Quality improvement in neurology

Headache Quality Measurement Set

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Headache is the most frequent reason for a person to seek care from a neurologist and is the most common subspecialty practice focus identified by neurologists.¹ Although headache is most commonly encountered in primary care,^{2,3} it is also the fourth leading cause of emergency department visits,⁴ with 1.2 million encounters annually in US emergency departments for migraine alone.⁵

Primary headache disorders are extraordinarily common and for many people contribute to significant disability. Although most of the population experiences a primary headache disorder in their lifetime with tension-type headache as the most common disorder,⁶ migraine alone affects 12% of the population in any given year and is accompanied by substantial comorbidities.⁷ The most severe form of migraine, chronic migraine, features a 1% population prevalence, disproportionate disability, and high individual and societal cost.⁸ Recent estimates demonstrate a total annual societal cost on average for a person with chronic migraine exceeding \$8,000 and for episodic migraine approximating \$3,000.⁹

Migraine has its most severe disability during young and middle age, when people are most economically productive in society, adding to the disproportionate burden. According to the 2016 Global Burden of Disease study by the World Health Organization, migraine ranks second among all causes of years lost to disability (YLD)¹⁰ and is the *top* cause of YLD worldwide among persons aged 15–49 years.¹¹ Although less common, cluster headache, the most common trigeminal autonomic cephalalgia, features a lifetime prevalence of 1 in 1,000 persons¹² and is particularly intractable and burdensome.¹³ Cluster headache features extraordinarily severe attacks of pain accompanied by autonomic symptoms. Cluster headache is incredibly disabling; recent studies demonstrate people with cluster headache are twice as likely to miss work¹⁴ and 3 times as likely to have depression.¹⁵

Headache disorders are chronic neurologic diseases characterized by episodic attacks. Therefore, treatment typically consists of a combination of acute strategies meant to reduce attack symptoms and preventive strategies meant to reduce attack frequency. Recent and emerging advances in the treatment of migraine, cluster headache, and other headache disorders have great potential to influence clinical practice across a variety of age groups. These advances include acute and preventive pharmacological therapies, procedures, and nonpharmacological treatments such as neuromodulation devices and behavioral therapies.

In 2015, the American Academy of Neurology (AAN) published the first set of quality measures for headache, with the goal of providing a standard to measure and improve care for patients with headache disorders.¹⁶ Because of such advances in our understanding of these disorders,

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The following measures were approved by the work group. Providers are encouraged to identify the 1 or 2 measures that would be most meaningful for your patient populations and implement these measures to drive performance improvement in practice.

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and in their diagnosis and treatment, we provide an update for quality measurement in headache.

Opportunities for improvement

Treatment advances

Management of headache disorders has rapidly evolved in the recent years, featuring advances in pharmacological, neuromodulation, and behavioral therapies. Since the previous headache measure set publication in 2015, the Food and Drug Administration has approved 8 new migraine-specific preventive and acute medications and cleared 4 neuromodulation devices, including 2 treatments for cluster headache (external vagus nerve stimulation, galcanezumab) and one treatment with a label extending to adolescents (single pulse transcranial magnetic stimulation). Divergent pharmacological treatment patterns across adult and pediatric populations^{17,18} reinforce the need to conceptualize preventive treatment more broadly, as a concept not just restricted to medications.

Opioid use

The prevalent and excessive use of opioids is a public health concern and adversely affects people with headache disorders in a variety of care settings.^{5,19} Excessive opioid use is a risk factor for migraine progression to chronic migraine.²⁰ The AAN and other organizations already feature quality measures directly addressing appropriate opioid use and misuse (table 1), and these measures address opioids in the context of acute therapy recommendations and migraine progression risk factor assessment.

Adherence to treatments

Therapy adherence is a critical issue in the care for patients with headache disorders. Underutilization of prescribed acute migraine-specific therapies may be a risk factor for migraine to progress to chronic migraine.²¹ Acute therapies often require a complex decision-making procedure, taking into account the trade-offs between early treatment to improve efficacy and limiting the use to reduce the risk of

medication overuse.^{22,23} Unfortunately, adherence to preventive therapies is particularly challenging^{24,25} for chronic disorders when episodic symptoms are not active every day. Furthermore, many preventive therapies are intolerable for some patients but often have a latency period requiring consistent use before efficacy manifests to permit patients to make an informed decision about the trade-off between side effects and efficacy. More recent treatments such as monoclonal antibodies, self-administered monthly or quarterly, and onabotulinumtoxinA, administered in the office every 12 weeks, make treatment adherence a less practical factor to assess. Therefore, this measure concept was not developed further. A quality measure on therapy adherence should be considered in the future, not only for medications but also for neuromodulation devices and behavioral therapies as well.

