Measuring Migraine-Related Quality of Care Across 10 Health Plans

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Migraine is a highly prevalent, chronic, episodic condition that is often misdiagnosed and undertreated. The associated healthcare costs are significant, and lost workplace productivity secondary to migraine headache is substantial.[1] Migraineurs have poorer health-related quality of life than individuals with diabetes, hypertension, or depression, thus making it a significant public health concern that is not often recognized.[2]

Migraine affects approximately 12% of adults in a given year, with prevalence 3 times higher in women than men.[2-4] Partly due to its episodic nature, migraine remains undiagnosed in as many as 56% of sufferers, and nearly half of migraineurs have never contacted a physician or used medication to manage their headaches.[1,2,5-8] Although 1 in 4 migraineurs is eligible for preventive treatment, only 12% receive it.[4]

At the personal level, migraine can be debilitating and impair quality of life. At the system level, costs associated with migraine care, both direct costs of medical care and indirect costs of lost productivity, are significant.[9] Direct costs for those who do seek treatment have been estimated at anywhere from $1.25 billion to $11.1 billion annually.[1,9-12] If poorly managed, the condition leads to annual lost productivity estimated in the range of $16.2 to $28.7 billion.[1,9,13] In the workplace, absenteeism due to migraine can result in up to 7 days a year of lost productivity, costing $709 to $4453 per migraineur.[11] Migraine also continues to be among the top 5 conditions with the greatest impact on presenteeism, and thus represents a substantial burden for employers.[1,14]

Because migraine is prevalent and costly, standardized measures are needed to manage and improve care. In 2006, a literature review revealed that no standardized measures existed for monitoring migraine care.[15] In order to begin developing a measurement set, an expert panel was assembled and a set of 20 measures with detailed specifications was developed. These measures focused on quality issues that could be captured through claims data readily available from health plans.[15] An unpublished pilot test was conducted using 2 data sets in 2007, and the measurement specifications were clarified to address identified ambiguities and inconsistencies. In this study we report on the subsequent pilot test of the measurement set.

Objectives: To refine a previously published standardized quality and utilization measurement set for migraine care and to establish performance benchmarks.

Study Design: Retrospective application of the migraine measurement set to health plan data in order to assess patterns of health service utilization.

Methods: Measurement specifications were applied to data from 10 health plans for measurement year 2009.

Results: Of the 2.9 million continuously enrolled members of the health plans, 138,004 (4.7%) met inclusion criteria for the migraine population. Of these, 26% did not have a migraine diagnosis, but were utilizing migraine drugs; 12% had a computed tomography scan within the year (range 8%-25% across plans); and 8% had magnetic resonance imaging (range 6%-11%). Nearly 18% of the migraineurs had 1 or more visits to an emergency department/urgent care center for migraine; few (6%) were followed up with primary care visits. Approximately one-fourth of the migraineurs were not being routinely monitored by a physician. Medication utilization also was examined for members of the migraine population with pharmacy benefits. A significant proportion (42%) were given a migraine preventive, 38% had at least 1 prescription for a triptan, and 2% of those on triptans were potentially overutilizing the medication. Among patients aged 18 to 49 years who were given triptans, 3% had a cardiac contraindication; this percentage rose to 7% for patients aged 50 to 64 years.

Conclusions: This study demonstrates the value of standardized measures in identifying potential quality issues for migraine care, including underdiagnosis, overutilization of imaging, and underutilization of preventive drugs.

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METHODS

This work builds on the previously reported measures.[1,15] A lit-

Take-Away Points

Although migraine is a prevalent and costly chronic condition, a standardized mechanism for measuring health service utilization at the health plan level does not exist. Our research provides a strategy for health plans to:

■ Identify and standardize measurement of health service utilization for a migraine population.

■ Apply the migraine quality of care measurement set to identify and examine care for health plan members with migraine.

■ Establish performance benchmarks.

erature review update was conducted to determine whether any new care standards or measures related to migraine care had been published or endorsed since the original measure-development project. The original measures and the findings from the literature review were presented to an advisory group consisting of clinical experts and quality measurement professionals.

