Report

Selected Quality Measure Performance

Persistence of Beta-Blocker Treatment After a Heart Attack — National Quality Strategy Domain: Effective Clinical Care

March 2024

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Who we are

IQVIA (NYSE: IQV) is a leading global provider of advanced analytics, technology solutions, and clinical research services to the life sciences industry. IQVIA creates intelligent connections across all aspects of healthcare through its analytics, transformative technology, big data resources and extensive domain expertise. IQVIA Connected Intelligence™ delivers powerful insights with speed and agility — enabling customers to accelerate the clinical development and commercialization of innovative medical treatments that improve healthcare outcomes for patients. With approximately 90,000 employees, IQVIA conducts operations in more than 100 countries.

IQVIA is a global leader in protecting individual patient privacy. The company uses a wide variety of privacy-enhancing technologies and safeguards to protect individual privacy while generating and analyzing information on a scale that helps healthcare stakeholders identify disease patterns and correlate with the precise treatment path and therapy needed for better outcomes. IQVIA's insights and execution capabilities help biotech, medical device and pharmaceutical companies, medical researchers, government agencies, payers and other healthcare stakeholders tap into a deeper understanding of diseases, human behaviors and scientific advances, in an effort to advance their path toward cures. To learn more, visit www.iqvia.com.

About the qualified entity certification program

The Centers for Medicare & Medicaid Services (CMS) Qualified Entity Program (also known as the Medicare Data Sharing for Performance Measurement Program) enables Qualified Entities (QEs) to receive Medicare Parts A and B claims data and Part D prescription claims data to facilitate the evaluation of health care quality and provider performance (more information here). Organizations approved as QEs are required to use the Medicare data to produce and publicly disseminate CMS-approved reports.

The purpose of this report

IQVIA's objective was to combine CMS data with IQVIA's fully-adjudicated administrative claims data to provide a more complete view of healthcare quality performance metrics, and to better measure and quantify vital healthcare processes. This report presents a summary of our findings on beta-blocker use after discharge for acute myocardial infarction (AMI) using a standard process measure endorsed by the National Quality Forum (NQF):

- **Persistence of beta-blocker treatment after a heart attack (NQF-0071)**

The endorsement for NQF-0071 was renewed in 2020. To be compliant with its endorsed specifications (See: 2019 version & 2023 version), IQVIA created an alternative measure for NQF-0071 by slightly modifying its code-based definitions of inclusion, exclusion (See Appendix 1 for full code lists) and performance met. This report will provide the public with an evaluation of standards of care across a more diverse group of patients in terms of age, gender, and geographic location.

What this report measures

This report measures the percentage of patients 18 years of age and older during the measurement year (2019) who were hospitalized and discharged from July 1, 2018, to June 30, 2019, with a diagnosis of AMI, and who were prescribed persistent beta-blockers after discharge. The technical specifications for this report were adapted from those used by the National Committee for Quality Assurance (NCQA). This report measures the percentage of patients 18 years of age and older during the measurement year (2019) who were hospitalized and discharged from July 1, 2018, to June 30, 2019, with a diagnosis of AMI, and who were prescribed persistent beta-blockers after discharge. The technical specifications for this report were adapted from those used by the National Committee for Quality Assurance (NCQA).

To be included as an eligible case all the following criteria should be met:

- Age ≥ 18 years within measurement year (2019).
- Discharge(s) for AMI between July 1 of the year prior to the measurement year (2018) to June 30 of the measurement period (2019).
- Observed patient encounter(s) during performance period (2019).

Cases are excluded if any of the following criteria are met:

- A diagnosis of asthma, chronic obstructive pulmonary disease, obstructive chronic bronchitis, chronic respiratory conditions due to fumes and vapors, hypotension, heart block >1 or sinus bradycardia any time during the patient's history through the end of the measurement period.
- A medication dispensing event indicating a history of asthma any time during the patient's history through the end of the measurement period.
- Identified as having an intolerance or allergy to beta-blocker therapy.
- Hospitalization(s) in which the patient was transferred directly to a non-acute care facility for any diagnosis.
- Advanced illness and frailty.
- Use of hospice services any time during the measurement period or enrolled in an I-SNP or living long-term in institutional settings.

In specification documents for NQF-0071 some inclusion/exclusion criteria, and the performance measure itself, were defined using quality reporting, non-billable HCPCS G-codes. These non-payable G-codes are sparsely populated in most commercial claims databases so creating the denominator and measuring performance would not be possible in IQVIA commercial claims and would provide no added value over CMS FFS claims alone. In addition, with respect to the performance measure, no specifications were provided for handling overlapping beta-blocker prescriptions or medication stockpiling. Therefore, it was necessary to make proxy definitions/rules for inclusion/exclusion criteria and the performance measure using only ICD10, CPT codes, and/or dispensing records. Additionally, minor changes to the value sets and medication lists we made to reflect current practice. Without making these changes IQVIA would not be able to accurately report on the NQF-0071 performance measure in the comingled data.

Our proxy definitions/rules for inclusion/exclusion criteria and the performance measure using only ICD10, CPT codes, and/or dispensing records provide more up-to-date clinical characterizations that are not reliant on non-payable G-codes; *these codes have transportability across most commercial claims databases.*

Why this measure is important

Clinical guidelines recommend the use of beta-blockers in patients who experience an AMI as beta-blockers confer short-term benefits like reducing the infarct size and lowering the risk for ventricular arrhythmias, and long-term benefits like improving the preservation of the left ventricular function, mitigating maladaptive ventricular remodeling, and reducing the risk of heart failure. At the same time, it is not clear how often patients are maintained on beta-blocker treatment after an AMI as recommended. As a relatively low-cost treatment modality with known efficacy in reducing the risk and severity of reinfarction, and mortality overall, strategies to increase beta-blocker use in this patient population are needed. The objective of generating performance metrics beta-blocker use is to help inform population-level strategy development and prioritizations for intervention.

Data sources

IQVIA PharMetrics Plus® for MedTech:

IQVIA PharMetrics Plus for MedTech (PMTX-M) is a health plan claims database comprised of fully-adjudicated medical and pharmacy claims for more than 100 million unique enrollees since 2006. Data contributors to PMTX-M are largely commercial health plans. PMTX-M representative of the commercially insured US national population for patients under 65 years of age. PMTX-M contains a longitudinal view of inpatient and outpatient services, prescription and office/outpatient administered drugs, costs, and detailed enrollment information. All data are compliant to the Health Insurance Portability and Accountability Act (HIPAA) to protect patient privacy.

Comingled data asset:

IQVIA comingled Medicare Fee-for-Service (FFS) data and IQVIA PMTX-M for 2018 and 2019 only. CMS makes all Parts A, B, and D Medicare FFS data available to approved QEs. Enrollees' data from both CMS and approved PMTX-M suppliers with Parts A & B or Med/Rx were combined, and common patients were linked using unique, de-identified patient IDs. One caveat, CMS beneficiaries who were enrolled with Medicare Advantage (alternative to FFS Medicare parts A, B and D) for a given month will be considered unenrolled for that month since we do not have corresponding medical claims.

