



Guide to Calculating the Use of Multiple Concurrent Antipsychotics in Children and Adolescents (APC-CH) Measure in the Child Core Set

Introduction

The “Use of Multiple Concurrent Antipsychotics in Children and Adolescents” (APC-CH) measure, which assesses potentially inappropriate prescribing and use of antipsychotic medications among children in Medicaid and the Children’s Health Insurance Program (CHIP), was added to the Child Core Set in 2016.¹ The APC-CH measure is defined as the percentage of children and adolescents 1–17 years of age who were treated with antipsychotic medications and who were on two or more concurrent antipsychotic medications for at least 90 consecutive days during the measurement year (see box for an overview of the measure).

This measure is a high priority for CMS for several reasons: (1) the rapid growth in the use of expensive and high-risk antipsychotics among children and adolescents, (2) the inappropriate prescribing of antipsychotics when not clinically indicated, and (3) the serious side effects of these medications.² CMS provides technical assistance (TA) to states to help them calculate the APC-CH measure.

This TA resource provides a step-by-step guide to calculating the APC-CH measure and describes the sample SAS code and data elements that can be used to calculate the measure.³ The sample SAS code (including the National Drug Code [NDC] list) is available to state Medicaid agencies upon request through the TA mailbox at MACQualityTA@cms.hhs.gov.

Overview of the APC-CH Measure

Definition	The percentage of children and adolescents 1–17 years of age who were treated with antipsychotic medications and who were on two or more concurrent antipsychotic medications for at least 90 consecutive days during the measurement year
Numerator	Medicaid/CHIP enrollees on two or more concurrent antipsychotic medications for at least 90 consecutive days during the measurement year.
Denominator	Medicaid/CHIP enrollees with 90 days or more continuous antipsychotic medication treatment during the measurement year.
Continuous Enrollment	The measurement year.
Allowable Gap	No more than one gap in continuous enrollment of up to 45 days.
Anchor Date	The enrollee must be enrolled on December 31st of the measurement year.
Required Benefits	Medical and Pharmacy.

¹ The APC-CH measure steward is the National Committee for Quality Assurance (NCQA).

² More information about the development and the importance of this measure is available at http://www.ahrq.gov/sites/default/files/wysiwyg/policymakers/chipra/factsheets/chipra_1415-p011-1-ef.pdf.

³ The technical specifications for the APC-CH measure are available in the Child Core Set Resource Manual at <https://www.medicaid.gov/license-agreement-cpt-cdt-nubc.html?file=%2Fmedicaid%2Fquality-of-care%2Fdownloads%2Fmedicaid-and-chip-child-core-set-manual.pdf>. In addition, CMS held a TA webinar about the APC-CH measure on August 23, 2016. The slides and related resources are available at <https://www.medicaid.gov/medicaid/quality-of-care/performance-measurement/child-core-set/index.html>.

Step-by-Step Guide to Calculating the APC-CH Measure⁴

The APC-CH measure is calculated using administrative claims data for the measurement year. For FFY 2017 reporting, states should use claims data from calendar year (CY) 2016. Supplemental data sources, such as electronic health records or registry data, cannot be used to calculate the measure.

Calculating the Denominator

The denominator for the measure is defined as the number of unique Medicaid/CHIP enrollees ages 1 to 17 with 90 days or more of continuous antipsychotic medication treatment. Although denied claims are not included when assessing the numerator, all claims (paid, suspended, pending and denied) must be included when identifying the eligible population.

Step 1: Identify Enrollees Ages 1 to 17 Dispensed Antipsychotic Medications

Calculate the age for each enrollee based on the end date of the measurement year and the enrollee's date of birth. For FFY 2017 reporting, include enrollees if they are 1 to 17 years old as of December 31, 2016. For example, if an enrollee is 16 years and 360 days on December 31, 2016, he or she would be included. If the date of birth for an enrollee is missing, do not include the enrollee in the measure calculation.

Among enrollees ages 1 to 17 years, identify those who were dispensed any of the first- or second- generation antipsychotic medications found in the NDC list, which is included in the ZIP file containing the sample SAS code.

Step 2: Calculate Continuous Enrollment

To be eligible for the measure, enrollees must be continuously enrolled in Medicaid or CHIP during the measurement year. An enrollee can have no more than one gap in continuous enrollment of up to 45 days, and must be enrolled on the last day of the measurement year (the "anchor date" for the measure). When reporting at the Medicaid/CHIP program level, enrollees should be assessed for continuous enrollment in "any plan." An enrollee who switched health plans (or who moved between fee-for-service and managed care) during the measurement period is still considered continuously enrolled as long as there is at most one gap in enrollment up to 45 days.⁵ To be eligible for the measure, each enrollee must also have medical and pharmacy benefits during the continuous enrollment.

