled.
 - The 2nd, 4th, and 5th strata each require 16 cases to be sampled.
 - The 6th stratum has 201 patients per quarter, which requires a 10 percent (%) sample size, or 21 cases (twenty percent of 201 equals 20.1 rounded to the next whole number equals 21).
 - The 8th stratum is more than the maximum required quarterly sample size, so this stratum requires 48 cases to be sampled.

- The XYZ Initial Patient Population sizes for a hospital are 1, 1, 0, 0, 1, 0, 1, and 1 patients respectively per stratum for the quarter. Since the total Initial Patient Population for XYZ is 5, the hospital may choose to not submit patient level data. If the hospital chooses to submit patient level data, the required quarterly sample sizes for each stratum would be 1, 1, 0, 0, 1, 0, 1, and 1.
 - The 1st, 2nd, 5th, 7th, and 8th strata are less than the minimum required quarterly sample size, so 100% of each of these strata is sampled.
 - There is no data to sample for the 3rd, 4th, and 6th strata.

Quarterly Example 3: Measure set has sub-populations

For hospitals selecting sample cases for measure set DEF which contains 3 independent sub-populations a modified sampling procedure is required. The three sub-populations must be sampled independently from each other.

1 - Hospitals selecting sample cases for sub-population 1 must ensure that the Initial Patient Population and sample size for the sub-population 1 meet the following conditions:

Quarterly Sample Size Based on Hospital's Initial Patient Population Size for the Patient Sub-Population 1

Average Quarterly Initial Patient Sub-Population Size "N"	Minimum Required Sub-Population Sample Size "n"
≥ 896	180
226 - 895	20% of Initial Patient Population size
45 - 225	45
< 45	No sampling; 100% Initial Patient Population required

2 - Hospitals selecting sample cases for sub-population 2 must ensure that the Initial Patient Population and sample size for sub-population 2 meet the following conditions:

Quarterly Sample Size Based on Hospital's Initial Patient Population Size for the Patient Sub-Population 2

Average Quarterly Initial Patient Sub-Population Size "N"	Minimum Required Sub-Population Sample Size "n"
≥ 1796	360
451 - 1795	20% of Initial Patient Population size
90 - 450	90
< 90	No sampling; 100% Initial Patient Population required

3 – Sub-population 3 *is not eligible* for sampling and will use the entire Initial Patient Population for reporting.

Examples

- Quarterly sampling for sub-population 1:
 - A hospital's sub-population 1 is 752 during the second quarter. Using the quarterly sampling table for sub-population 1, the sample size required is 20 percent (%) of this sub-population, or 151 cases for the quarter (twenty percent of 752 equals 150.4 rounded up to the next whole number equals 151).
 - A hospital's sub-population 1 is 5 during the first quarter. Using the quarterly sampling table for sub-population 1, the sample size is less than

the minimum required quarterly sample size, so 100 percent (%) of this sub-population is sampled.

- A hospital's sub-population 1 is 99 during the third quarter. The required quarterly sample is 45 cases.
2. Quarterly sampling for sub-population 2:
- A hospital's sub-population 2 is 511 during the second quarter. Using the quarterly sampling table for sub-population 2, the sample size required is 20 percent (%) of this sub-population, or 103 cases for the quarter (twenty percent of 511 equals 102.2 rounded up to the next whole number equals 103).
 - A hospital's sub-population 2 is 3 during the first quarter. Using the quarterly sampling table for sub-population 2, the sample size is less than the minimum required quarterly sample size, so 100 percent (%) of this sub-population is sampled.
 - A hospital's sub-population 2 is 300 during the third quarter. The required quarterly sample is 90 cases.
3. Quarterly sampling for sub-population 3:
- Sub-population *is not eligible* for sampling and will use the entire Initial Patient Sub-Population for reporting.

Monthly Sampling Examples

Monthly Example 1: Measure set is Not Stratified

Hospitals selecting sample cases for ABC measure set must ensure that its Initial Patient Population and monthly sample size meet the following conditions:

**Monthly Sample Size
Based on Hospital's Initial Patient Population for the ABC Measure Set**

Average Monthly Initial Patient Population "N"	Minimum Required Sample Size "n"
≥ 516	104
131-515	20% of the Initial Patient Population
26-130	26
< 26	No sampling; 100% of the Initial Patient Population is required

Examples

- A hospital's ABC Initial Patient Population is 25 patients during January. Using the above table, no sampling is allowed – 100 percent (%) of the population is required.
- A hospital's ABC Initial Patient Population is 130 patients during February. Using the above table, the required sample size is seen to be a minimum of 26 ABC patients for this month.