Advisors were chosen based on contributions to the literature on migraine clinical care and measurement, as well as recommendations from the co-primary investigator (SS), a national expert on the topic. The group of advisors engaged in the initial phase of measurement development were invited to continue their participation through the pilot test reported on here. The advisory group is a convenience sample of thought leaders that we the authors believed would contribute to the discussion and review processes. The advisors' recommendations were incorporated into a revised set of measures and specifications.

Measurement specifications were modeled after the Healthcare Effectiveness Data and Information Set (HEDIS) measures on effectiveness of care and utilization. The main categories of measures included diagnosis of migraine, radiology utilization, physician utilization, emergency department (ED)/urgent care center utilization, and utilization of pharmaceuticals. A summary of the measures is provided in **Table 1**.

The sampling frame for the measures was defined as members of a health plan who were aged 18 to 64 years, were insured through either a commercial provider or Medicaid, and had continuous enrollment as defined by HEDIS during the measurement year. The migraine population was identified based on medical and/or pharmacy claims data. Because migraine is underdiagnosed and undercoded, the migraine population, as defined in the specifications, also includes those individuals who did not have a diagnosis of migraine but did have 1 or more claims with a diagnosis of headache, or who were given a drug specific to migraine care.

The Medical Outcomes Research for Effectiveness and Economics Registry (MORE[2]) was selected as the validation study data source because it contained data on multiple health plans and included a wide range of plan sizes and geographic

locations. Inovalon was asked to identify 10 health plans for inclusion in the study. The Thomas Jefferson University Institutional Review Board evaluated the study protocol and determined that it was exempt from further review.

The selected health plans covered a total of 2.9 million lives (**Table 2**). Of the 10 included plans, 5 had commercial members, 3 had Medicaid members, and 2 had both. The plan sizes ranged from 69,359 to 834,285 members, with an average plan size of 292,161 members. The migraine population identified across the 10 plans for measurement year 2009 included 138,004 members. Of these, 27% (36,579) had 1 or more claims/encounters with a coded diagnosis of migraine; 16% (21,718) had multiple episodes of headache, not coded as migraine; 26% (36,223) had at least 1 prescription for a migraine drug; and the remaining 32% of the members (43,484) met more than 1 of these 3 criteria for inclusion in the migraine population.

The 26 migraine quality of care measures were applied to the data for this identified population. Data were analyzed at the plan level and aggregated across plans, with examination of median values and ranges across plans, in order to begin to establish plan-level benchmarks for the measures. The analytic findings were reviewed with expert advisors in November 2010 during an in-person meeting (see Acknowledgments). In addition to review of the findings, the intent of this meeting was to seek input from the advisors on modifications to the measurement set based on the reviewed findings and to improve the utility of the measures for health plans. The data presented in this article are based on the measurement set that was presented to the advisors in November. A number of recommendations (see the Discussion section) were considered in addition to research opportunities that would expand on this work and further validate the measurement set.

RESULTS

As noted above, the migraine population included 138,004 members. The majority of these (80.9%) were female. Migraineurs were identified in 2 separate calculations based on their benefits coverage. Of the individuals with medical benefits, 4.7% had a diagnosis of migraine or medical claims indicative of migraine; 4.9% of those with medical and pharmaceutical benefits were identified as migraineurs.

Findings regarding the measures of radiologic testing, physician visits, and use of emergent and urgent care services are presented in **Table 3**. Within the migraine population, 12% had a computed tomography (CT) scan for migraine during the