Tension-type headache and neuroimaging

Although tension-type headache is the most prevalent headache disorder in the population and chronic tension-type headache can be disabling, the evidence for preventive treatment is not robust. Therefore, quality measures for the treatment of tension-type headache should be revisited after the emergence of a higher quality of level of evidence. Finally, to exclude secondary causes of headache, clinicians may turn to neuroimaging. An existing AAN quality measure addresses imaging overuse,²⁶ the American College of Radiology has developed appropriateness criteria,²⁷ and the American Headache Society (AHS) has both a Choosing Wisely statement²⁸ and a more specific guideline.²⁹ The quality of more specific neuroimaging hospital protocols for thunderclap headache presentations specifically, including communication between the managing clinician and the radiologist, may be a topic for future consideration.

Methods

The AAN and the AHS formed a work group of key stakeholders from care team members that care for patients with headache. Details of the full measure development process are available online.³⁰ The construction of the work group began

Table 1 Additional relevant measures

ICSI guideline on the diagnosis and treatment of headache
[icsi.org/wp-content/uploads/2019/01/Headache.pdf](https://www.icsi.org/wp-content/uploads/2019/01/Headache.pdf)
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Use of opioids at high dosage in persons without cancer
pqaalliance.org/opioid-core-measure-set

Documentation of signed opioid treatment agreement
aan.com/policy-and-guidelines/quality/quality-measures2/quality-measures/other/documentation-of-signed-opioid-treatment-agreement/

Evaluation or interview for risk of opioid misuse
aan.com/policy-and-guidelines/quality/quality-measures2/quality-measures/other/evaluation-of-interview-for-risk-of-opioid-misuse/

Opioid therapy follow-up evaluation
aan.com/policy-and-guidelines/quality/quality-measures2/quality-measures/other/opioid-therapy-follow-up-evaluation/

Overuse of imaging for the evaluation of primary headache
aan.com/siteassets/home-page/policy-and-guidelines/quality/quality-measures/other-neurologic-conditions/2018universalneurologymeasurements.pdf

with a nomination process from the AAN, which led to the formation of the 12-member work group.

All work group members were required to disclose potential conflicts of interest and completed applications summarizing experiences and interests. The facilitators and chair independently selected members from the pool of qualified specialists and expert nominees. The selection was based on the nominee's experience in performance measures, quality improvement, and clinical activities.

The measure development process included the following: (1) evidence-based literature search, (2) establishing a multidisciplinary work group adhering to the AAN conflict of interest policy, (3) drafting candidate measures and technical specifications, (4) convening the work group virtually to review candidate measures, (5) refining and discussion of the candidate measures, (6) soliciting public comments on approved measures during a 21-day period, (7) refining the final measures according to the input received during the public comment period and corresponding technical specifications, and (8) obtaining approvals from the work group, AAN Quality Measures Subcommittee, AAN Quality Committee, American Academy of Neurology Institute Board of Directors, and AHS Board of Directors.

The work group sought to develop evidence-based measures to support the delivery of high-quality care and to improve patient outcomes. The work group, guided by a medical librarian, conducted a comprehensive literature search, identifying 6,676 abstracts relevant to the potential measures. Data available from AAN.com (Appendix e-2, aan.com/siteassets/home-page/policy-and-guidelines/quality/quality-measures/headache/appendix-2-headache-lit-search.pdf). AAN staff conducted a preliminary review of the literature results to deduplicate articles and eliminate articles that were not pertinent to the topic. The remaining citations were given to the expert work group to review and identify relevant guidelines, systematic reviews, meta-analyses, and quality improvement articles. This yielded 22 guidelines, systematic reviews, and meta-analyses to represent a core feature of the evidence base for the measures developed. After the development of draft measure concepts during the virtual meeting, a public comment period resulted in comments from 17 individuals. This feedback drove concept refinement, which resulted in 6 measures that were approved (table 2). The work group approved measures most applicable to outpatient settings.