- A hospital's ABC Initial Patient Population is 301 patients during March. Using the above table, the required sample size is seen to be 20 percent (%) of the population, or 61 cases for the month (twenty percent of 301 equals 60.2 rounded to the next whole number equals 61).
- A hospital's ABC Initial Patient Population is 516 patients during April. Using the above table, the required sample size is seen to be a minimum of 104 ABC patients for this month.

Monthly Example 2: Measure set is Stratified

For hospitals selecting sample cases for the XYZ measure set, a modified sampling procedure is required. Hospitals selecting sample cases for this set must ensure that each individual strata population and monthly sample size meets the following conditions:

Select within each of the seven individual measure stratum and the 8th XYZ stratum.

**Monthly Sample Size
Based on Hospital's Initial Patient Population for the XYZ Measure Set**

Average Monthly Stratum Initial Patient Population "N"	Minimum Required Stratum Sample Size "n"
≥ 151	16
61 - 150	10% of the Initial Patient Population
6 - 60	6
< 6	No sampling; 100% of the Initial Patient Population is required

Example

- The XYZ Initial Patient Population sizes for a hospital are 5, 50, 15, 141, 35, 201, 3, and 481 patients respectively in June. The required monthly sample sizes would be 5, 6, 6, 15, 6, 16, 3, and 16.
 - The 1st and 7th strata are less than the minimum required monthly sample size, so 100 percent (%) of each of these strata is sampled.
 - The 2nd, 3rd, and 5th strata each require 6 cases to be sampled.
 - The 4th stratum has 141 patients per month, which requires a 10 percent (%) sample size, or 15 cases (twenty percent of 141 equals 14.1 rounded to the next whole number equals 15).
 - The 6th and 8th strata are each more than the maximum required monthly sample size, so this stratum requires 16 cases to be sampled.

Monthly Example 3: Measure set has sub-populations

For hospitals selecting sample cases for measure set DEF which contains 3 independent sub-populations a modified sampling procedure is required. The three sub-populations must be sampled independently from each other.

1 - Hospitals selecting sample cases for sub-population 1 must ensure that the Initial Patient Population and sample size for sub-population 1 meet the following conditions:

Monthly Sample Size
Based on Hospital's Initial Patient Population Size for the Patient Sub-Population
1

Average Monthly Initial Patient Sub-Population Size "N"	Minimum Required Sub-Population Sample Size "n"
≥ 296	60
76 - 295	20% of Initial Patient Population size
15 - 75	15
< 15	No sampling; 100% Initial Patient Population required

2 - Hospitals selecting sample cases for sub-population 2 must ensure that the Initial Patient Population and sample size for sub-population 2 meet the following conditions:

Monthly Sample Size
Based on Hospital's Initial Patient Population Size for the Patient Sub-Population
2

Average Monthly Initial Patient Sub-Population Size "N"	Minimum Required Sub-Population Sample Size "n"
≥ 596	120
151 - 595	20% of Initial Patient Population size
30 - 150	30
< 30	No sampling; 100% Initial Patient Population required

3 – Sub-population 3 *is not eligible* for sampling and will use the entire Initial Patient Sub-Population for reporting.

Example

1. Monthly sampling for sub-population 1:
 - A hospital's sub-population 1 is 81 during March. Using the monthly sampling table for sub-population 1, the sample size required is 20 percent (%) of this sub-population, or 17 cases for the month (twenty percent of 81 equals 16.2 rounded up to the next whole number equals 17).
 - A hospital's sub-population 1 is 5 during February. Using the monthly sampling table for sub-population 2, the sample size is less than the minimum required monthly sample size, so 100 percent (%) of this sub-population is sampled.
 - A hospital's sub-population 1 is 45 during January. The required monthly sample is 15 cases.
2. Monthly sampling for sub-population 2:
 - A hospital's sub-population is 387 during March. Using the monthly sampling table for sub-population 2, the sample size required is 20 percent (%) of this sub-population, or 78 cases for the month (twenty

percent of 387 equals 77.4 rounded up to the next whole number equals 78).