Step 3: Identify Dispensing Events

For each enrollee that meets the criteria defined in Steps 1 and 2, identify all antipsychotic dispensing events during the measurement year. To identify dispensing events, look for a dispensed prescription of any of the antipsychotic medications in the NDC list, which is included in the ZIP file containing the sample SAS code.⁶

⁴ The APC-CH measure development was funded by the Agency for Healthcare Research and Quality (AHRQ) and the Centers for Medicare & Medicaid Services (CMS) under the CHIPRA Pediatric Quality Measures Program Centers of Excellence grant number U18 HS020503-03. AHRQ, in accordance to CHIPRA 42 U.S.C. Section 1139A(b), and consistent with AHRQ's mandate to disseminate research results, 42 U.S.C. Section 299c-3, has a worldwide irrevocable license to use and permit others to use products and materials from the grant for government purposes which may include making the materials available for verification or replication by other researchers and making them available to the health care community and the public if such distribution would significantly increase access to a product and thereby produce substantial or valuable public health benefits. The Measure, while copyrighted, can be reproduced and distributed, without modification, for noncommercial purposes, e.g., use by health care providers in connection with their practices. Commercial use is defined as the sale, license, or distribution of the Measure for commercial gain, or incorporation of the Measure into a product or service that is sold, licensed, or distributed for commercial gain. Commercial uses of the Measure require a license agreement between the user and The National Committee for Quality Assurance (NCQA). NCQA shall not be responsible for any use of the Measure. NCQA makes no representations, warranties, or endorsement about the quality of any organization or physician that uses or reports performance measures and NCQA has no liability to anyone who relies on such measures. NCQA performance measures and specifications are not clinical guidelines and do not establish a standard of medical care.

⁵ In some states, rates are calculated at the health plan level. States should create a state-level rate by combining rates across multiple reporting units. For additional guidance on calculating state-level rates, refer to the TA Brief, "Developing State-Level Rates Using Data from Multiple Sources," available at <https://www.medicaid.gov/medicaid/quality-of-care/downloads/state-level-rates-brief.pdf>.

⁶ Note that first-time prescriptions for an enrollee must be dispensed before October 3 to meet the 90-day eligibility criteria.

Step 4: Calculate Length of Drug Events

Identify start and end dates for drug events, which are defined separately by drug using the Drug ID field in the NDC list.

- For each Drug ID identified in Step 3, sort dispensing events chronologically by dispensing date.
- If there is more than one prescription for the same medication dispensed on the same day, use the prescription with the longest days' supply.
- Starting with the first prescription in the measurement year, search for a second dispensing event for the same drug. If there is no second event with the same Drug ID, define the drug's start date as the date it was dispensed and the end date as the start date plus the days' supply, minus one. For example, a January 1 prescription with a 30 days' supply has an end date of January 30.
- If there is a second dispensing event with the same drug ID, determine if the gap between the first and second prescription's start date is less than or equal to the first prescription's supply plus 32 days. If so, add the second prescription to the first prescription and count the gap days between the prescriptions as continuous use of the antipsychotic.⁷ For example, the enrollee in the table below would have a treatment start date of 7/1/2016 and an end date of 9/30/2016, with one allowable gap. Note that multiple gaps in continuous use of an antipsychotic are allowed between drugs of the same drug ID, as long as the number of days between (but not including) the first prescription's dispense date and the second prescription's dispense date is less than or equal to the first prescription's days supply plus 32 days. Therefore, continue assessing all subsequent dispensing events with allowable gaps for the same Drug ID and adjust end dates of the drug event as needed.

Denominator Example

Drug ID ^a	Start Date	Days' Supply	End Date	Allowable Gap	Notes
1	7/1/2016	30	7/30/2016	62 (30 days' supply plus 32 days)	Gap between 7/1/2016 start date for Dispensing Event #1 and 9/1/2016 start date for Dispensing Event #2 = 61 days Because 61 does not exceed 62, gap is allowable
1	9/1/2016	30	9/30/2016	62 (30 days' supply plus 32 days)	End date assigned (9/30/16); no other dispensing events

^a Note that gaps between prescriptions of different drugs are not assessed or counted.