How the measure was calculated

To accurately produce performance measures in these data we must implement strict inclusion/ exclusion criteria of the underlying base population to create valid denominators. In line with the NCQA technical specifications, this analysis did not require risk adjustment or use of an outlier method.

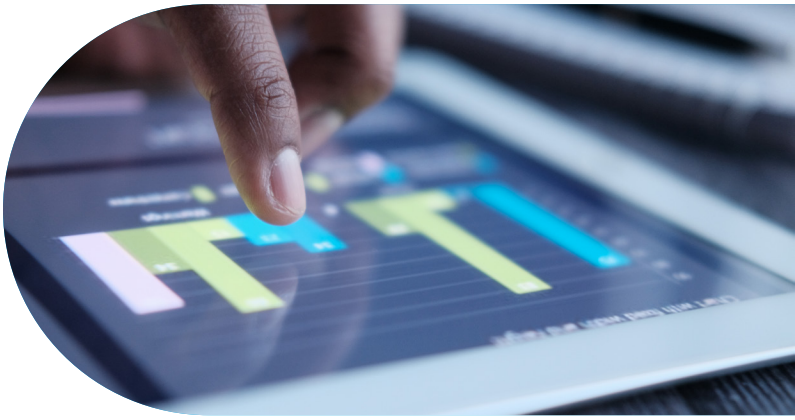
We identified the population eligible (denominator) by selecting patients 18 years of age and older as of December 31 of the measurement year (2019) who were hospitalized and discharged from July 1 of the year prior to the measurement year (2018) to June 30 of the measurement year (2019) with diagnosis of AMI; several exclusions were applied based on patient comorbidities and hospice care.

We defined the performance measure (numerator) as the number of patients who had at least 135 days of treatment with (any) beta-blockers during the 180-day measurement interval post discharge date for the AMI (or index date).

Table 1. Included beta-blockers

Class	Molecule
Noncardioselective beta-blockers	Carvedilol, labetalol, nadolol, penbutolol, pindolol, propranolol, timolol, sotalol
Cardioselective beta-blockers	Acebutolol, atenolol, betaxolol, bisoprolol, metoprolol, nebivolol
Antihypertensive combinations	Atenolol-chlorthalidone, bendroflumethiazide-nadolol, bisoprolol-hydrochlorothiazide, hydrochlorothiazide-metoprolol, hydrochlorothiazide-propranolol

To assess days of treatment within 180-day window, we used dispensed beta blocker days' supply to calculate cumulative beta-blocker treatment days within 180-day post-index date accounting for early refills and stockpiling. For example, if a patient was dispensed a 30-day supply and received a subsequent 30-day supply before the previous prescription days' supply was finished, we assumed the new dispensing would begin following the completion of the previous prescription days' supply.



Patients counted towards the numerator if they met either of the following numerator options:

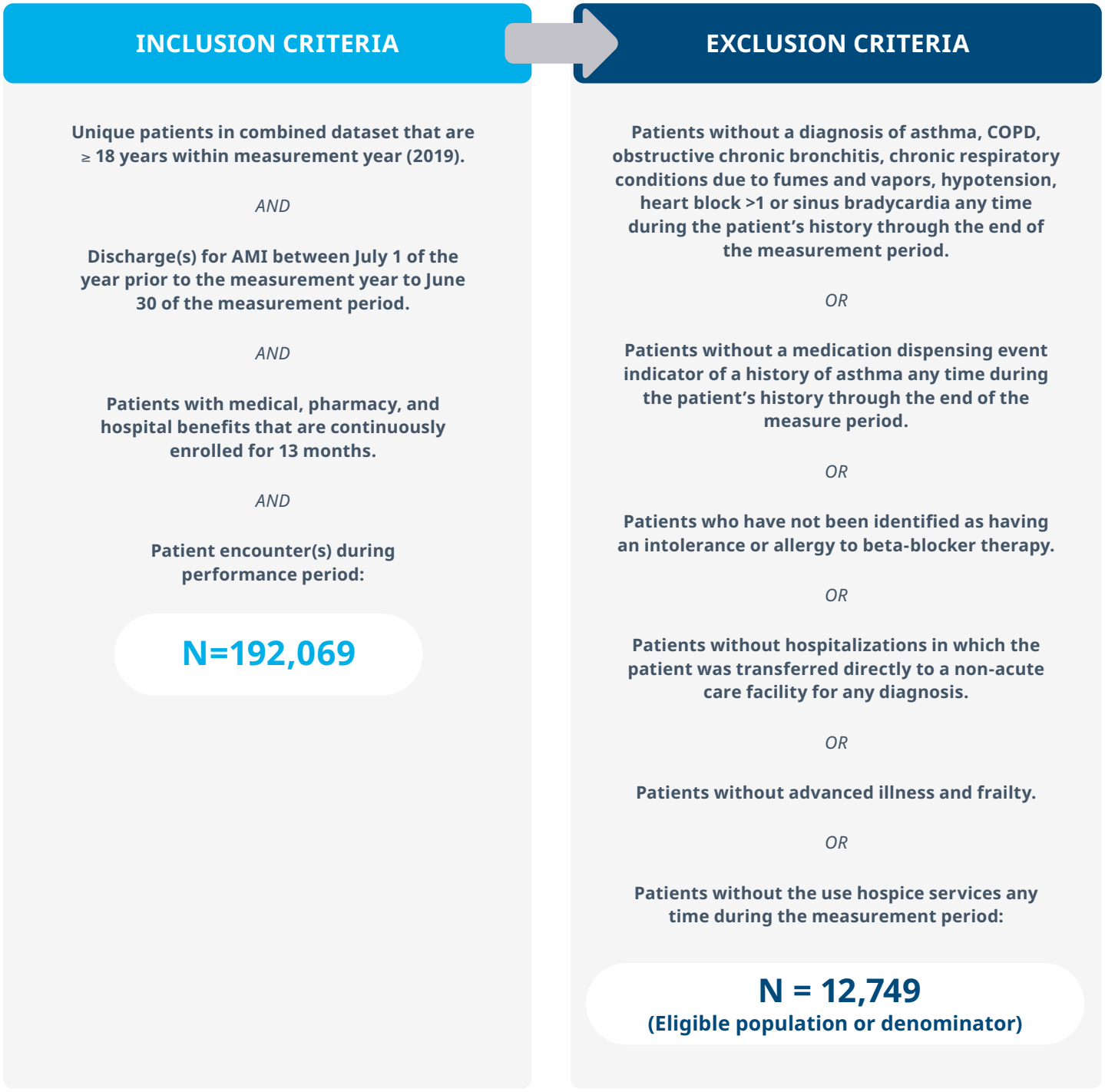
Performance met:
Patients prescribed at least 135 days of treatment with beta-blockers during the 180-day measurement interval post discharge for AMI.