- A hospital's sub-population 2 is 3 during February. Using the monthly sampling table for sub-population 2, the sample size is less than the minimum required monthly sample size, so 100 percent (%) of this sub-population is sampled.
 - A hospital's sub-population 2 is 47 during January. The required monthly sample is 30 cases.
3. Monthly sampling for sub-population 3:
Sub-population 3 *is not eligible* for sampling and will use the entire Initial Patient Sub-Population for reporting.

Sampling Approaches

As previously stated in this section, hospitals have the option to sample from their population, or submit their entire population. Hospitals that choose to sample must ensure that the sampled data represent their Initial Patient Population by using either the simple random sampling or systematic random sampling methods and that the sampling techniques are applied consistently within a quarter. For example, monthly samples for a measure set, stratum, or sub-population must use consistent sampling techniques across the quarterly submission period.

- Simple random sampling - selecting a sample size (n) from a population of size (N) in such a way that every case has the same chance of being selected.
- Systematic random sampling - selecting every kth record from a population of size N in such a way that a sample size of n is obtained, where k is less than or equal to N/n. The first sample record (i.e., the starting point) must be randomly selected before taking every kth record. This is a two-step process:
 1. Randomly select the starting point by choosing a number between one and k using a table of random numbers or a computer-generated random number; and
 2. Then select every k^{th} record thereafter until the selection of the sample size is completed.

Each hospital is ultimately responsible that sampling techniques applied for their hospital adhere to the sampling requirements outlined in this manual. ORYX Vendors are responsible for ensuring that the sampling techniques are applied consistently across their client hospitals.

Sampling Approach Examples

For a hospital with an Initial Patient Population size of 350 ABC measure set discharges per quarter, the sample size would be 78. To select a random sample of 78 ABC patients:

- Simple random sampling:
 1. Generate random numbers for individual ABC patient records from a random number function using a statistical software package or computer programming language.
 2. Sort data by the random numbers either in an increasing or decreasing order.

Select the first 78 ABC patient records as the random sample.

- Systematic random sampling:
 1. In this example, the hospital's Initial Patient Population size equals 350 and the sample size equals 78. Divide the Initial Patient Population size by the sample size and take the quotient (i.e., the integer portion) as the sampling interval k . The sampling interval k equals $350/78$ equals 4.5. Thus, every 4th ABC patient record will be selected from the Initial Patient Population until 78 cases are selected.
 2. To ensure that each ABC patient has an equal chance of being selected, the "starting point" must be randomly determined before selecting every 4th ABC patient record. This can be done using a computer random number generator or a random number table to randomly choose a number between 1 and 4 as the starting point.

Transmission of Initial Patient Population and Sample Data Elements

CMS and The Joint Commission require transmission of Initial Patient Population and sample count data for all chart abstracted measure sets. For CMS, if the hospital submits the ED, STK and/or VTE measure sets electronically only (as eMeasures), the transmission of the Initial Patient Population and sample count data is not required. Transmission of Initial Patient Population and sample count data elements are used to assist in evaluating completeness of submission in accordance with CMS/The Joint Commission sampling requirements.

The Initial Patient Population Size refers to all patients (Medicare and non-Medicare) who share common payment sources which can be identified by utilizing administrative data such as the UB-04. All ICD-10 diagnosis and procedure codes included in the appropriate Initial Patient Population definition must be applied. This identification process must be completed prior to the application of data integrity filter, measure exclusions, and the application of sampling methodology. For specific measure set and strata definitions, refer to the appropriate Initial Patient Population discussion in the Measure Information section of this manual.

The Initial Patient Population and sample data elements are:

- Initial Patient Population Size – Medicare Only*
- Initial Patient Population Size – Non-Medicare Only*
- Sample
- Sampling Frequency*
- Sample Size – Medicare Only*
- Sample Size – Non-Medicare Only*

* The Joint Commission and CMS: Transmitted in the Hospital Initial Patient Population data file. Refer to the *Hospital Initial Patient Population Data XML File Layout* in the Transmission section of this manual.

