How-To Guide: Chronic Obstructive Pulmonary Disease (COPD) Emergency Department (ED) Visits

Provided by CDC's Environmental Public Health Tracking Program

May 2022

PURPOSE AND USE OF THIS DOCUMENT

This document describes the steps for extracting and formatting the necessary data required for the Tracking Program's Nationally Consistent Data and Measures (NCDM) for chronic obstructive pulmonary disease (COPD) emergency department (ED) visits.

HOW-TO GUIDE

	Description
Measures	Chronic Obstructive Pulmonary Disease (COPD) Emergency Department (ED) Visits
Data Source(s)	Outpatient, Inpatient, and Observation Stay Data Files
NCDM Data Requirements	• Health Outcome: Chronic Obstructive Pulmonary Disease (COPD) • State/County of Residence • Admission Year/Month • Age Group • Sex Optional: • Race and ethnicity
Definitions Relevant to Indictor	*COPD:* Chronic Obstructive Pulmonary Disease (COPD) is a large group of lung diseases characterized by airflow obstruction and is often associated with symptoms related to difficulty in breathing, but can be present without any symptoms. The most important and frequent conditions in COPD are chronic bronchitis and emphysema, but also includes other diagnoses; ICD-9-CM 490-492, 496 as the primary diagnosis or 493.2 as a primary diagnosis when 490-492, 496 is present in any other diagnosis codes; ICD-10-CM codes J40-J44 *Duplicate Record*: More than one record for the same person with the same ED visit data (e.g., sex, date of birth, admission/ED visit date, and Zip code have exact same

	Description
	information). Duplicate records may also be due to continuation of data beyond a single line. In this case, duplicates may be identified using a record sequence number.
	ED Visit: Condition of being treated in an acute care hospital in an emergency department (ED) for treatment as an outpatient, or placed in an acute care hospital (admitted) as an inpatient subsequent to treatment in the ED.
	ED Visit Date: The calendar date of the ED visit: • Day (optional) • Month (required) • Year (required)
	ED Visit Year: An ED visit for the health outcome of interest during a specific calendar year. ED visit year is based only upon the calendar year of the visit, even when discharge and/or release year is different.
	Emergency Department Visit: Treatment in a hospital emergency department. This should include both patients who are treated and released and those that are admitted as inpatients from the emergency department.
	Hospital Transfers: The practice of discharging a patient from one facility and readmitting them to a second facility within 48 hours.
	Multiple Visits: More than one ED visit for the same person for the same diagnosis code occurring on different dates and related to a separate event within a given year. Multiple ED visits are considered separate events if they occurred more than 48 hours apart.
	Observation Stay: This is an alternative to inpatient admission that exists in some facilities but for the Tracking Program is considered in ED visit statistics. Observation stays may originate as an ED visit or directly as an observation stay. Note that the definition of an observation stay may not be standard across hospitals, and observation stays may not be recorded across states in a consistent manner.
	Out-of-State Visits: When a resident of your county/state is treated in an emergency department located in another state (usually an abutting state).

	Primary Diagnosis Code: The first diagnosis field(s) of the coded clinical record (i.e., primary or principal diagnosis).
	
	    ICD-9-CM: Prior to October 1, 2015, diagnosis codes are represented by ICD-9-CM codes (the International Classification of Diseases, 9th Revision, Clinical Modification).
	
	    ICD-10-CM: As of October 1, 2015, diagnosis codes are represented by ICD-10-CM codes (the International Classification of Diseases, 10th Revision, Clinical Modification).

	Resident: Any person with a residential address in your city/county/state at the time of the ED visit.
HTG Requirements and Cautions	• This How-to Guide provides instructions for the development of the dataset for submission to CDC and for calculating the required and optional measures. The Data Dictionary should be referred to for the standardized definitions and notations of the variables to be submitted to CDC. The data file should be converted to the .XML file