The AAN plans to provide resources to review these measures every 6 months. Thus, this measure set aims to provide a working framework for measurement, rather than a long-term mandate.

Results

Our work group developed 6 approved measures. The first 4 topics receiving priority included migraine frequency

documentation, counseling, and management using acute and preventive therapies. The final measures focus on the acute and preventive treatment of cluster headache.

Documentation of migraine frequency

Proper assessment of migraine attack frequency is a core metric foundational for diagnosis, assessing migraine impact, determining appropriate treatment plans, and assessing the impact of treatment. A diagnosis of migraine without aura and migraine with aura requires a cumulative number of attacks in the International Classification of Headache Disorders.³¹ Migraine attack frequency is the major feature that enables the diagnosis of chronic migraine, defined in someone with migraine by having the presence of headache on more than 15 days per month for at least 3 months, of which at least 8 headache days per month fulfill migraine criteria or respond to a migraine-specific medication. 2.5% of people with episodic migraine (<15 days per month of headache) progress to chronic migraine annually, rendering it an important public health problem.²⁰

The decision to initiate preventive therapy for migraine is grounded in an assessment of migraine attack frequency.⁷ Documenting the reduction of migraine frequency is a desired outcome for preventive treatment and requires asking the patient and documenting frequency in a standard format in the medical record.³² A retrospective recall is sufficient for documenting headache and migraine attack frequency. However, migraine attack frequency may be captured more accurately using headache diaries including electronic-based recording tools such as apps on a mobile phone because synchronous monitoring reduces biases associated with retrospective recall.³³

Modifiable lifestyle and chronification factors counseling for migraine

Lifestyle factors influence migraine severity and attack frequency. These include high and variable stress, poor quality sleep, skipping meals, alcohol, and irregular caffeine intake^{34,35} from other dietary sources or medication sources, or both. Assessment and counseling to manage lifestyle factors associated with attack frequency and migraine severity is a fundamental part of education for patients with migraine and requires an individualized approach. This treatment aspect may be particularly important for the pediatric population, especially in the absence of strong evidence for medical preventive therapy.

Lifestyle factors are also potentially modifiable risk factors for migraine to progress to chronic migraine.³⁴ It is particularly important to assess and counsel patients regarding acute medication overuse. Defined as regular use of acute medications more than 10 or 15 days per month depending on medication class,³¹ acute medication overuse is highly disabling,¹⁰ prevalent, and prominently associated with a risk of migraine progressing to chronic

Table 2 2019 AAN headache measurement set

Title	Numerator	Denominator	Exclusions
Documentation of migraine frequency	Patients who had their migraine frequency documented in one of the following formats at each visit: <ul style="list-style-type: none"> • "Patient has [#] migraine attacks each [wk/mo/y]" • "Patient has [#] migraine days each [wk/mo/y]" • "Patient has [#] bad/severe headache days each [wk/mo/y]" • "Patient has daily migraine symptoms" 	Patients ≥6 years of age diagnosed with migraine	<ul style="list-style-type: none"> • Patient and/or caregiver decline to answer • Patient has cognitive impairment, and no caregiver is available
Modifiable lifestyle and chronification factors counseling for migraine	Documentation that the patient was counseled on at least 1 modifiable lifestyle or chronification factor once during the measurement period	Patients ≥6 years of age diagnosed with migraine	<ul style="list-style-type: none"> • Patient and/or caregiver decline counseling
Treatment prescribed for acute migraine attacks	Patients who were prescribed a guideline recommended or FDA approved/cleared treatment for acute migraine attacks once during the measurement period	Patients ≥6 years of age diagnosed with migraine	<ul style="list-style-type: none"> • Treatments are medically contraindicated or ineffective for the patient. • Patient is already on an effective acute migraine medication. • Patient has history of acute migraine medication overuse. • Patient has minimal or no pain with migraine. • Patient and/or caregiver decline.
Migraine preventive therapy management	Patients whose migraine frequency is ≥6 days per month/4 attacks per month who were managed with an evidence-based preventive migraine therapy, including therapies prescribed by another clinician once during the measurement period	Patients ≥6 years of age diagnosed with migraine	<ul style="list-style-type: none"> • Patient migraine frequency <6 days per month or <4 attacks per month • Patient and/or caregiver decline therapies
Acute treatment prescribed for cluster headache	Patients who were prescribed an acute treatment, including treatments prescribed by a different clinician once during the measurement period	Patients ≥18 years of age with a diagnosis of cluster headache	<ul style="list-style-type: none"> • Guideline recommended treatment is medically contraindicated or ineffective for the patient. • Patient reports no CH attacks within the past 12 months. • CH are sufficiently controlled with over the counter [OTC] medications. • Patient and/or caregiver decline. • Lack of insurance or insurance coverage for treatment prescribed.
Preventive treatment prescribed for cluster headache	Patients who were prescribed short-term and/or long-term preventive treatment, including treatments prescribed by a different clinician once during the measurement period	Patients ≥18 years of age with a diagnosis of cluster headache	<ul style="list-style-type: none"> • Provider determined attack frequency does not warrant preventive treatment • Same 5 exclusions as Acute Treatment Prescribed for Cluster Headache measure