■ **Table 1**. Migraine Quality of Care Measurement Set Definitions

Measure	Title	Numerator	Denominator
Diagnosis (DX)			
DX.1	Diagnosis of migraine	All patients with an outpatient, ED, or urgent care center visit for migraine, recurrent headache, or migraine drug/migraine analgesic prescription	All patients in the eligible population
DX.2	Migraine prevalence by sex	*For male prevalence:* All male patients with an outpatient, ED, or urgent care center visit for migraine, recurrent headache, or migraine drug/-migraine analgesic prescription *For female prevalence:* All female patients with an outpatient, ED, or urgent care center visit for migraine, recurrent headache, or migraine drug/-migraine analgesic prescription	All patients in the eligible population
DX.3	Nondiagnosis, patients without a migraine diagnosis who received a prescription for a migraine drug	A prescription for a migraine drug or migraine analgesic without a migraine diagnosis, during an outpatient, ED, or urgent care center visit	All patients in the migraine population
DX.4	Nondiagnosis, prevalence by sex	*For male prevalence:* All male patients with a prescription for a migraine drug or migraine analgesic, without a migraine diagnosis, during an outpatient, ED, or urgent care center visit *For female prevalence:* All female patients with a prescription for a migraine drug or migraine analgesic without a migraine diagnosis, during an outpatient, ED, or urgent care center visit	*For male prevalence:* All men in the migraine population *For female prevalence:* All women in the migraine population
Radiology Utilization (RA)			
RA.1	A CT scan of the head and/or sinuses for migraine	All patients with 1 or more CT scan(s) of the head and/or sinuses for migraine	All patients in the migraine population
RA.2	A CT scan of the head and/or sinuses during an ED visit	All CT scans of the head and/or sinuses for migraine within 48 hours of an ED visit	All CT scans of the head and/or sinuses for migraine
RA.3	A CT or MRI scan of the head and/or sinuses for migraine not during an ED visit	All CT or MRI scans of the head and/or sinuses for migraine not occurring on the same date as an ED visit	All CT or MRI scans of the head and/or sinuses for migraine
RA.4	An MRI scan of the head and/or sinuses for migraine	All patients with an MRI scan of the head and/or sinuses for migraine	All patients in the migraine population
RA.5	Multiple CT or MRI scans for migraine	All patients with more than 1 CT or MRI scan for migraine	All patients in the migraine population
Physician Utilization (PH)			
PH.1	A PCP visit for migraine	One or more PCP visit(s) for migraine	All patients in the migraine population
PH.2	A neurologist visit for migraine	One or more neurologist visit(s) for migraine	All patients in the migraine population
ED/Urgent Care Center Utilization (ED)			
ED.1	An ED/urgent care center visit for migraine	One or more ED or urgent care center visit(s) for migraine	All patients in the migraine population
ED.2	A PCP or neurologist visit within 30 days of a migraine-related ED/urgent care center visit	One or more PCP or neurologist visit(s) within 30 days following an ED or urgent care center visit for migraine	All patients in the migraine population

(Continued)

■ **Table 1**. Migraine Quality of Care Measurement Set Definitions *(Continued)*

Measure	Title	Numerator	Denominator
Pharmacy Utilization (RX)			
RX.1	Prescription for a migraine preventive	Dispensed at least 2 prescriptions for any migraine preventive drug[a]	All patients in the migraine population
RX.2	Prescription for a triptan	Dispensed at least 1 prescription for any triptan[a]	All patients in the migraine population
RX.3	Prescription for an ergot alkaloid derivative	Dispensed at least 1 prescription for any ergot alkaloid derivative[a]	All patients in the migraine population
RX.4a	Prescription for a long-acting opioid	Dispensed at least 1 prescription for any long-acting opioid	All patients in the migraine population
RX.4b	Prescription for a short-acting opioid	Dispensed at least 1 prescription for any short-acting opioid	All patients in the migraine population
RX.4c	Prescription for a rapid-acting fentanyl product	Dispensed at least 1 prescription for any rapid-acting fentanyl product	All patients in the migraine population
RX.5	Prescription for a triptan and a migraine preventive	Dispensed at least 1 prescription for a migraine preventive drug	All patients in the migraine population with a prescription for a triptan during the measurement year
RX.6	Triptan high use	Dispensed more than 12 tablets per month during the prescribing period	All patients in the migraine population with a prescription for a triptan during the measurement year
RX.7	Triptan high use and a migraine preventive	Dispensed at least 1 prescription for a migraine preventive drug	Dispensed more than 12 tablets per month during the prescribing period
RX.8	Prescription for a triptan and cardiac contraindication(s)	A prescription for at least 1 drug associated with cardiac contraindication(s) or with an outpatient, ED, or urgent care center visit with a cardiac contraindication listed as a diagnosis[a]	All patients in the migraine population with a prescription for a triptan during the measurement year
RX.9	Prescription for a triptan and a prescription for an SSRI or SNRI	Dispensed at least 30 tablets/capsules of an SSRI or SNRI	All patients in the migraine population with a prescription for a triptan during the measurement year
RX.10	Multiple prescriptions for an opioid product	Dispensed at least 10 tablets/capsules per month in a 6-month period for an opioid	All patients in the migraine population
RX.11	Multiple prescriptions for a butalbital product	Dispensed at least 10 tablets per month in a 6-month period for a butalbital product	All patients in the migraine population