Performance not met:
Patients not prescribed at least 135 days of treatment with beta-blockers during the 180-day measurement interval post discharge for AMI (Patients with some beta-blocker use during the period are noted separately).

Results

There were 43,243,239 unique patients 18 years of age or older within the measurement period (2019), of which 192,069 (0.44%) met inclusion criteria (See Figure 1). After applying exclusions related to beta-blocker contraindication and codes indicative of advanced illness,**12,749 patients** met the criteria for eligibility (i.e., included in the denominator).

Figure 1. Identification of the measure population



Population overview and demographics

Among those ≥18 years old within the selection period (July 2018 to June 2019), 60.3% (n=26,077,957) were 65-84 years old and 44.4% were male (n=19,230,819) in combined CMS and PMTX-M dataset (See Appendix 2). Among the eligible population, more than two thirds were 65-84 years old (n=8,625; 67.5%) (See Figure 2), and a greater proportion were male (n=7,883; 61.8%) (See Figure 3).

Figure 2. Frequency distribution of the eligible population by age group

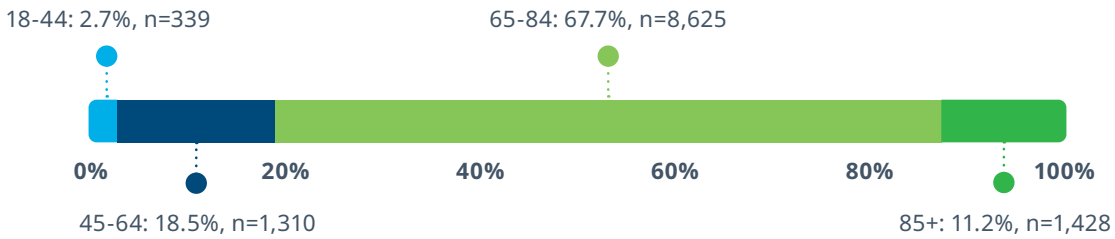
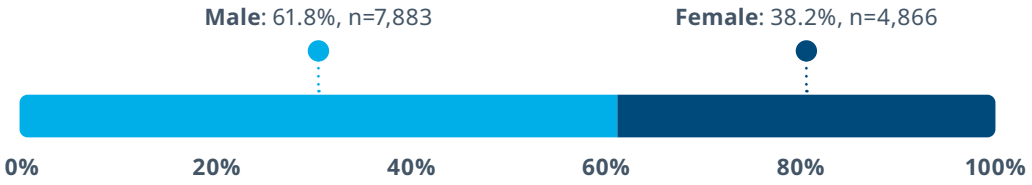
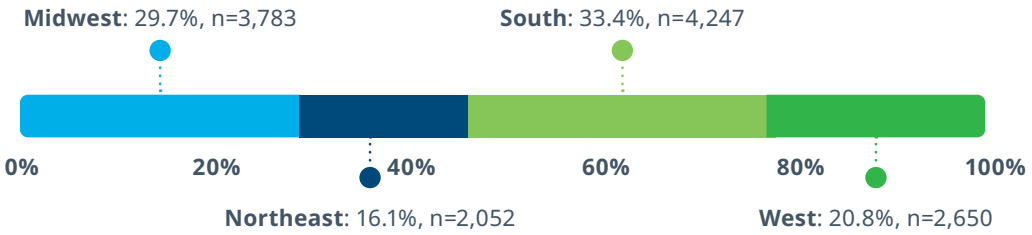


Figure 3. Frequency distribution of the eligible population by patient sex



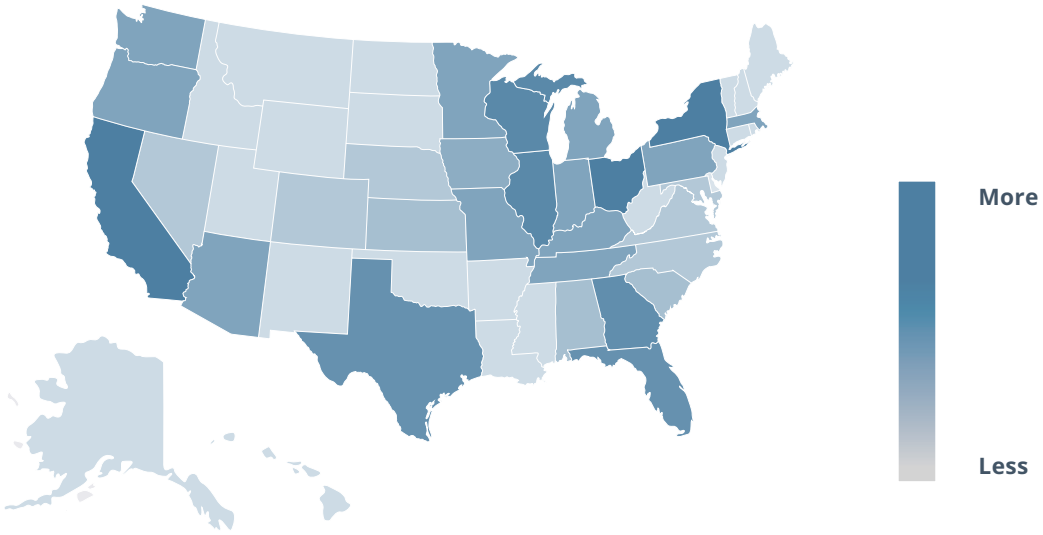
Overall (≥18 years old within the selection period), 37.1% (n=16,042,665) patients reside in the South region (See Appendix 2), which was also the region with the greatest representation among the eligible population (n=4,247; 33.3%) (See Figure 4). Figure 5 shows the eligible cases by state.

Figure 4. Frequency distribution of the eligible population by patient region



Note: Unknown (n=17; 0.1%) was excluded from the figure, but remained in analysis

Figure 5. Frequency distribution of the eligible population by patient state



NQF 0071 numerator(s) and performance rate

Overall, 64.4% had at least 135 days of treatment with beta-blockers, while 35.6% did not; however, slightly more than half of the group without at least 135 days did have some beta-blocker treatment during the measurement period.

Numerator options		
Performance Met	Patient who had at least 135 days of treatment with beta-blockers during the 180-day measurement interval post discharge for AMI	8,211 (64.4%)
Performance Not Met (Primary)	Patient who did not get treated with beta blockers or did not have at least 135 days of treatment with beta-blockers during the 180-day measurement interval post discharge for AMI	4,538 (35.6%)
Performance Not Met (Secondary)	Patient who was treated with beta blockers but did not have at least 135 days of treatment with beta-blockers during the 180-day measurement interval post discharge for AMI	2,336 (51.5% of performance not met group)

Overall, there was 100% data completeness in the comingled set and the overall performance rate is 64.4%.