migraine, particularly with the regular use of barbiturates and opioids.²⁰

Treatment prescribed for acute migraine attack

Recommending treatment for acute migraine attacks is a critical therapeutic component for all patients with migraine in any care setting. Migraine attacks are acutely debilitating because of symptoms through the attack phases: premonitory symptoms, aura, headache, and postdrome. Undertreatment of acute attacks is common and associated with migraine progression to chronic migraine,²¹ rendering it an important modifiable risk factor. Optimal acute treatment strategies are required for all patients, and there are templates available that can help to communicate these treatment recommendations consistently.^{36,37} Acute treatment approaches for migraine usually feature over-the-counter or prescription medications but may also include neuromodulation devices.

Acute medication overuse is a complicating factor in patients with frequent migraine attacks³⁸ and may also be a risk factor for migraine progression to chronic migraine.²⁰ Therefore, an allowable exclusion for not offering a prescription may be the presence of acute medication overuse to avoid potential escalation of this more nuanced clinical situation where a complex set of decisions need to be made, making the "Modifiable Lifestyle and Chronification Factors Counseling for Migraine" a more useful measure to apply.

Migraine preventive therapy management

Preventive therapy is a cornerstone of migraine management. The goal of preventive therapy is to reduce the frequency and severity of individual attacks, improve responsiveness to acute therapies, reduce the ictal and interictal burden and disability, and potentially to induce a remission of migraine as a disease, including those with chronic migraine. Preventive treatments should be offered when people with migraine have ≥6

Table 3 Proposed concepts considered but not developed

Topic	Description
Opioids	Percentage of patients with primary headache who were assessed for addiction risk had a documented reason for needing opioid or barbiturate therapy and received less than 8 days of an opioid medication or less than 5 days of barbiturate medication
	Percentage of patients with a primary headache disorder who were treated initially with an opioid (inverse measure)
Treatment adherence	Percentage of patients with a diagnosis of primary headache who were assessed for adherence to therapy protocol
Thunderclap headache	Percentage of hospitals that have a protocol for transmitting suspected diagnosis information for patient presenting with lone acute headache in the radiology request for CT procedure
Chronic tension-type headache	Percentage of patients who were prescribed a preventive therapy for chronic tension-type headache

monthly headache days, ≥ 4 monthly headache days with some impairment, or ≥ 3 monthly headache days with severe impairment or bed rest. Preventive therapy can be considered with ≥ 4 monthly migraine days with normal functioning, ≥ 3 monthly migraine days with some impairment, or ≥ 2 monthly migraine days with severe impairment.⁷ These criteria were recently reiterated by an AHS position article.³² In the general population, the American Migraine Prevalence and Prevention study suggests approximately 38% of people with migraine need preventive therapy, but only 13% currently use preventive therapy,⁷ showing a huge unmet need. Reduction of migraine attack frequency is likely a treatment that can prevent the onset of chronic migraine in people with episodic migraine.

Acute and preventive treatment prescribed for cluster headache

Patients with cluster headache either have episodic cluster headache where periods of attack freedom exceed 3

months annually, or chronic cluster headache, where remission periods last less than 3 months annually. Nonetheless, all patients with cluster headache can feature attack periods of weeks to month in duration that are extremely disabling. Therefore, the default approach for patients with cluster headache is to require a treatment strategy to manage individual attacks and reduce attack frequency and severity. The quality measure for cluster headache includes both of these treatment approaches in a paired measure.