	Description
	format and the required header inserted into the XML file, according to the Schema found on SharePoint. Additional How-to Guide is available for instructions for calculating the measures.
	• *Data Source:* ED visits include both patients who are admitted to the hospital through the emergency department (inpatients) and those who are treated and released (outpatients); therefore, both inpatient and outpatient data are required for this indicator. If identified and/or stored separately, observation stay data should be included as well. Please consult your data steward and data mangers to understand the variables and coding system, specifically for race and ethnicity variables.
	• *Duplicate Records:* This How-to Guide presumes that the user has removed duplicate records (see definitions for more information), while keeping multiple visits. A case should be counted once per ED visit; de-duplication of records to achieve this goal should be conducted at the discretion of the data owners, managers, and/or analysts.
	• *Complete Dataset Guidelines:* The Tracking Network's NCDM are based upon date of admission or ED visit because of the goal of relating an ED visit with an environmental event. Most inpatient and outpatient data are released in annual discharge-based datasets; sometimes quarterly files are also released. Because the NCDM is based on admission or ED visit date, it is necessary to have the dataset of the year of interest as well as that for the subsequent year (or first quarter of the subsequent year) in order to capture admissions/visits that were discharged in the subsequent year. For example, 2005 data should not be submitted prior to receipt of either the first quarter 2006 or annual 2006 discharge dataset from the data steward. Some discretion on this rule is allowed if a program can show that inclusion of the subsequent year's data does not impact the data for the year of interest to a degree that would require re-submission. Re-submission due to incomplete data should be avoided.
	• *Out-of-State ED Visits*: ED visits of residents to out-of-state hospitals should be included when available but are not required to be included. For states with significant out-of-state ED visits, it is preferable to wait until the out-of-state data are available for inclusion so as to avoid the need for re-submission of more complete data in the future. However, some consideration of timeliness is also appropriate; if out-of-state data are overly delayed then submission without them is acceptable. It is noted that some states must include out-of-state admissions of its residents. Use the Metadata Creation Tool (MCT) to acknowledge the disposition of these admissions and provide any additional information about out-of-state data.
	• *Federal Facilities:* Admissions to federal facilities, such as Veteran's Hospitals, are not included. Be certain to inform CDC if your state requires that your dataset includes admissions to federal facilities so that the measures can be appropriately footnoted.
	• *Transfers:* Patients transferred from or to other acute care facilities are not excluded. Use the MCT to capture if and how transfers were excluded.
Step #1	Identify the data sources for ED visits

	Description
	It is necessary for the recipients to communicate with their data steward to understand how their emergency department and inpatient data are structured. This can vary state to state. Please refer to Appendix A at the end of this document for more information and examples. ED visits include both patients who are treated and released in the ED (outpatients) and who are admitted as inpatients through the emergency department; therefore, both inpatient and outpatient data files are required for this indicator. If identified separately, observation stay data files are also required. Note: Steps 2 – 7 could be performed in a different order so long as you retain all necessary variables needed until step 8.
Step #2a	From ED data, select all records that meet the following criteria: • Occurred during the year(s) of interest • State of residence is your state Date of admission is not missing

Step #2b	Identify ED visits in inpatient hospitalization data.
	
	From inpatient hospitalization data, select all records that meet the following criteria:
	
	• Restrict the dataset to patients who were admitted from an ED using the following criteria:
	
	    ○ Point of origin code indicates emergency department, or
	    ○ CPT codes: 99281-99285, 99288 (added in data year 2018), G0380-G0384 (added in data year 2018)
	    ○ Revenue codes: 0450-0459
	    ○ Positive ED charges
	
	Note: Please refer to Appendix A for additional information on accurately capturing the subset of inpatient hospitalizations that were admitted through the emergency department (ED). These criteria are consistent with the criteria used by AHRQ (see: http://www.hcup-us.ahrq.gov/db/vars/siddistnote.jsp?var=hcup_ed).
	
	Then, select all records that meet the following criteria:
	• Occurred during the year(s) of interest
	• State of residence is your state.

Step #2c	Identify ED visits observation stay data In states where observation stays are identified separately, include these observation stay records with ED visits. Not all states require the reporting of observation stay records. Contact data stewards to determine whether records for observation stays are collected and if so, if the records are located with outpatient or inpatient records, or in a separate file.