Performance rate (64.4%)[1]		
Numerator	Performance Met	8,211 (64.4%)
Denominator	Data Completeness Numerator (i.e., perfornce met + performnce not met, primary)	4,538 (35.6%)

[1] (Performance Met=8,211) + (Performance Not Met, primary=4,538) / (Eligible population = 12,749) = 100%

Variations in NQF 0071 performance rates based on age, sex, region, and state

The performance rate was highest in the 65–84 year age group (n=5,869; 68.1%) and lowest in 18-44 year age group (n=145; 42.8%) (See Figure 6), and roughly equivalent between male and female patients (See Figure 7).

Figure 6. Measure performance rate by age group

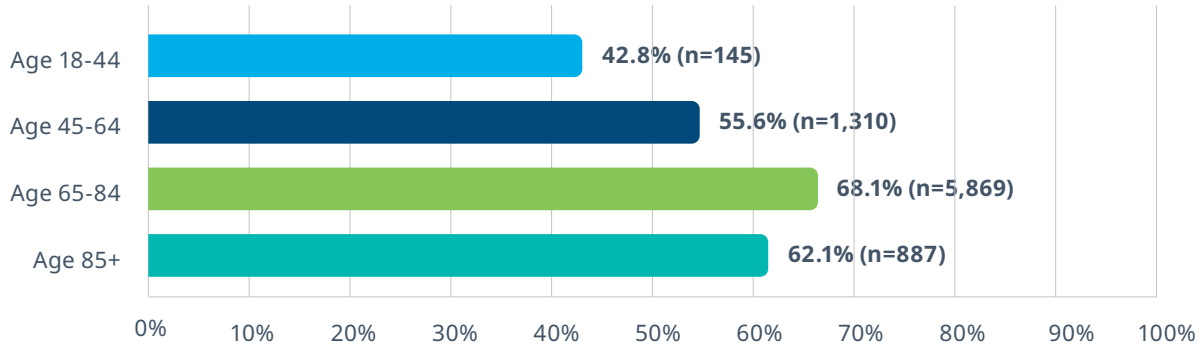
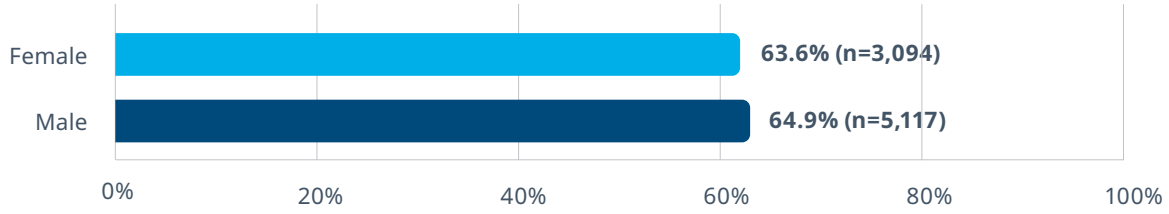


Figure 7. Measure performance rate by sex



The performance rate was highest in the Northeast region (n=1,409; 68.7%) and lowest in the West region (n=1,638; 61.8%) (See Figure 8). Figure 9 and Table 1 show the performance rate by state, which varied minimally.

Figure 8. Measure performance rate by region

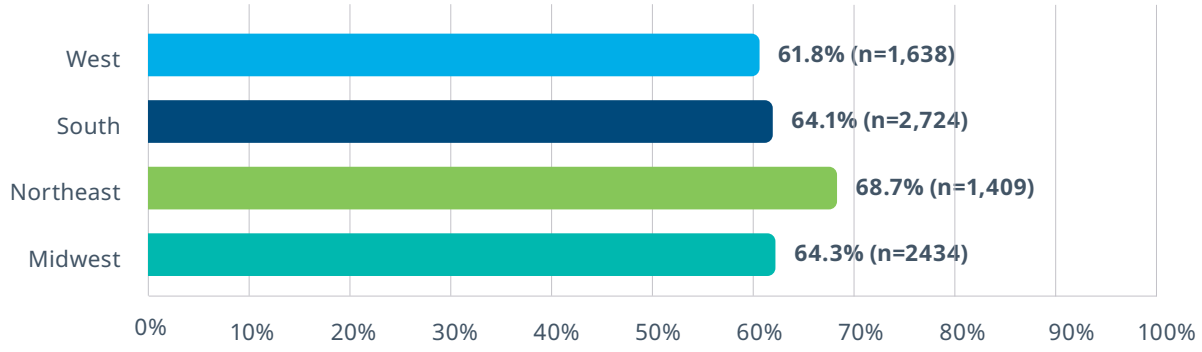


Figure 9. Measure performance rate by state

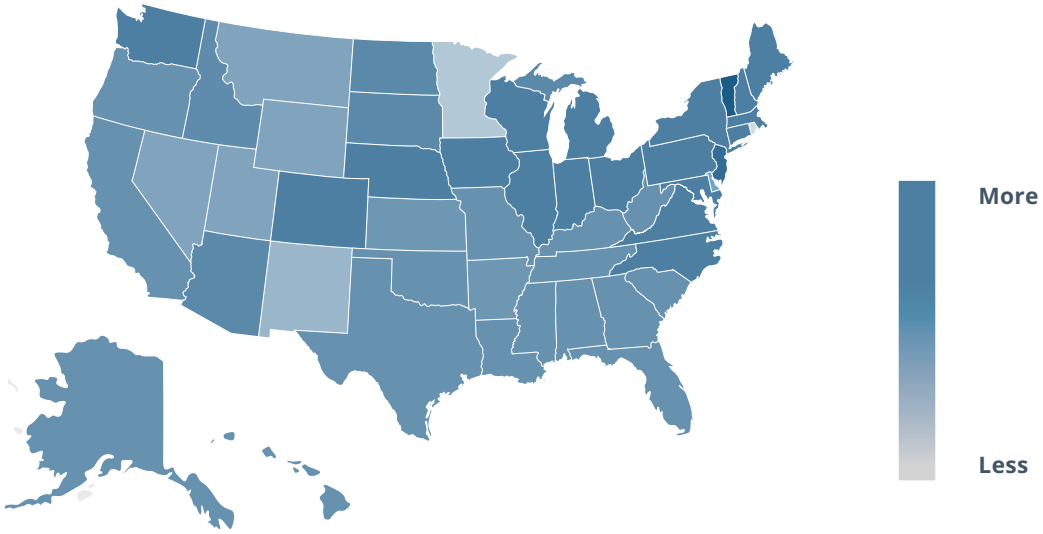


Table 2. Measure performance by state

States	Performance rate	States	Performance rate	States	Performance rate	States	Performance rate
AK	60.0%	ID	64.1%	MT	59.6%	RI	66.7%
AL	62.4%	IL	66.5%	NC	68.1%	SC	64.3%
AR	59.8%	IN	68.6%	ND	66.0%	SD	65.3%
AZ	62.1%	KS	58.9%	NE	74.6%	TN	63.1%
CA	60.2%	KY	63.9%	NH	68.5%	TX	59.3%
CO	70.4%	LA	61.9%	NJ	71.7%	UT	60.3%
CT	63.8%	MA	69.0%	NM	50.0%	VA	70.3%
DC	30.0%	MD	67.2%	NV	56.0%	VT	78.5%
DE	53.6%	ME	66.9%	NY	68.2%	WA	67.9%
FL	64.2%	MI	63.3%	OH	68.3%	WI	65.0%
GA	64.0%	MN	40.1%	OK	61.8%	WV	63.1%
HI	69.4%	MO	62.5%	OR	61.1%	WY	60.0%
IA	69.9%	MS	60.0%	PA	69.5%		