CT indicates computed tomography; ED, emergency department; MRI, magnetic resonance imaging; PCP, primary care physician; SNRI, serotonin-norepinephrine reuptake inhibitor; SSRI, selective serotonin reuptake inhibitor.
[a]Definitional lists of drugs and diagnoses used for each measure can be provided by the corresponding author upon request.

measurement period, and 8% had a magnetic resonance imaging (MRI) scan. There was variation in utilization of MRI and CT scans in the range of 6% to 11% and 8% to 25%, respectively, across the 10 plans. To be consistent with the evidence-based guidelines, the timing and location of the test were also considered.[16] More than 73% of CT scans and MRIs were completed within 48 hours of an ED visit. The proportion of individuals who had multiple scans was of great importance to this assessment, since they would likely be the population driving utilization. However, we found that only 2% of the migraine population had multiple CT and/or MRI scans, and that more than half of these scans (53%) occurred outside of an ED visit.

More than half of migraineurs (61%) visited their primary care provider to manage their condition, while 13% visited a neurologist. Nearly 18% visited the ED or an urgent care center for migraine-related issues. Few migraineurs (6%) followed up with a primary care provider or neurologist in the month after an ED or urgent care center visit. The data indicated that a quarter of migraineurs were not annually being monitored by a physician, which may have contributed to

ED or urgent care utilization. Studies demonstrate that close monitoring of migraine pain by a physician affects how well the condition is controlled.[17]

Findings for the pharmacy utilization measures, calculated for those individuals in the migraine population who had pharmacy benefits, are shown in **Table 4**. Medication use was common among the study population (RX1-RX4), regardless of a migraine diagnosis: 42% of individuals had at least 2 prescriptions for a migraine preventive (defined as any beta-blocker, tricyclic antidepressant, selective serotonin reuptake inhibitor [SSRI], serotonin-norepinephrine reuptake inhibitor [SNRI], anticonvulsant, calcium channel blocker, cyproheptadine, methylergonnovine, or botulinum toxin type A); nearly 38% had at least 1 prescription for a triptan; and fewer than 1% had a prescription for an ergot alkaloid/derivative. Short-acting opioids were used frequently (50%), whereas long-acting opioids (4%) and rapid-acting fentanyl products (0.1%) were not. Considerable variation was noted in pharmacy utilization rates across plans, with the exception of ergot alkaloid/derivatives and rapid-acting fentanyl products, which both had very low utilization across all plans.

Several measures (RX.5-RX7) looked more closely at triptan use. For those individuals with at least 1 triptan prescription in the measurement year, 52% had at least 1 prescription for a migraine preventive and 2% averaged more than 12 triptan doses per month over the 12-month period. Of those averaging more than 12 triptan doses per month, 70% had at least 1 prescription for a migraine preventive. All 3 of these measures had substantial variations between health plans (Table 4).

■ **Table 2**. Health Plan Characteristics

Characteristics	No. (%)
Population	
Medical benefits	2,921,606
Commercial	2,515,705 (86.1)
Medicaid	405,901 (13.9)
Medical and pharmaceutical benefits	2,474,678
Commercial	2,083,153 (84.2)
Medicaid	391,525 (15.8)
Plan	
Average plan size	292,161
Median plan size	231,908
Range of plan sizes	69,359-834,285

Measures RX.8 and RX.9 looked at whether individuals in the migraine population who were given triptans had lower rates of concurrent cardiac contraindications (ischemic cardiac syndromes, cerebrovascular syndromes, coronary artery disease, peripheral vascular syndromes, or uncontrolled hypertension) or concurrent SSRI/SNRI therapy than those in the migraine population who were not given triptans. Nearly 5% of the migraine population was using triptans despite having cardiac contraindications. Individuals aged 18 to 49 years who were given triptans had a 3% rate of cardiac contraindications, whereas those not given triptans had a 6% rate of cardiac contraindications. In individuals aged 50 to 64 years, a more