Sample indicates whether or not the hospital has sampled data for the specified time period. *Sampling Frequency* indicates if the hospital has sampled using the monthly or quarterly methodology, whether the entire population was used for the specified time period or the hospital had five or fewer discharges for the discharge quarter and did not submit patient level data.

Initial Patient Population Size – Medicare Only includes all patients that are billed under Medicare or Title 18. Medicare can be listed as a primary, secondary, tertiary or lower on the list of payment sources for the patient. In addition, patients who are participating as a member of a Medicare HMO/Medicare Advantage are included in the Medicare counts, e.g., Medicare Blue, Humana Gold, Secure Horizons, AARP, Coventry Advantra, etc.

Initial Patient Population and Sample Size Examples

Example 1 – Hospital does not sample

A hospital uses the Initial Patient Population(s) for the ABC measure set to identify 120 cases in the ABC Initial Patient Population during the second quarter. The hospital does not sample the ABC measure set, so data for all 120 cases are collected and used to calculate the hospital's rate for each ABC measure. 40 of the 120 cases in the ABC Initial Patient Population are Medicare patients.

The breakdown of data by month and Medicare/Non-Medicare is:

Initial Patient Population and Sample Size	April	May	June	Total
Initial Patient Population – Medicare patients	10	15	15	40
Initial Patient Population – Non-Medicare patients	20	30	30	80
Total Initial Patient Population Size	30	45	45	120
Sample Size – Medicare patients	10	15	15	40
Sample Size – Non-Medicare patients	20	30	30	80
Total Sample Size	30	45	45	120

The following is transmitted for each month in the quarter:

Initial Patient Population and Sample Size	April	May	June
<i>ICD Population Size (Initial Patient Population Size – Medicare Only + Initial Patient Population Size – Non-Medicare Only)</i>	30	45	45
<i>Initial Patient Population Size – Medicare Only</i>	10	15	15
<i>Initial Patient Population Size – Non-Medicare Only</i>	20	30	30
<i>Sample</i>	N	N	N
<i>Sampling Frequency (3 = not sampling)</i>	3	3	3
<i>Sample Size – Medicare Only</i>	10	15	15
<i>Sample Size – Non-Medicare Only</i>	20	30	30

Example 2 – Hospital samples monthly

A hospital uses the Initial Patient Population(s) for the ABC measure set to identify 120 cases in the ABC Initial Patient Population during the second quarter. From these 120 cases, the hospital uses the monthly sample size requirements and randomly selects a sample of 26 cases for each month. Data for these 26 cases are collected and used to calculate the hospital's rate for each ABC measure. 40 of the 120 cases in the ABC Initial Patient Population are Medicare patients and 24 of these cases were included in the sample.

The breakdown of data by month and Medicare/Non-Medicare is:

Initial Patient Population and Sample Size	April	May	June	Total
Initial Patient Population – Medicare patients	10	15	15	40
Initial Patient Population – Non-Medicare patients	20	30	30	80
Total Initial Patient Population Size	30	45	45	120
Sample Size – Medicare patients	8	9	7	24
Sample Size – Non-Medicare patients	18	17	19	54
Total Sample Size	26	26	26	78

The following is transmitted for each month in the quarter:

Initial Patient Population and Sample Size	April	May	June
<i>ICD Population Size</i>	30	45	45
<i>(Initial Patient Population Size – Medicare Only + Initial Patient Population Size – Non-Medicare Only)</i>			
<i>Initial Patient Population Size – Medicare Only</i>	10	15	15
<i>Initial Patient Population Size – Non-Medicare Only</i>	20	30	30
<i>Sample</i>	Y	Y	Y
<i>Sampling Frequency (1 = sampling data monthly)</i>	1	1	1
<i>Sample Size – Medicare Only</i>	8	9	7
<i>Sample Size – Non-Medicare Only</i>	18	17	19

Example 3 – Hospital samples quarterly

A hospital uses the Initial Patient Population(s) for the ABC measure set to identify 120 cases in the ABC Initial Patient Population during the second quarter. From these 120 cases, the hospital uses the quarterly sample size requirements and randomly selects a sample of 78 cases. Data for these 78 cases are collected and are then used to calculate the hospital's rate for each ABC measure. 40 of the 120 cases in the ABC Initial Patient Population are Medicare patients and 20 of these cases were included in the sample.