Discussion of findings

After comingling CMS data with IQVIA administrative claims we found overall more than two thirds of the eligible patients had persistent beta-blocker use (defined as >135 days in 180 days) post-AMI in the study period. While there was some minor variation by age, there was little variation in the proportion of patients with persistent beta-blocker use by sex or region. Among those without persistent beta-blocker use, more than half of patients had some beta-blocker use within 180 days of their AMI. Our findings suggest that most eligible patients indicated for beta-blockers are treated with them consistently after an AMI, but some improvements can be made in expanding use overall and ensuring patients start early and adhere to their beta-blocker treatment regimen post-AMI. There are some limitations of this analysis that should be considered. Our clinical definitions, including those for the inclusion/exclusion criteria, are based on administrative claims codes that likely have variable validity. Also, while we made exclusions based on known contraindications, the factors that went into clinical decisions to prescribe or not prescribe beta-blockers are unknown; therefore, there could be valid clinical reasons for never starting or discontinuing beta-blockers in an unknown proportion of patients. Finally, we only analyzed two years of data to compute performance rates and therefore our findings represent 2018/2019 trends alone.

Appendix 1: Clinical code lists

Denominator steps	Description
1	**Patients age at date of service ≥ 18 years (within measurement year 2019)**
2	**Include patients with at least one eligible case identified as:** **Discharge(s) for AMI between July 1 of the year prior to the measurement year to June 30 of the measurement period** (ICD10 codes: I21, I21.0, I21.01, I21.02, I21.09, I21.1, I21.11, I21.19, I21.2, I21.21, I21.29, I21.3, I21.4, I21.9, I21.A, I21.A1, I21.A9, I21.B) **AND** **Select patient encounter(s) during performance period (CPT Codes:** 99201, 99202, 99203, 99204, 99205, 99211, 99212, 99213, 99214, 99215, 99221, 99222, 99223, 99231, 99232, 99233, 99234, 99235, 99236, 99238, 99239, 99241, 99242, 99243, 99244, 99245, 99251, 99252, 99253, 99254, 99255, 99281, 99282, 99283, 99284, 99285, 99291, 99292, 99304, 99305, 99306, 99307, 99308, 99309, 99310, 99315, 99316, 99318, 99324, 99325, 99326, 99327, 99328, 99334, 99335, 99336, 99337, 99341, 99342, 99343, 99344, 99345, 99347, 99348, 99349, 99350, 99381, 99382, 99383, 99384, 99385, 99386, 99387, 99391, 99392, 99394, 99395, 99396, 99397, 99401, 99402, 99403, 99404, 99411, 99412, 99429, 99455, 99456, 99483)
3	**Exclude:** **Patients with a diagnosis of asthma, COPD, obstructive chronic bronchitis, chronic respiratory conditions due to fumes and vapors, hypotension, heart block >1 or sinus bradycardia any time during the patient's history through the end of the measurement period** (ICD10 codes: J45, J45.2, J45.20, J45.21, J45.22, J45.3, J45.30, J45.31, J45.32, J45.4, J45.40, J45.41, J45.42, J45.5, J45.50, J45.51, J45.52, J45.9, J45.90, J45.901, J45.902, J45.909, J45.99, J45.990, J45.991, J45.998, J82.83, J44, J44.0, J44.1, J44.8, J44.81, J44.89, J44.9, J68.4, I44.1, I44.2, I44.4, I44.5, I44.60, I44.69, I44.7, I45.0, I45.10, I45.19, I45.2, I45.3, I45.6, I49.5, I95.0, I95.1, I95.2, I95.3, I95.81, I95.89, I95.9, R00.1,T44.7X5A, T44.7X5D, T44.7X5S) **OR** **Patients with a medication dispensing event indicator of a history of asthma any time during the patient's history through the end of the measure period** (Bronchodilator combinations: TIOTROPIUM BROMIDE MONOHYDRATE, FLUTICASONE-UMECLIDINIUM-VILANTEROL, BUDESONIDE-FORMOTEROL FUMARATE DIHYDRATE, FLUTICASONE FUROATE-VILANTEROL, FLUTICASONE-SALMETEROL, FLUTICASONE-SALMETEROL WITH SENSOR, MOMETASONE FUROATE-FORMOTEROL FUMARATE DIHYDRATE, IPRATROPIUM-ALBUTEROL Inhaled corticosteroids: BECLOMETHASONE DIPROPIONATE, BECLOMETHASONE DIPROPIONATE HFA, BUDESONIDE (INHALATION), CICLESONIDE, FLUNISOLIDE, FLUNISOLIDE HFA, FLUTICASONE FUROATE (INHALATION), FLUTICASONE PROPIONATE (INHALATION), FLUTICASONE PROPIONATE HFA, FLUTICASONE PROPIONATE WITH SENSOR (INHALATION), MOMETASONE FUROATE (INHALATION))