■ **Table 3**. Service Utilization

| Measure | Percentage | | |
	Overall	Median	Range
Radiology utilization			
RA.1 CT scan	12.47	11.18	7.71-24.50
RA.2 CT scan during an ED visit	73.21	74.02	58.68-86.18
RA.3 CT or MRI scan not during an ED visit[a]	53.02	55.58	37.70-66.78
RA.4 MRI scan	8.27	8.77	6.02-10.72
RA.5 Multiple scans	2.23	1.83	1.0 -6.00
Physician visits			
PH.1 A PCP visit for migraine	61.10	58.28	52.70-72.73
PH.2 A neurologist visit for migraine[a]	12.86	15.18	3.98-23.84
ED and urgent care center visits			
ED.1 An ED/urgent care center visit for migraine	17.76	15.00	9.78-39.08
ED.2 A PCP or neurologist visit within 30 days of a migraine-related ED/urgent care center visit	5.97	5.19	4.25-11.39

CT indicates computed tomography; ED, emergency department; MRI, magnetic resonance imaging; PCP, primary care physician.
[a]Indicates subsequently altered measure.

■ **Table 4**. Pharmacy Utilization

Measure		Percentage		
		Overall	Median	Range
RX.1	Prescription for a migraine preventive	41.82	43.79	32.74-54.22
RX.2	Prescription for a triptan	37.74	36.49	22.24-44.90
RX.3	Prescription for an ergot alkaloid/derivative	0.79	0.72	0.47-1.07
RX.4a	Prescription for a long-acting opioid	3.80	3.11	1.83-8.99
RX.4b	Prescription for a short-acting opioid	49.53	46.44	33.00-76.50
RX.4c	Prescription for a rapid-acting fentanyl product	0.06	0.04	0.01-0.20
RX.5	Prescription for a triptan *and* migraine preventive	52.04	54.85	43.61-68.04
Rx.6	Triptan high use	2.22	2.23	0.27-5.20
RX.7	Triptan high use *and* migraine preventive	70.43	71.24	66.67-87.50
RX.8	Prescription for triptan *and* cardiac contraindication(s)	4.52	4.98	3.23-7.84
RX.9	Prescription for triptan *and* prescription for SSRI or SNRI	29.32	30.74	22.43-45.68
RX.10	Multiple prescriptions for an opioid product	35.14	33.95	24.12-56.81
RX.11	Multiple prescriptions for a butalbital product	10.29	11.34	7.67-15.10

SNRI indicates serotonin-norepinephrine reuptake inhibitor; SSRI, selective serotonin reuptake inhibitor.

conservative approach was observed, with 7% of those given a triptan having a cardiac contraindication and 19% of those not given a triptan having a cardiac contraindication. Nearly 30% of the migraine population was concurrently given an SSRI/SNRI and a triptan. Individuals aged 18 to 49 years who were given a triptan were observed to be on concurrent SSRI/SNRI therapy 28% of the time, whereas those not given a triptan were on SSRI/SNRI therapy 24% of the time. Those aged 50 to 64 years exhibited similar rates and trends, with 32% of those given a triptan receiving SSRI/SNRI therapy, and 29% of those not given a triptan during the measurement year receiving SSRI/SNRI therapy.

The final 2 RX measures examined multiple prescriptions for opioids and butalbital products in the migraine population. More than one-third (35%) of the migraine population were dispensed an average of 10 doses of opioids per month over a 6-month period (RX.10). Ten percent of the migraine population were given an average of 10 doses of butalbital-containing products per month over a 6-month period (RX.11). Considerable variability was observed for RX.10 between plans, but variability was more modest for RX.11.

DISCUSSION

This study demonstrates several potential quality concerns associated with migraine care and the potential utility of the measurement set in helping health plans examine care for their members with migraine.