The breakdown of data by month and Medicare/Non-Medicare are:

Initial Patient Population and Sample Size	April	May	June	Total
Initial Patient Population – Medicare patients	10	15	15	40
Initial Patient Population – Non-Medicare patients	20	30	30	80
Total Initial Patient Population Size	30	45	45	120
Sample Size – Medicare patients	5	10	5	20
Sample Size – Non-Medicare patients	10	20	28	58
Total Sample Size	15	30	33	78

The following is transmitted for each month in the quarter:

Initial Patient Population and Sample Size	April	May	June
<i>ICD Population Size (Initial Patient Population Size – Medicare Only + Initial Patient Population Size – Non-Medicare Only)</i>	30	45	45
<i>Initial Patient Population Size – Medicare Only</i>	10	15	15
<i>Initial Patient Population Size – Non-Medicare Only</i>	20	30	30
<i>Sample</i>	Y	Y	Y
<i>Sampling Frequency (2 = sampling data quarterly)</i>	2	2	2
<i>Sample Size – Medicare Only</i>	5	10	5
<i>Sample Size – Non-Medicare Only</i>	10	20	28

Example 4 – Hospital has five or fewer discharges and chooses to not submit patient level data

A hospital uses the Initial Patient Population(s) for the ABC measure set to identify 5 cases in the ABC Initial Patient Population for the entire measure set during the second quarter. Since the total Initial Patient Population for ABC is 5, the hospital chooses to not submit patient level data.

The breakdown of data by month and Medicare/Non-Medicare is:

Initial Patient Population and Sample Size	April	May	June	Total
Initial Patient Population – Medicare patients	1	0	2	3
Initial Patient Population – Non-Medicare patients	0	1	1	2
Total Initial Patient Population Size	1	1	3	5
Sample Size – Medicare patients	0	0	0	0
Sample Size – Non-Medicare patients	0	0	0	0
Total Sample Size	0	0	0	0

The following is transmitted for each month in the quarter:

Initial Patient Population and Sample Size	April	May	June
<i>ICD Population Size (Initial Patient Population Size – Medicare Only + Initial Patient Population Size – Non-Medicare Only)</i>	1	1	3
<i>Initial Patient Population Size – Medicare Only</i>	1	0	2
<i>Initial Patient Population Size – Non-Medicare Only</i>	0	1	1
<i>Sample (clinical XML file)</i>	N/A	N/A	N/A
<i>Sample (Joint Commission’s HCO-level file)</i>	N	N	N
<i>Sampling Frequency (4 = N/A)</i>	4	4	4
<i>Sample Size – Medicare Only</i>	0	0	0
<i>Sample Size – Non-Medicare Only</i>	0	0	0

Example 5 – Hospital has five or fewer discharges and chooses to submit patient level data

A hospital uses the Initial Patient Population(s) for the ABC measure set to identify 5 cases in the ABC Initial Patient Population for the entire measure set during the second quarter. Even though the total Initial Patient Population for ABC is 5, the hospital chooses to submit patient level data.

The breakdown of data by month and Medicare/Non-Medicare is:

Initial Patient Population and Sample Size	April	May	June	Total
Initial Patient Population – Medicare patients	1	0	2	3
Initial Patient Population – Non-Medicare patients	0	1	1	2
Total Initial Patient Population Size	1	1	3	5
Sample Size – Medicare patients	1	0	2	3
Sample Size – Non-Medicare patients	0	1	1	2
Total Sample Size	1	1	3	5

The following is transmitted for each month in the quarter:

Initial Patient Population and Sample Size	April	May	June
<i>ICD Population Size (Initial Patient Population Size – Medicare Only + Initial Patient Population Size – Non-Medicare Only)</i>	1	1	3
<i>Initial Patient Population Size – Medicare Only</i>	1	0	2
<i>Initial Patient Population Size – Non-Medicare Only</i>	0	1	1
<i>Sample</i>	N	N	N
<i>Sampling Frequency (3 = Not Sampling)</i>	3	3	3
<i>Sample Size – Medicare Only</i>	1	0	2
<i>Sample Size – Non-Medicare Only</i>	0	1	1