Denominator steps	Description
3	**OR** **Patients who are identified as having an intolerance or allergy to beta-blocker therapy (ICD10 codes:** I44.1, I44.2, I44.4, I44.5, I44.6, I44.60, I44.69, I44.7, I45.0, I45.10, I45.19, I45.2, I45.3, I45.6, I45.9, I95.0, I95.1, I95.2, I95.3, I95.8, I95.81, I95.89, I95.9, R00.1, T44.7X5, T44.7X5A, T44.7X5D, T44.7X5S; CPT codes: G9190) **OR** **Patient hospitalizations in which the patient was transferred directly to a non-acute care facility for any diagnosis** (Patient Discharge Status Codes: 3, 4, 5, 63, 64) **OR** **Patients with advanced illness and frailty** (ICD10 codes: A81.00, A81.01, A81.09, C25, C25.0, C25.1, C25.2, C25.3, C25.4, C25.7, C25.8, C25.9, C71, C71.0, C71.1, C71.2, C71.3, C71.4, C71.5, C71.6, C71.7, C71.8, C71.9, C77, C77.0, C77.1, C77.2, C77.3, C77.4, C77.5, C77.8, C77.9, C78, C78.0, C78.00, C78.01, C78.02, C78.1, C78.2, C78.3, C78.30, C78.39, C78.4, C78.5, C78.6, C78.7, C78.8, C78.80, C78.89, C79, C79.0, C79.00, C79.01, C79.02, C79.1, C79.10, C79.11, C79.19, C79.2, C79.3, C79.31, C79.32, C79.4, C79.40, C79.49, C79.5, C79.51, C79.52, C79.6, C79.60, C79.61, C79.62, C79.63, C79.7, C79.70, C79.71, C79.72, C79.8, C79.81, C79.82, C79.89, C79.9, C91.00, C91.02, C92.00, C92.02, C93.00, C93.02, C93.90, C93.92, C93.Z0, C93.Z2, C94.30, C94.32, F01.50, F01.51, F01.511, F01.518, F02.80, F02.81, F02.811, F02.818, F03.90, F03.91, F03.911, F03.918, F04, F10.26, F10.27, F10.96, F10.97, G10, G12.21, G20, G20.A, G20.A1, G20.A2, G20.B, G20.B1, G20.B2, G20.C, G30, G30.0, G30.1, G30.8, G30.9, G31, G31.0, G31.01, G31.09, G31.1, G31.2, G31.8, G31.80, G31.81, G31.82, G31.83, I09.81, I11.0, I12.0, I13.0, I13.11, I13.2, I50, I50.1, I50.2, I50.20, I50.21, I50.22, I50.23, I50.3, I50.30, I50.31, I50.32, I50.33, I50.4, I50.40, I50.41, I50.42, I50.43, I50.8, I50.81, I50.810, I50.811, I50.812, I50.813, I50.814, I50.82, I50.83, I50.84, I50.89, I50.9, J43.0, J43.1, J43.2, J43.8, J43.9, J68.4, J84.10, J84.112, J84.17, J96.10, J96.11, J96.12, J96.20, J96.21, J96.22, J96.90, J96.91, J96.92, J98.2, J98.3, K70.10, K70.11, K70.2, K70.30, K70.31, K70.40, K70.41, K70.9, K74.0, K74.00, K74.01, K74.02, K74.1, K74.2, K74.4, K74.5, K74.60, K74.69, L89, L89.0, L89.00, L89.000, L89.001, L89.002, L89.003, L89.004, L89.006, L89.009, L89.01, L89.010, L89.011, L89.012, L89.013, L89.014, L89.016, L89.019, L89.02, L89.020, L89.021, L89.022, L89.023, L89.024, L89.026, L89.029, L89.1, L89.10, L89.100, L89.101, L89.102, L89.103, L89.104, L89.106, L89.109, L89.11, L89.110, L89.111, L89.112, L89.113, L89.114, L89.116, L89.119, L89.12, L89.120, L89.121, L89.122, L89.123, L89.124, L89.126, L89.129, L89.13, L89.130, L89.131, L89.132, L89.133, L89.134, L89.136, L89.139, L89.14, L89.140, L89.141, L89.142, L89.143, L89.144, L89.146, L89.149, L89.15, L89.150, L89.151, L89.152, L89.153, L89.154, L89.156, L89.159, L89.2, L89.20, L89.200, L89.201, L89.202, L89.203, L89.204, L89.206, L89.209, L89.21, L89.210, L89.211, L89.212, L89.213, L89.214, L89.216, L89.219, L89.22, L89.220, L89.221, L89.222, L89.223, L89.224, L89.226, L89.229, L89.3, L89.30, L89.300, L89.301, L89.302, L89.303, L89.304, L89.306, L89.309, L89.31, L89.310, L89.311, L89.312, L89.313, L89.314, L89.316, L89.319, L89.32, L89.320, L89.321, L89.322, L89.323, L89.324, L89.326, L89.329, L89.4, L89.40, L89.41, L89.42, L89.43, L89.44, L89.45, L89.46, L89.5, L89.50, L89.500, L89.501, L89.502, L89.503, L89.504, L89.506, L89.509, L89.51, L89.510, L89.511, L89.512, L89.513, L89.514, L89.516, L89.519, L89.52, L89.520, L89.521, L89.522, L89.523, L89.524, L89.526, L89.529, L89.6, L89.60, L89.600, L89.601, L89.602, L89.603, L89.604, L89.606, L89.609, L89.61, L89.610, L89.611, L89.612, L89.613, L89.614, L89.616, L89.619, L89.62, L89.620, L89.621, L89.622, L89.623, L89.624, L89.626, L89.629, L89.8, L89.81, L89.810, L89.811, L89.812, L89.813, L89.814, L89.816, L89.819, L89.89, L89.890, L89.891, L89.892, L89.893, L89.894, L89.896, L89.899, L89.9, L89.90, L89.91, L89.92, L89.93, L89.94, L89.95, L89.96, N18.5, N18.6, L89.119, L89.139, L89.149, L89.159, L89.209, L89.309, L89.899, L89.90, M62.50, M62.81, M62.84, R26.0, R26.1, R26.2, R26.89, R26.9, R41.81, R53.1, R53.81, R54, R62.7, R63.4, R63.6, R64, W01, W01.0, W01.0XXA, W01.0XXD, W01.0XXS, W01.1, W01.10, W01.10XA, W01.10XD, W01.10XS, W01.11, W01.110, W01.110A, W01.110D, W01.110S, W01.111, W01.111A, W01.111D, W01.111S, W01.118, W01.118A, W01.118D, W01.118S, W01.119, W01.119A, W01.119D, W01.119S, W01.19, W01.190, W01.190A, W01.190D, W01.190S,