If there is a second dispensing event with the same Drug ID and there is a gap that exceeds the allowable gap, assign an end date for this drug event and follow the beginning of step 4 for the remaining dispensing events. An enrollee can have multiple start and end dates per Drug ID during the measurement year. Continue calculating the length of dispensing events by each drug ID until there is a non-allowable gap (that is, the gap between the first and second prescription's start date is more than the first prescription's days' supply plus 32 days), events are exhausted, or events go beyond December 31. If an event goes beyond December 31, assign December 31 as the end date.

Step 5: Identify Enrollees with Consecutive Treatment Days

If an enrollee has at least 90 consecutive treatment days with at least one drug, include the enrollee in the denominator. Note that consecutive treatment can include different medications (as long as there are no gaps between treatment days). Examples of 90 days of consecutive treatment could include: (1) one 90-day supply of one drug, (2) multiple consecutive prescriptions of the same drug (with or without allowable gaps), or (3) multiple consecutive prescriptions for different drugs (with no gaps between treatment days).

⁷ If a record includes more than one prescription for the same medication dispensed on the same day, use only the prescriptions with the longest days' supply. If there are 2 or more prescriptions that all had longest days' supply (e.g., four prescriptions for 90 days' supply), select one arbitrarily.

Calculating the Numerator

The numerator is defined as the number of enrollees who are dispensed two or more antipsychotic medications concurrently for at least 90 consecutive days.⁸

Step 1: Identify Drug Events

For each enrollee, identify the start and end dates for each drug event identified in Step 4 of the denominator.

Step 2: Identify Concurrent Treatment

Identify enrollees with overlapping treatment with two or more different antipsychotic medications using the drug event start and end dates identified in Step 1 of the numerator. Among enrollees with concurrent treatment, count the number of consecutive days that the enrollee was treated with two or more medications. If the number of consecutive days on two or more medications is at least 90 days, the enrollee is numerator compliant. If the number of consecutive days on multiple drugs is less than 90, but the days between the first drug-event end date and the next drug-event start date is not more than 15 days, include the days in the concurrent drug event. For example, if the enrollee is on multiple antipsychotics for 60 consecutive days and then has a gap of 15 days or less before the next day they are on multiple antipsychotics, those gap days are allowed and counted as days in the multiple concurrent drug event. An enrollee may have more than one gap in treatment with multiple antipsychotics, as long as each gap is not more than 15 days.

Calculating the Rates

Calculate the measure rates based on the de-duplicated number of enrollees in the numerator and denominator (defined as numerator/denominator *100). The measure should be reported for three age stratifications (1–5 years, 6–11 years, and 12–17 years) and a total rate. The total rate is the sum of the numerators for the three age stratifications divided by the sum of the denominators for the three age stratifications.

The rates should be rounded to one decimal. When reporting rates, states should note any deviations from the measure specifications (such as measurement year or data source), as well as any eligible populations excluded from the measure. Note that for this measure, lower rates indicate better performance.

Overview of the Sample SAS Code for the APC-CH Measure and Related Resources

The rest of this TA resource describes the content of the sample SAS code. Because the data availability, format, and file structures may vary across states, the sample SAS code should be customized to each state's data system. Additionally, the code is designed to handle continuous enrollment in a single program and will need to be adapted if a state needs to account for changes in enrollment across programs (Medicaid and CHIP), delivery systems managed care or fee-for-service), and managed care plans.

The sample SAS code includes four parts:

1. **Data Preparation.** This section of code establishes the location of input and output datasets needed to calculate the measure.
2. **Denominator.** This section of code identifies the eligible population for the measure, which includes enrollees 1 to 17 years old with 90 days of continuous antipsychotic medication treatment during the measurement year. This code uses the input datasets identified in the Data Preparation step. The output file produced by this step (“denominator_output”) contains enrollees that meet the denominator definition.
3. **Numerator.** This section of code identifies the numerator for the APC-CH measure, which includes enrollees taking two or more concurrent antipsychotic medications for at least 90 consecutive days during the measurement year. This

⁸ Note that all enrollees in the numerator must also meet the denominator criteria and be included in the denominator.

code uses the output file (“denominator_output”) from the Denominator step. The output file produced by this step (“numerator_output”) includes enrollees that meet the numerator and denominator definitions.

4. **Aggregation.** This section of code calculates measure rates based on the denominator and numerator counts included in the output file from the Numerator step (“numerator_output”). The output file produced by this code (“measure_results”) includes a total rate and rates for each of the three age groups (1–5 years, 6–11 years, and 12–17 years).