	Description

	• Restrict the dataset to patients who visited the ED using the following criteria:
	
	    ○ Revenue code: 0762, or
	    ○ Positive OS charge when revenue codes not available, or
	    ○ CPT codes: 99217–99220, 99224-99226, 99234–99236, G0738-G0739
	
	Note: These criteria are consistent with the criteria used by AHRQ (see: https://hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=hcup_os)
	
	Then, select all records that meet the following criteria:
	
	• Occurred during the year(s) of interest
	• State of residence is your state

Step #3a (ICD-10-CM)	Select and retain cases having any of the following ICD-10-CM codes J40.* - J44.* as primary diagnosis: **ICD-10-CM Code Description** J40.* Bronchitis, not specified as acute or chronic J41.* Simple and mucopurulent chronic bronchitis J42.* Unspecified chronic bronchitis J43.* Emphysema J44.* Other chronic obstructive pulmonary disease Note: '*' includes all sub variation codes
Step #3b (ICD-9-CM)	Select and retain cases having any of the following ICD-9-CM codes as primary diagnosis: **ICD-9-CM Code Description** 490.* Bronchitis, not specified as acute or chronic 491.* Chronic bronchitis 492.* Emphysema 496.* Chronic airway obstruction, not elsewhere classified 493.2[*] Chronic obstructive asthma is included only when 490.* - 492.* or 496.* is present in any of the **secondary** Diagnosis codes (see step 4). Note: '*' includes all sub variation codes. **Exclude** cases with 493.2 as a primary diagnosis if none of the secondary diagnosis fields contain 490.*-492.* or 496.
Step #4	From each dataset, remove duplicates. The following variables may be used to identify duplicate records: hospital code, medical record number, admission date, discharge date, date of birth, sex, and Zip code. Duplicate records may also be due to continuation of data beyond a single record line. In this case, duplicates may be identified using a record sequence number.

	Description
Step #5	For each dataset retain, at least, the following variables. Additional variables may be necessary depending on your state's data. The actual names of the variables may differ. Please consult your data steward and data mangers to understand the variables and coding system, specifically for race and ethnicity variables. • State of residence • County of residence* • Date of admission/visit • Date of discharge • Date of birth or age at time of admission • Sex • Race • Ethnicity * County of residence data collection varies by state. These methods can include a patient self-reporting county of residence, data organizations assigning county of residence by ZIPzip code, or geocoding patient address. Recipients that have access to patient address and have geocoded that address have observed disagreement between the county of residence field and the geocoded county. This is likely due to data vendors assigning county by ZIPzip code, which can overlap county boundaries. When possible, use the geocoded county of residence for data accuracy. For more information, please refer to the [Environmental Public Health Tracking Program - Geocoding Standards document.](#)
Step #6	Merge all datasets from steps 2a, 2b, and 2c where ED visits have been identified after completing steps 3 – 5 for each.
Step #7	Create demographic variables: AgeGroup Create AgeGroup variable using either patient's date of birth and date of admission or age at time of admission. The base format for AgeGroup is by 5-year age groups beginning 0-4 and ending with 85+ resulting in 18 age groups plus one for unknown. Hospitalization counts must be submitted to CDC by these 5-year age groups coded from 1 to 19 (see Data Dictionary). Race and Ethnicity (optional) Race and ethnicity variables are optional for submission to CDC. If race and ethnicity data is being provided, be sure that the coding structure conforms to that laid out in the Data Dictionary. Counts and measures may be generated for recipient portals without specifying race or ethnicity if these data are missing or considered unreliable/inaccurate. Note: For Race and ethnicity, the code 'W' includes White alone. The code 'B' includes Black alone. The code 'O' includes American Indian or Alaskan Native or Asian or Pacific Islander or two or more races. The code 'H' includes those who are 'Hispanic alone' and those who are both 'Hispanic and non-Hispanic'.

	Description
Step #8	Create variable "MonthlyVisits" and summarize data by the following variables coded according to data dictionary: • AgeGroup • County (patient's county of residence as 5-digit FIPS code) • EdVisitYear • EdVisitMonth • Ethnicity (if using) • Race (if using) • Sex Do not expand dataset to include all combinations of these variables where MonthlyVisits equals zero. CDC will expand data and fill in zeros after data are validated. If missing combinations of these variables should not be interpreted as zero (for example, county X didn't report data in year Y), then please include this information in your metadata.
Step #9	Create the following variables and code according to data dictionary: • HealthOutcomeID
Step #10	Create new variable called "RowIdentifier". RowIdentifier should be a sequence of numbers from 1 to the number of rows in your dataset.
Step #11	Order the variables according the schema • RowIdentifier • AgeGroup • County • EdVisitMonth • EdVisitYear • Ethnicity (optional) • HealthOutcomeID • MonthlyVisits • Race (optional) • Sex
Step #12	Convert to XML Before converting to XML, create separate data files for each year of data. The data file should be converted to the .XML file format and the required header inserted into the XML file, according to the Schema found on SharePoint. Insert your state FIPS code in the XML header. This completes the required steps for data submission.