Denominator steps	Description
3	W01.198, W01.198A, W01.198D, W01.198S, W06, W06.XXXA, W06.XXXD, W06.XXXS, W07, W07.XXXA, W07.XXXD, W07.XXXS, W08, W08.XXXA, W08.XXXD, W08.XXXS, W10, W10.0, W10.0XXA, W10.0XXD, W10.0XXS, W10.1, W10.1XXA, W10.1XXD, W10.1XXS, W10.2, W10.2XXA, W10.2XXD, W10.2XXS, W10.8, W10.8XXA, W10.8XXD, W10.8XXS, W10.9, W10.9XXA, W10.9XXD, W10.9XXS, W18.00, W18.00XA, W18.00XD, W18.00XS, W18.02, W18.02XA, W18.02XD, W18.02XS, W18.09, W18.09XA, W18.09XD, W18.09XS, W18.11, W18.11XA, W18.11XD, W18.11XS, W18.12, W18.12XA, W18.12XD, W18.12XS, W18.2, W18.2XXA, W18.2XXD, W18.2XXS, W18.3, W18.30, W18.30XA, W18.30XD, W18.30XS, W18.31, W18.31XA, W18.31XD, W18.31XS, W18.39, W18.39XA, W18.39XD, W18.39XS, W19, W19.XXXA, W19.XXXD, W19.XXXS, Y92.119, Z59.3, Z73.6, Z74, Z74.0, Z74.01, Z74.09, Z74.1, Z74.2, Z74.3, Z74.8, Z74.9, Z91.81, Z99.11, Z99.3, Z99.81, Z99.89; CPT codes: M1187, M1188, 99504, 99509, E0100, E0105, E0130, E0135, E0140, E0141, E0143, E0144, E0147, E0148, E0149, E0163, E0165, E0167, E0168, E0170, E0171, E0250, E0251, E0255, E0256, E0260, E0261, E0265, E0266, E0270, E0290, E0291, E0292, E0293, E0294, E0296, E0297, E0301, E0302, E0303, E0304, E0424, E0425, E0430, E0431, E0433, E0434, E0435, E0439, E0440, E0441, E0442, E0443, E0444, E0462, E0465, E0466, E0470, E0471, E0472, E0561, E0562, E1130, E1140, E1150, E1160, E1161, E1240, E1250, E1260, E1270, E1280, E1285, E1290, E1295, E1296, E1297, E1298, G0162, G0299, G0300, G0493, G0494, S0271, S0311, S9123, S9124, T1000, T1001, T1002, T1003, T1004, T1005, T1019, T1020, T1021, T1022, T1030) OR **Patients who use hospice services any time during the measurement period or enrolled in an I-SNP or living long-term in institutional settings** (CPT codes: 99377, 99378, G0051, G0151, G0152, G0153, G0155, G0156, G0157, G0158, G0182, G0299, G0300, G0495, G0496, G9473, G9474, G9475, G9476, G9477, G9478, G9479, G9687, G9688, G9690, G9691, G9692, G9693, G9694, G9700, G9702, G9707, G9709, G9710, G9713, G9714, G9715, G9720, G9723, G9725, G9740, G9741, G9758, G9760, G9761, G9768, G9805, G9819, G9858, G9860, G9861, G9996, M1059, M1067, M1154, M1159, M1165, M1167, M1186, M1191, Q5001, Q5002, Q5003, Q5004, Q5005, Q5006, Q5007, Q5008, Q5009, Q5010, S9126, T2042, T2043, T2044, T2045, T2046)

Appendix 2: Full denominator result tables

TABLE 1A: DENOMINATOR CALCULATION (OVERALL)

Description	Patients remaining		Patients excluded	
	N	%	N	%
Unique patients in combined dataset that are ≥ 18 years within the selection period (July 2018 to June 2019)	**43,243,239**			
INCLUSIONS: **Include patients with at least one eligible encounter identified as:** 1) Discharge(s) for AMI between July 1 (2018) of the year prior to the measurement year to June 30 (2019) of the measurement period **AND** 2) Patient encounter(s) during performance period (See analysis plan for CPT codes)	**192,069**	**0.44%**	**43,051,170**	**99.56%**
EXCLUSIONS: 1) Excluding patients with a diagnosis of asthma, COPD, obstructive chronic bronchitis, chronic respiratory conditions due to fumes and vapors, hypotension, heart block >1 or sinus bradycardia any time during the patient's history through the end of the measurement period. **OR** 2) Excluding patients with a medication dispensing event indicator of a history of asthma any time during the patient's history through the end of the measurement period. **OR** 3) Excluding patients who have been identified as having an intolerance or allergy to beta-blocker therapy (any time during the patient's history through the end of the measurement period). **OR** 4) Excluding patients with hospitalizations in which the patient was transferred directly to a non-acute care facility for any diagnosis (any time during the patient's history through the end of the measurement period). **OR** 5) Excluding patients with advanced illness and frailty any time during the measurement period. **OR** 6) Excluding patients who use hospice services any time during the measurement period or enrolled in an I-SNP or living long-term in institutional settings.	**12,749**	**6.64%**	**179,320**	**93.36%**

TABLE 2A: DENOMINATOR CALCULATION BY AGE GROUP

Description		Patients remaining		Patients excluded	
		N	%	N	%
Unique patients in combined dataset that are ≥ 18 years within the selection period (July 2018 to June 2019)	18-44	4,029,741			
	45-64	6,644,038			
	65-84	26,077,957			
	85+	6,491,503			
INCLUSIONS: see Table 1A	18-44	2,507	0.06%	4,027,234	99.94%
	45-64	25,696	0.39%	6,618,342	99.61%
	65-84	111,358	0.43%	25,966,599	99.57%
	85+	52,508	0.81%	6,438,995	99.19%
EXCLUSIONS: see Table 1A	18-44	339	13.52%	2,168	86.48%
	45-64	2,357	9.17%	23,339	90.83%
	65-84	8,625	7.75%	102,733	92.25%
	85+	1,428	2.72%	51,080	97.28%

TABLE 3A: DENOMINATOR CALCULATION BY SEX

Description		Patients remaining		Patients excluded	
		N	%	N	%
Unique patients in combined dataset that are ≥ 18 years within the selection period (July 2018 to June 2019)	Male	19,230,819			
	Female	24,011,664			
	Unknown	756			
INCLUSIONS: see Table 1A	Male	97,007	0.50%	19,133,812	99.50%
	Female	95,062	0.40%	23,916,602	99.60%
	Unknown	0	0.00%	756	100.00%
EXCLUSIONS: see Table 1A	Male	0	0.00%	756	100.00%
	Female	7,883	8.13%	89,124	91.87%
	Unknown	4,866	5.12%	90,196	94.88%

TABLE 4A: DENOMINATOR CALCULATION BY REGION

Description		Patients remaining		Patients excluded	
		N	%	N	%
Unique patients in combined dataset that are ≥ 18 years within the selection period (July 2018 to June 2019)	Midwest	10,704,475			
	Northeast	7,461,976			
	South	16,042,665			
	West	8,859,668			
	Unknown	174,455			
INCLUSIONS: see Table 1A	Midwest	49,309	0.46%	10,655,166	99.54%
	Northeast	39,270	0.53%	7,422,706	99.47%
	South	71,281	0.44%	15,971,384	99.56%
	West	32,013	0.36%	8,827,655	99.64%
	Unknown	196	0.11%	174,259	99.89%
EXCLUSIONS: see Table 1A	Midwest	3,783	7.67%	45,526	92.33%
	Northeast	2,052	5.23%	37,218	94.77%
	South	4,247	5.96%	67,034	94.04%
	West	2,650	8.28%	29,363	91.72%
	Unknown	17	8.67%	179	91.33%

TABLE 5A: DENOMINATOR CALCULATION BY STATE

Description		Patients remaining		Patients excluded	
		N	%	N	%
Unique patients in combined dataset that are ≥ 18 years within the selection period (July 2018 to June 2019)	IA	524,854			
	IL	1,591,320			
	IN	1,256,835			
	KS	425,809			
	MI	1,211,732			
	MN	1,246,212			
	MO	1,067,214			
	ND	106,179			
	NE	282,511			
	OH	2,019,455			
	SD	134,253			
	WI	838,101			
	CT	623,276			
	MA	951,129			