Other resources used to calculate the APC-CH measure for FFY 2017 include:

1. **FFY 2017 Child Core Set APC-CH Measure Specifications.** The measure specifications for the APC-CH measure can be found in the Child Core Set Technical Specifications and Resource Manual, which are available at <https://www.medicaid.gov/license-agreement-cpt-cdt-nubc.html?file=%2Fmedicaid%2Fquality-of-care%2Fdownloads%2Fmedicaid-and-chip-child-core-set-manual.pdf>.
2. **2017 Antipsychotic Medication National Drug Codes Table (APC-A_2017.xlsx).** This file, which is included in the ZIP file, contains the names, drug identifiers (Drug IDs), and NDCs for antipsychotic medications used to identify the measure denominator.

Input Data Needed to Calculate the APC-CH Measure

As specified in the Data Preparation step, input datasets should use the file names and include the mandatory variables listed in Table 1.

Table 1. Overview of Input Files, File Names, and Mandatory Variables Used to Calculate the APC-CH Measure

Input File	File Name	Mandatory Variables
Enrollment File	Enrollment	EnrollID, DOB, StartDate, FinishDate, Drug, Medical
Pharmacy File	Pharmacy	EnrollID, PDaysSup, PrServDate, NDC, SuppData
NDC Codes (contained in ZIP file)	APC-A_2017	NDC_Code, Drug_ID

Variable names should follow the specifications in Table 2. In order to use the sample SAS code without modification, the enrollment and pharmacy input files should be in .csv format with no header row, and the values for each data element should be formatted according to the data element description in Table 2. The data elements in Table 2 are organized by their file input source and are described along the following dimensions:

- Data Element Name – the name of the data element.
- Data Element Description – a brief description of the data element.
- Variable Name – the name of the variable that represents the data element, as it appears in the sample SAS code.

Table 2. Input File Data Elements

Data Element Name	Data Element Description	Variable Name
Enrollment File (enrollment)		
Enrollee ID	Sequence of numbers and/or characters that uniquely identify an enrollee.	EnrollID
Date of Birth	Enrollee's date of birth (YYYYMMDD).	DOB
Start Date	Date enrollee enrolled or the notification date (YYYYMMDD).	StartDate

Data Element Name	Data Element Description	Variable Name
Finish Date	Date enrollee disenrolled, if there is a start date (YYYYMMDD).	FinishDate
Drug Benefit	If enrollee has an ambulatory prescription benefit (0/1 flag).	Drug
Medical Benefit	If enrollee has medical benefit (0/1 flag).	Medical
Pharmacy Claims File (pharmacy)		
Enrollee ID	Sequence of numbers and/or characters that uniquely identify an enrollee.	EnrollID
Days' Supply	The number of days the prescription should last if taken according to directions (numeric or blank).	PDaysSup
Service Date	Date when the prescription is filled (YYYYMMDD).	PrServDate
NDC Drug Code	Type of drug.	NDC
Supplemental Data	If enrollee has supplemental data. Supplemental data includes electronic health records and registry data and should be excluded from the measure calculation (0/1 flag).	SuppData

The Numerator step will generate an output file called “numerator_output” containing the data elements described in Table 3. This file includes all enrollees in the denominator and indicates which enrollees are included in the numerator. The variable “Meas” includes indicators for each age category.

Table 3. Data Elements for Calculating the Measure Rate (numerator_output)

Data Element Name	Data Element Description	Variable Name	Variable Type
Enrollee ID	Sequence of numbers and/or characters that uniquely identify an enrollee.	EnrollID	Character
Measure ID	This variable is used to identify the age groups for which this measure is reported, and can take on the value of APC1 (Age 1–5), APC2 (Age 6–11), APC3 (Age 12–17).	Meas	Character
Numerator	This variable can take on the value 0 (not in the numerator) or 1 (in the numerator).	Num	Numeric

As shown in Table 4, the Aggregation step generates measure rates using the information in the numerator output file. For Core Set measure reporting, states should submit three age-specific rates (1–5 years, 6–11 years, and 12–17 years), and a total rate.

Table 4. Data Elements in Final Measure Results Output File (measure_results)

Data Element Name	Data Element Description	Variable Name
Age	Age range of measure stratification group.	Age
Numerator	Measure numerator.	Num
Denominator	Measure denominator.	Den
Rate	Equals numerator / denominator.	Rate

For Further Information

For technical assistance related to calculating and reporting the APC-CH measure, as well as other Core Set measures, contact the TA mailbox at MACqualityTA@cms.hhs.gov.