Migraine is significantly underdiagnosed and undercoded, with 42% of the migraine population in this study identified by means other than a diagnosis code or visit for migraine in the measurement year. The identified population prevalence (4.7%-4.9%) using the measurement specifications was significantly lower than the 10% to 12% population prevalence rates derived from survey and chart review studies,[2,4] suggesting that many people with migraine may not seek out treatment, or may be misdiagnosed and/or undertreated.

The findings for the identified population nonetheless show that migraineurs are utilizing a considerable number of healthcare services related to their condition. About 20% of migraineurs had a CT scan or MRI scan in the measurement year (2% had multiple scans), close to 18% went to the ED or an urgent care center, and 38% utilized an abortive medication (triptan, ergot alkaloid/derivative, or butalbital-containing product). The data presented in this study represent a sample of 10 plans with broad variability. The migraine quality of care measures provide guidance for the establishment of national benchmarks for utilization of healthcare services and medications for migraine care. This study represents initial efforts to identify benchmarks and provide evidence of how health plans can use them to classify and manage their migraine patients.

This assessment also highlights a number of opportunities for improvement in migraine treatment and management. Initial identification of migraineurs and documentation through claims are key elements of managing migraine pain. As a chronic, episodic condition, migraine must be well con-

■ Table 5. Advisor's Revisions to the 2011 Migraine Quality of Care Measurement Set[a,b]

Measure	Title	Numerator	Denominator
Diagnosis (DX)			
DX.2	Migraine prevalence by sex	*For male prevalence:* All male patients with an outpatient, ED, or urgent care center visit for migraine, recurrent headache, or migraine drug/migraine analgesic prescription *For female prevalence:* All female patients with an outpatient, ED, or urgent care center visit for migraine, recurrent headache, or migraine drug/migraine analgesic prescription	**All males in the eligible population** **All females in the eligible population**
Radiology Utilization (RA)			
RA.3	A MRI scan of the head and/or sinuses for migraine during an ED visit	All MRI scans of the head and/or sinuses **for** migraine occurring **within 48 hours** of an ED visit	All MRI scans of the head and/or sinuses for migraine
Physician Utilization (PH)			
PH.1	A PCP or **neurologist** visit for **headache or** migraine	One or more PCP **or neurologist** visit(s) **where headache or** migraine **is noted as a diagnosis**	All patients in the migraine population
ED/Urgent Care Center Utilization (ED)			
ED.2	A **PCP visit** within 30 days of a migraine-related ED/urgent care center visit	One or more **PCP visit(s)** within 30 days following an ED or urgent care center visit for migraine	All patients in the migraine population
ED.3	**A PCP visit for migraine within 30 days of a migraine-related ED/urgent care center visit**	**One or more PCP visit(s) for migraine within 30 days following an ED or urgent care center visit for migraine**	**All patients in the migraine population**
Pharmacy Utilization (RX)			
RX.2	Prescription for a triptan **and/or ergot alkaloid derivative**	Dispensed at least 1 prescription for any triptan or ergot alkaloid derivative[c]	All patients in the migraine population
RX.6	Triptan high use	Dispensed more than 12 tablets per month during **a 6-month** period	All patients in the migraine population with a prescription for a triptan during the measurement year
RX.8	Prescription for triptan *and* cardiac contraindication(s)	**Dispensed at least 1 prescription for a triptan**	All patients in the migraine population with a prescription for a **drug associated with cardiac contraindication *or* with an outpatient, ED, or urgent care center visit with a cardiac contraindication listed as a diagnosis**

ED indicates emergency department; MRI, magnetic resonance imaging; PCP, primary care physician.
[a]The migraine population is a subset of the eligible population. Patients who have a visit for or diagnosis of migraine or headache were identified through (1) claim/encounter data (1 or more claim(s)/encounter(s) for migraine *or* **any visit where headache is listed as a primary diagnosis**) and (2) pharmacy data (1 or more prescription(s) for a migraine drug or migraine analgesic). The managed care organization must use *both* methods to identify the eligible population; however, to be included in the measure, a member needs to be identified by only 1 method.
[b]Boldfaced entries represent the advisor's revisions.
[c]Definitional lists of drugs and diagnoses used for each measure can be provided by the corresponding author upon request.

trolled to keep utilization of medical services low. Given the generic availability of many migraine abortive and preventive medications, medical services are the primary driver of migraineur cost from a payer perspective. Pain control also has a profound effect on ED and urgent care center visits. Because almost three-fourths of CT scans are completed within 48 hours of an emergent visit, better outpatient management might keep patients out of the ED and reduce neuroimaging rates. Based on the low rate of follow-up subsequent to an ED/urgent care visit, there is great opportunity to improve patient communication and long-term outcomes by encouraging follow-up with a primary care physician or neurologist after emergent visits.