Description	Patients remaining		Patients excluded	
	N	%	N	%
	ME 342,461			
	NH 377,014			
	NJ 1,153,865			
	NY 2,283,204			
	PA 1,494,363			
	RI 113,853			
	VT 122,811			
	AL 621,944			
	AR 469,814			
	DC 67,739			
	DE 170,945			
	FL 2,517,501			
	GA 1,458,424			
	KY 997,141			
	LA 534,396			
	MD 813,060			
	MS 478,487			
	NC 1,292,458			
	OK 561,027			
	SC 776,013			
	TN 831,862			
	TX 2,411,529			
	VA 1,741,524			
	WV 298,801			
	AK 85,223			
	AZ 796,430			
	CA 4,202,642			
	CO 738,029			
	HI 124,815			
	ID 217,600			
	MT 176,988			
	NM 251,390			
	NV 351,950			
	OR 706,045			
	UT 244,789			
	WA 866,056			
	WY 97,711			
	<null> 174,455			

Description		Patients remaining		Patients excluded	
		N	%	N	%
INCLUSIONS: see Table 1A	IA	2,633	0.50%	522,221	99.50%
	IL	8,396	0.53%	1,582,924	99.47%
	IN	5,335	0.42%	1,251,500	99.58%
	KS	2,628	0.62%	423,181	99.38%
	MI	8,409	0.69%	1,203,323	99.31%
	MN	2,172	0.17%	1,244,040	99.83%
	MO	4,191	0.39%	1,063,023	99.61%
	ND	720	0.68%	105,459	99.32%
	NE	1,409	0.50%	281,102	99.50%
	OH	9,673	0.48%	2,009,782	99.52%
	SD	579	0.43%	133,674	99.57%
	WI	3,164	0.38%	834,937	99.62%
	CT	2,399	0.38%	620,877	99.62%
	MA	6,308	0.66%	944,821	99.34%
	ME	2,046	0.60%	340,415	99.40%
	NH	1,406	0.37%	375,608	99.63%
	NJ	5,968	0.52%	1,147,897	99.48%
	NY	11,131	0.49%	2,272,073	99.51%
	PA	8,302	0.56%	1,486,061	99.44%
	RI	835	0.73%	113,018	99.27%
	VT	875	0.71%	121,936	99.29%
	AL	3,130	0.50%	618,814	99.50%
	AR	2,217	0.47%	467,597	99.53%
	DC	331	0.49%	67,408	99.51%
	DE	698	0.41%	170,247	99.59%
	FL	11,291	0.45%	2,506,210	99.55%
	GA	4,602	0.32%	1,453,822	99.68%
	KY	4,643	0.47%	992,498	99.53%
	LA	2,604	0.49%	531,792	99.51%
	MD	3,829	0.47%	809,231	99.53%
	MS	2,081	0.43%	476,406	99.57%
	NC	5,873	0.45%	1,286,585	99.55%
	OK	3,338	0.59%	557,689	99.41%
	SC	3,006	0.39%	773,007	99.61%
	TN	4,569	0.55%	827,293	99.45%
	TX	10,919	0.45%	2,400,610	99.55%
	VA	5,873	0.34%	1,735,651	99.66%
	WV	2,277	0.76%	296,524	99.24%
	AK	341	0.40%	84,882	99.60%

Description		Patients remaining		Patients excluded	
		N	%	N	%
	AZ	2,679	0.34%	793,751	99.66%
	CA	15,789	0.38%	4,186,853	99.62%
	CO	1,500	0.20%	736,529	99.80%
	HI	472	0.38%	124,343	99.62%
	ID	775	0.36%	216,825	99.64%
	MT	667	0.38%	176,321	99.62%
	NM	1,129	0.45%	250,261	99.55%
	NV	1,237	0.35%	350,713	99.65%
	OR	2,768	0.39%	703,277	99.61%
	UT	701	0.29%	244,088	99.71%
	WA	3,538	0.41%	862,518	99.59%
	WY	417	0.43%	97,294	99.57%
	<null>	196	0.11%	174,259	99.89%
EXCLUSIONS: see Table 1A	IA	226	8.58%	2,407	91.42%
	IL	582	6.93%	7,814	93.07%
	IN	436	8.17%	4,899	91.83%
	KS	185	7.04%	2,443	92.96%
	MI	471	5.60%	7,938	94.40%
	MN	292	13.44%	1,880	86.56%
	MO	307	7.33%	3,884	92.67%
	ND	53	7.36%	667	92.64%
	NE	126	8.94%	1,283	91.06%
	OH	819	8.47%	8,854	91.53%
	SD	49	8.46%	530	91.54%
	WI	237	7.49%	2,927	92.51%
	CT	185	7.71%	2,214	92.29%
	MA	323	5.12%	5,985	94.88%
	ME	148	7.23%	1,898	92.77%
	NH	111	7.89%	1,295	92.11%
	NJ	191	3.20%	5,777	96.80%
	NY	686	6.16%	10,445	93.84%
	PA	292	3.52%	8,010	96.48%
	RI	51	6.11%	784	93.89%
	VT	65	7.43%	810	92.57%
	AL	242	7.73%	2,888	92.27%
	AR	97	4.38%	2,120	95.62%
	DC	10	3.02%	321	96.98%
	DE	28	4.01%	670	95.99%

Description	Patients remaining		Patients excluded	
	N	%	N	%
FL	511	4.53%	10,780	95.47%
GA	444	9.65%	4,158	90.35%
KY	346	7.45%	4,297	92.55%
LA	105	4.03%	2,499	95.97%
MD	137	3.58%	3,692	96.42%
MS	80	3.84%	2,001	96.16%
NC	439	7.47%	5,434	92.53%
OK	131	3.92%	3,207	96.08%
SC	255	8.48%	2,751	91.52%
TN	331	7.24%	4,238	92.76%
TX	472	4.32%	10,447	95.68%
VA	489	8.33%	5,384	91.67%
WV	130	5.71%	2,147	94.29%
AK	25	7.33%	316	92.67%
AZ	293	10.94%	2,386	89.06%
CA	1,143	7.24%	14,646	92.76%
CO	115	7.67%	1,385	92.33%
HI	36	7.63%	436	92.37%
ID	64	8.26%	711	91.74%
MT	57	8.55%	610	91.45%
NM	36	3.19%	1,093	96.81%
NV	109	8.81%	1,128	91.19%
OR	332	11.99%	2,436	88.01%
UT	73	10.41%	628	89.59%
WA	327	9.24%	3,211	90.76%
WY	40	9.59%	377	90.41%
<null>	17	8.67%	179	91.33%

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