APPENDIX A – RECORDS IDENTIFIED AS ED VISITS

Hospitalization Workgroup
Environmental Public Health Tracking
Revised on March 25, 2022

<u>Sub-team Members</u>

Jenny Camponeschi (WI)
Mary Dinsdale (OR)
Charles Hawley (NAHDO)
Gwen LaSelva (NY)
Sydney Ogden (MI)

Background

Per the requirements provided by the CDC in this Emergency Department (ED) How-to Guide, it states: *"ED Visits include both patients who are admitted to the hospital through the emergency department (inpatients) and those who are treated and released (outpatients); therefore, both inpatient and outpatient data are required for this indicator."*

Given this information, ED datasets need to include patients that were in the ED and treated/released, as well as a subset of inpatient hospitalizations that were admitted through the ED.

In addition, specific criteria indicate how to select inpatient hospitalizations that are admitted from an emergency department.

> *"Restrict the dataset to patients who were admitted from an ED using the following criteria:*
> * *Point of origin code indicates emergency department, or*
> * *CPT codes: 99281-99285, 99288, or G0380-G0384, or*
> * *Revenue codes: 0450-0459, or*
> * *Positive ED charges*

While there are multiple options for selecting hospitalizations that were admitted via the ED, many recipients use a variable indicating the source or point of origin (first bullet point above) and a code indicating ED as the method by which to include this sub-set of data in their ED visit datasets.

Variables to Determine Admittance to Hospital

The SOURCE variable in inpatient hospitalization records is one way to capture the source of the admission. For the "SOURCE" variable, there are 15 different options, including "emergency department" (code = 7). The code for "emergency department" was discontinued on 7/1/2010. The "POINT OF ORIGIN" variable provides another avenue to capture the sub-group of inpatient hospitalizations admitted through the ED but is not available in data sets for all recipients. Because not all recipients have access to the "POINT OF ORIGIN" variable, if they were using the "SOURCE" variable as a proxy, this would lead to the necessity to find another way to include the hospitalizations that were admitted through the ED as of 7/1/2010.

Because this sub-set is a smaller group of the entire ED visit data set, it's possible that a recipient using the "SOURCE" variable to include hospitalizations that were admitted through the ED may not have noticed that the "SOURCE" variable no longer captured hospitalizations that were admitted through the ED.

This Appendix lays out this information so recipients can make informed decisions in effectively and accurately selecting the sub-group of hospitalizations that were admitted through the ED and including them in the ED visit dataset, per CDC requirements.

Important Points to Consider in Preparation of Datasets

* If your state/city is using the "SOURCE" variable, the code for ED was discontinued on July 1, 2010. Therefore, as of this date, using this variable to identify hospitalizations admitted through the ED is no

longer effective and this sub-group of data will not be included. If the only way a recipient is capturing these data is using the "SOURCE" variable and that recipient makes no effort to capture these data by one of the other methods, datasets from 2010 will likely be missing that subset of data.

- Even prior to the discontinuation of the ED option in the "SOURCE" variable, this variable was poorly coded and not accurate and effective in capturing hospitalizations that were admitted through the ED.

- Recipients should communicate with their data stewards to understand and select the best way to capture the sub-group of hospitalizations that were admitted through the ED. Some recipients don't only use one source, but multiple ways to capture this sub-group (e.g., point of origin and revenue codes).

- If your state/city was/is using the "SOURCE" variable to select hospitalizations that were admitted through the ED, you should determine another way to include these data starting on 7/1/10. It is preferable to complete an entire year of data using the same method. This may involve resubmitting 2010 data and updating the accompanying metadata.

- Changes in the way that recipients select hospitalizations that were admitted through the ED should be clearly documented in the metadata for that dataset.

- Recipients that change the methodology by which they select the hospitalizations admitted through the ED (e.g., changing from using the "SOURCE" variable in 2009 to a "flag" variable that indicates any ED charges in 2010) may want to look at the data over a longer period to see if the change in methodology influenced the data. Any deviations in the data should be noted in the metadata for that data set and year.

- If a recipient loses the method by which they select hospitalizations that are admitted through the ED (e.g., the "SOURCE" variable code for ED was discontinued) and they have no other method to select these data, if possible, the recipient should work with their data steward to explore other options to select these data. (For example, the recipient might inquire about the data steward creating a "flag" variable to indicate that there were positive ED charges. It is ideal for this variable to be created/included for the entire year during which the variable is lost.)