The pharmaceutical results also indicate several opportunities for improvement and further investigation. The great variability in findings across health plans suggests opportunities for improved implementation of care standards and monitoring of appropriate utilization of migraine medications. For instance, triptan utilization (RX.2) varied considerably among plans, as the highest rate of utilization was more than double the lowest rate. The mean triptan utilization rate observed (37.74%) was higher than that reported by a recent population-based study (20%).[18] This higher rate may be due to the way we defined the migraine population, or to the fact that prior work relied on patient self-report.[18]

In the migraine population as a whole, extremely high utilization of opioids as demonstrated by the RX.4 and RX.10 measures was concerning, as opioids are often implicated in medication overuse headaches. Although they are used less frequently than the opioids, butalbital-containing products can also be responsible for medication overuse headaches, and their utilization is not trivial, as shown by measure RX.11. The incidence of high use of triptan (measure RX.6) was encouraging, although individual health plan utilization management controls and our definition (which was designed only to capture the most egregious overusers throughout the measurement year) may have kept the incidence artificially low. However, the use of a migraine preventive (measure RX.7) in this population was not encouraging. Only 70% of these individuals had a prescription for a migraine preventive in the measurement year, and our definition of a preventive was rather generous. In the entire migraine population, 42% used a migraine preventive (measure RX.5), a rate considerably higher than the approximately 17% that was self-reported in a recent publication by Bigal and colleagues.[18] This difference may indicate that our definition of a preventive was too generous.

Based on the results observed with measure RX.9, it appears that migraineurs are not being denied care based on their use of other serotonergic medications. Although more caution

appears to be used in treating patients aged 50 to 64 years, measure RX.8 deserves further investigation because the proportion of triptan users who have cardiac contraindications is not insignificant. Finally, given the black box warning carried by rapid-acting fentanyl products, it was reassuring to see extremely low utilization of these products in measure RX.4c, although every health plan should strive for zero utilization of these products. For many of these measures, greater insight into patient compliance and adherence would be helpful to better understand additional opportunities for improvement.

Limitations

A number of limitations were realized while developing and testing the migraine quality of care measurement set. One of the early challenges was specifying the components to be included. Incorporating what we recognized as best practice based on the US Headache Consortium Guidelines (2000) and the evidence in the literature (2006-2010), we defined a measurement set based on elements known to be drivers of utilization. One limitation may be differences of opinion on how the numerators and denominators were defined. To mitigate disagreement, we enlisted the expertise of an advisory group of headache specialists and employer coalition representatives to review the measures.

The migraine prevalence rate in our study population was just under 5%, which is less than half the rate reported in the literature.[2,4] This lower rate may have resulted from the use of only 12 months of data, as well as relying on claims data rather than chart review and patient report. Nonetheless, the measures should be generalizable to any health plan (other than Medicare), and the data presented provide grounds for any health plan using the measures to compare its performance with the medians and ranges presented here.

Future Directions

The data presented here represent early efforts to establish national benchmarks for migraine care at the health plan level and to validate a standardized approach to measurement. Although further refinement with consultation from the expert advisory group is expected, the measurement set presented in this study has the potential to advance migraine measurement activities.

The advisors provided a number of recommendations to strengthen the migraine quality of care measurement set. There was unanimous agreement that underreporting of migraine is significant and necessitates capture of potential migraineurs in the migraine population. Recurrent headache was defined as 2 or more episodes of headache ≥ 7 days apart in the measurement set (n = 21,718). Rather than identifying this group through a defined time period, the advisors sug-

gested changing this component of the migraine population definition to "any visit where headache is listed as primary diagnosis" (n = 9177). This modification, representing a difference of 12,541 covered lives, would have an effect on most measures, since the migraine population serves as the denominator for a substantial portion of the measurement set.