Proposed concepts and retired measures

The process to update the 2015 Headache Quality Measurement Set involved reviewing the existing measures and proposing new measure concepts. Work group members proposed 5 measure concepts that were not approved because they lacked the evidence or were not feasible to implement in clinical practice at this time (table 3). These

Table 4 Retired headache quality measures

Title	Retirement rationale
Assessment of headache medication overuse in the treatment of primary headache disorders	Retired in favor of other existing measures on appropriate medication prescribing for primary headache.
Plan of care or referral for possible medication overuse headache	Feasibility concerns noted. Difficult to extract information without a chart review.
Overuse of neuroimaging for patients with primary headache and a normal neurologic examination	Retired in favor of a new measure created as part of the AAN Universal Neurology Quality Measurement Set.
Migraine or cervicogenic headache-related disability functional status	Feasibility concerns noted. Difficult to extract information without a chart review.
Plan of care for migraine or cervicogenic headache developed or reviewed	Feasibility concerns noted. Difficult to extract information without a chart review.
Overuse of opioid containing medications for primary headache disorders	Retired in favor of other existing opioid measures.
Overuse of barbiturate containing medications for primary headache disorders	Retired in favor of other existing measures on appropriate medication prescribing for primary headache.
Preventive migraine medication prescribed	Retired standalone measure in favor of incorporating this concept into 3 separate concepts which are part of the new measurement set.
Quality of life assessment for patients with primary headache disorders	Feasibility concerns noted. Difficult to recommend only one tool for use in practice. Quality of life scores are not uniformly documented in the medical record.

Abbreviation: AAN = American Academy of Neurology.

concepts will be revisited over time to see if they are ready for development.

The work group retired a number of measures from the 2015 headache quality measurement set¹⁶ (table 4). Many of these measures remain of critical importance and have since been incorporated into other endorsed measure sets by the AAN and other organizations already in use (table 3). Others have been reorganized into more consolidated or paired measures in this update. We felt the disproportionate emphasis on acute medication overuse in the previous headache measures could inadvertently lead to perverse incentives, whereby neurologists and other clinicians who serve challenging patients with higher disease severity would be penalized, potentially giving providers another reason to avoid treating this high-priority patient group. Acute medication overuse is a controversial topic,³⁹ and its persistence may be related to the underutilization of pharmacological and nonpharmacological preventive therapies, which we address. Many preventive therapies of different classes have evidence for effectiveness when acute medication overuse is present,^{40,41} although limited studies exist with primary analyses.⁴² We also did not include measures for cervicogenic headache in the current quality measures because their optimal approach for study, assessment, and treatment does not have a clear consensus.⁴³

Finally, we removed uses of the term “migraines” in our measures to use the proper, defined term of either “migraine,” “migraine attacks,” or “chronic migraine.” The term “migraines” is felt to be inaccurate³¹ and potentially stigmatizing to patients.⁴⁴ Migraine is a singular neurologic disorder defined by a plurality of attacks,³¹ features disabling symptoms including but not limited to headache, and has a substantial ictal and interictal burden.

Conclusions

These quality measures provide assessment tools for the appropriate care of patients with headache disorders, including migraine and cluster headache. As treatment advances in the field of headache medicine continue to develop rapidly, these measures will require revision in future years. We aimed to create measures that provided feasibility for the practicing clinician while also being patient-centered in our approach. Aside from including an assessment of migraine attack frequency, we did not include other specific outcome measures, such as standardized disability assessments, which do not currently have a uniform, feasible approach for standardized implementation in clinical practice. However, our measures provide the flexibility to measure contemporary headache clinical practice, including the use of all evidence-based treatments such as novel pharmaceuticals, neuromodulation, and behavioral therapies. Ongoing and future studies including the selection of specific acute and preventive therapies in both adult and pediatric populations and the appropriate

management strategy for acute medication overuse in people with migraine will influence future revision of these measures.

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Continued

Appendix (continued)

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Appendix (continued)

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Erin Lee	American Academy of Neurology, Minneapolis, MN	Study concept and design, acquisition of data, analysis and/or interpretation of data, drafting/revising the manuscript, critical revisions of the manuscript for important intellectual content, and study supervision including responsibility for conduct of research and final approval.
Raissa Villanueva, MD	University of Rochester, Rochester, NY	Study concept and design, acquisition of data, analysis and/or interpretation of data, drafting/revising the manuscript, critical revisions of the manuscript for important intellectual content, and study supervision including responsibility for conduct of research and final approval.

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