- There may be cases when a recipient loses the ability to select hospitalizations that were admitted through the ED (e.g., the "SOURCE" variable code for ED was discontinued) and after working with their data steward, does not have the ability to include this subset of data in any other way. If this is the case, the recipient should contact the CDC to discuss the issue at hand and determine a way to solve it. Metadata should always reflect exactly what data is included (and not included) in the dataset.

- It should be noted that there may be recipients that may not be able to capture the subset of data (hospitalizations admitted through the ED) due to the way their data systems and data sets are established in their state/city.

- If, for whatever reason, the sub-set of data including hospitalizations that were admitted through the ED is not able to be included, it should be noted that data without that specific sub-set are not comparable to data that contain the specific sub-set. This should be indicated in metadata, as well as appear as a footnote on tables/graphs which show multiple years. These references should occur on the national as well as the state portals, so that data users clearly understand that data should not be compared.

- Documentation from the Agency for Healthcare Research and Quality (AHRQ) indicates that overall, ED admissions to inpatient services runs about 16%. This is a benchmark that recipients can use to understand the quality of their data. Note that this is not one specific health condition but includes all admissions.

Scenarios ED Visits Structures

These are possible scenarios on how your emergency department and inpatient data are structured in your state. Please work with your data steward directly to fully understand your data.

State A: Receives 2 datasets - Emergency Department Only and Inpatient Data

State A receives two datasets. The emergency department dataset only includes patients that were only seen in the emergency department. Patients that visited the emergency department and were admitted to the hospital are not included in the emergency department. The inpatient data includes all admissions, which include patients admitted from the emergency department. This state will need to identify inpatient admissions through the emergency department using the selected criteria and merge those into the emergency department dataset.

State B: Receives 1 dataset – Emergency Department Only and Inpatient Data Combined

State B receives one dataset that combines emergency department visits and inpatient data. This state will need to separate out ensure patients are not counted twice in the data – once for the emergency department visit and once for the inpatient admission. Identify patients that had an emergency department visit using the selected criteria. Review the data to evaluate whether a patient is double counted. Identify duplicates by available unique identifier or patient characteristics (age, date of birth, sex, etc.).

State C: Receives 2 datasets – Emergency Department Data (all visits) and Inpatient Data

State C receives 2 datasets. An emergency department dataset that includes all visits to the emergency department and an inpatient dataset. If the emergency department dataset includes all visits including those that were admitted to the hospital, this state only needs the emergency department dataset.

Suggested Methods for the Evaluation of Completeness of ED Visit Datasets
1) For recipients that have the ability, perform a comparison of the four different methods (point of origin code indicating ED, CPT codes, revenue codes, positive ED charges) by which hospitalizations admitted through the ED are captured. It would be interesting to note the differences, if any, in using one method over the other to capture this sub-group. In addition, are there differences (and what are they) when more than one method is used to capture the sub-group.
2) Go back to the data beginning in 2000 and determine if there are changes that seem to correspond with changes in the way data are collected.

3) One possibility for exploring rates is for a recipient to refer to their published state-specific rates (on the Healthcare Cost and Utilization Project website) and compare these rates to the rates that are on the national portal. If there are significant differences, then this provides strong proof that recipients are not getting enough data (or variables) from data stewards in order to report accurate data. Data stewards and/or hospital associations should work to provide a way for recipients to capture hospitalizations that are admitted through the ED if this is not available. If we are certain that inconsistencies are present in the data, it's important to get data stewards in all states on notice that reporting is not consistent to the national program.

4) Documentation from the Agency for Healthcare Research and Quality (AHRQ) indicates that overall, ED admissions to inpatient services runs about 16%. This is a benchmark that recipients can use to understand the quality of their data. For example, recipients can run their data to see the percentage of hospitalizations that are admitted through the ED. If states are finding 5% of inpatient hospitalizations coming in through the ED (or 40%), then this is a signal that something is wrong, and the issue needs to be addressed.

CDC'S ENVIRONMENTAL PUBLIC HEALTH TRACKING PROGRAM

Contact us: trackingsupport@cdc.gov

Visit the Tracking Network today: www.cdc.gov/ephtracking

Follow us on social media:

- Twitter (@CDC_EPHTracking)
- Facebook (facebook.com/CDCEPHTracking)