Additional recommendations were made to modify numerator and denominator definitions to improve the mechanism used to capture elements of migraineur health service and pharmacy utilization. The details of these recommendations are presented in **Table 5**.

The migraine quality of care measurement set provides a framework for assessing migraine care. Additional assessments will be conducted and endorsement will be sought through the National Quality Forum to improve visibility and provide validation that the measures represent the interests of multiple healthcare stakeholders.

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REFERENCES

1. Gagne JJ, Leas B, Lofland JH, Goldfarb N, Freitag F, Silberstein S. Quality of care measures for migraine: a comprehensive review. *Dis Manag.* 2007;10(3):138-146.

2. Rasmussen BK. Epidemiology of headache. *Cephalalgia.* 2001;21(7):774-777.

3. Wilson JF. In the clinic: migraine [published correction appears in *Ann Intern Med.* 2008;148(5):408]. *Ann Intern Med.* 2007;147(9) ITC11-1-ITC11-16.

4. Lipton RB, Bigal ME, Diamond M, Freitag F, Reed ML, Stewart WF; AMPP Advisory Group. Migraine prevalence, disease burden, and the need for preventive therapy. *Neurology.* 2007;68(5):343-349.

5. Diamond S, Bigal ME, Silberstein S, Loder E, Reed M, Lipton RB. Patterns of diagnosis and acute and preventive treatment for migraine in the United States: results from the American Migraine Prevalence and Prevention Study [published correction appears in *Headache.* 2007;47(9):1365]. *Headache.* 2007;47(3):355-363.

6. O'Brien B, Goeree R, Streiner D. Prevalence of migraine headache in Canada: a population-based survey. *Int J Epidemiol.* 1994;23(5):1020-1026.

7. Rasmussen BK, Jensen R, Olesen J. Impact of headache on sickness absence and utilisation of medical services: a Danish population study. *J Epidemiol Community Health.* 1992;46(4):443-446.

8. Lipton RB, Stewart WF, Simon D. Medical consultation for migraine: results from the American Migraine Study. *Headache.* 1998;38(2):87-96.

9. Hu XH, Markson LE, Lipton RB, Stewart WF, Berger ML. Burden of migraine in the United States: disability and economic costs. *Arch Intern Med.* 1999;159(8):813-818.

10. Hawkins K, Rupnow M, Wang S. Direct cost burden of migraine among members of US employers. Poster presented at: American Headache Society Annual Meeting; June 2006; Los Angeles, CA.

11. Munakata J, Hazard E, Serrano D, et al. Economic burden of transformed migraine: results from the American Migraine Prevalence and Prevention (AMPP) Study. *Headache.* 2009;49(4):498-508.

12. Insinga R, Ng-Mak D, Hanson M. Costs associated with outpatient, emergency room and inpatient care for migraine in the USA. *Cephalalgia.* 2011;31(15):1570-1575.

13. Osterhaus JT, Gutterman DL, Plachetka JR. Healthcare resource and lost labour costs of migraine headache in the US. *Pharmacoeconomics.* 1992;2(1):67-76.

14. Goetzel RZ, Long SR, Ozminkowski RJ, Hawkins K, Wang S, Lynch W. Health, absence, disability, and presenteeism cost estimates of certain physical and mental health conditions affecting U.S. employers. *J Occup Environ Med.* 2004;46(4):398-412.

15. Leas BF, Gagne JJ, Goldfarb NI, Rupnow MF, Silberstein S. Assessing quality of care for migraineurs: a model health plan measurement set. *Popul Health Manag.* 2008;11(4):203-208.

16. Silberstein SD, Rosenberg J. Multispecialty consensus on diagnosis and treatment of headache. *Neurology.* 2000;54(8):1553.

17. Lipton RB, Amatniek JC, Ferrari MD, Gross M. Migraine: identifying and removing barriers to care. *Neurology.* 1994;44(6)(suppl 4):S63-S68.

18. Bigal ME, Buse DC, Chen Y, et al. Rates and predictors of starting a triptan: results from the American Migraine Prevalence and Prevention Study. *Headache.* 2010;50(9):1440-1448. ■