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October 7, 2021

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A career in medicine is challenging, and current practice leaves little time for keeping up with changes. With this in mind, we have developed these new features to bring you the best, most relevant information in a practical and clinically useful format each week.

On behalf of the entire *New England Journal of Medicine* staff, please accept my wishes for a rewarding career.

Sincerely,

Eric J. Rubin, MD, PhD

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Physician Compensation Models Seeing Modest Shifts

Components are changing to accommodate the need for flexibility and the push toward value-based care

By Bonnie Darves

The COVID-19 pandemic has unleashed upon the entire health care sector the biggest challenges it's endured in decades, yet the effect of the massive disruption in care delivery, hospital volumes, and physician group revenues have had an almost negligible effect on physician compensation structures. During the early "lockdown" months, some physicians experienced temporary income declines, some were furloughed, and those in the surgical specialties were hard hit when surgery volumes took a nosedive. Overall, fortunately, compensation stabilized significantly in 2021, in large part because the market remains intensely competitive and demand for services high, and many organizations were able to access government assistance programs to meet payroll.

Halee Fischer-Wright, MD, president and CEO of the Medical Group Management Association, noted that the MGMA's 2021 physician and provider compensation report found a modest 2.6 percent compensation increase for primary care physicians and a decrease of less than 1 percent for surgical specialties, despite the turmoil. "Practices acted quickly to leverage government programs … and adapted to new delivery models such as telemedicine, so they were able to ramp up quickly when patient volumes returned," she said.

Experts expect, however, that physician groups and the large entities that employ doctors learned an important lesson during the pandemic: plan for the unexpected, starting now. As such, employers will likely adjust compensation structures going forward to enable them more financial flexibility to respond to future uncertainty, even if the contracts that job-seeking physicians are presented today don't look markedly different than they did two years ago.

"The pandemic's effect on physician productivity and patient volumes may have been an anomaly, and organizations managed to adjust, but they've learned that they need to incorporate more flexibility in their physician compensation models going forward. What that means for physicians is that they're likely to see more frequent compensation changes than in the

past," said Fred Horton, president of the AMGA Consulting, affiliated with the American Medical Group Association. That's not necessarily a bad thing, Mr. Horton maintained, but it does mean that physicians need to be aware of and ask about factors that might trigger compensation-structure changes. "Physician should expect transparency in terms of how their compensation plans are structured and whether changes are planned," Mr. Horton said.

Value and quality metrics making their way into contracts

Shifts in compensation structures are occurring, however, on an incremental basis, and both employed physicians and those seeking to make a career move are well advised to get at least a basic understanding of the changes. For example, the long-predicted move toward inserting quality payments and incentives, and even penalties for not meeting quality or performance metrics — regardless of whether those metrics are levied by government payers, commercial payers, or even the groups themselves — is taking hold. It's only a matter of time, experts said, before quality-performance measures produce visible effects on physicians' paychecks.

Andrew Hajde, CMPE, director of consulting at the MGMA, pointed to two big-picture developments that are starting to take hold in physician compensation structures: value-based care metrics that call for care efficiency, equitability, timeliness, and safety; and risk-based contracts, in which specified quality metrics are tracked and physicians (or their employers) are accountable for providing quality care while avoiding excess hospital readmissions or other suboptimal outcomes. "These movements, long in transit, are really picking up pace now, so we're just starting to see these value-based components showing up in physician compensation models," Mr. Hajde said. "Overwhelmingly, however, we're still seeing primarily RVU-based models," he explained, in which physicians are paid on and required to meet organization-established productivity standards and may see their incomes affected upward or downward accordingly.

Here's how contract-set productivity expectations might transpire in practice to affect physicians' income, according to Mr. Horton: Organizations are setting productivity parameters, so even physicians who are on salary-based compensation models might have a contract clause that states that their compensation level is contingent on their meeting work RVU (relative value unit) targets. "For example, for a physician who receives a $300,000 salary, the contract might state that their productivity can't drop by more than 10 percent if they're to retain that salary," he said. "Similarly, physicians with lower salaries might see their compensation increase if they exceed the contract's stated productivity expectation."

Productivity incentives, primarily in the form of physicians' work RVU performance, are likely to persist in part because they offer employers a legally sanctioned and relatively fair way to reward their higher-performing physicians, all sources interviewed for this article reported. Recent experience suggests that RVU-component compensation models, which a decade ago were predicted to have disappeared by now, are still very common. David Fontenot, president and co-founder of the Texas-based physician recruiting firm Adaptive Medical Partners, reported that in 95 percent of the searches his firm has conducted in the past two years for fully employed practice opportunities, approximately half have included an RVU-based incentive and 32 percent have included a quality-based incentive.

"The quality-based component has been steadily trending up over the last three to four years but transitioning from volume- to outcomes-based compensation is a delicate balancing act," Mr. Fontenot said, in the persisting highly competitive physician-hiring market. "We almost never see traditional income guarantees anymore, though occasionally we'll see employed-model offers with an option to shift to pure production compensation after a one- or two-year period," he added. "What we are seeing, however, is hospital employers tinkering with hybrid structures — compensation models that blend quality incentives with work RVUs in an attempt to get closer to a value-based model," he said.

Although competition for physicians remains a key factor in how compensation packages are structured, the changes that are occurring, if incrementally, suggest that employers and practices are still seeking that elusive "sweet spot" in incentivizing physician performance via compensation structures without risking burnout, according to Patrice Streicher, a former president of the National Association of Physician Recruiters who serves as operations manager for Vista Staffing. "The most significant change I'm seeing in compensation models now is that there's more diversity than we've witnessed in the past 25 years. The primary driver of this diversity is trying to find the optimal model that supports and incentivizes value-based care — the focus on patient outcomes, visit experience, and readmissions reduction — without negatively affecting productivity. And that's challenging," Ms. Streicher said.

At the same time, Ms. Streicher added, organizations are trying to create compensation models that also accommodate specific practice characteristics, such as location, specialty, and the prevailing physician practice culture, particularly regarding practice decision-making.

Other components, new models on the rise

An example of the experimentation that's occurring as hiring organizations try to align cultural factors with financial realities, Ms. Streicher points out, is an emerging trend toward revenue collections–based components in compensation models. It's an odd shift, she acknowledged, that hearkens to the early days of group-practice models in which partners simply divvied total collections to pay themselves. But it's possibly an appealing model to entrepreneurial physicians who want to play an integral role in how the business is run and profit from fiscal prudence and aren't highly risk averse.

"We're seeing models in which practices pay a salary initially but then shift the physicians to compensation based on a percentage of collections," Ms. Streicher said. "In some cases, physicians who've transitioned to collections-based models are earning more than they did in volume- or productivity-based structures," she said. While this is unlikely to become a prevailing model, it's worth watching and it's appealing to employers seeking to reduce their financial risk, she noted.

The other trend Ms. Streicher is seeing — one that may be due in part to the havoc the pandemic wreaked, when physicians saw that their stability was determined by their employers' ability to withstand an economic crisis — is a move among some physicians to embrace permanent 1099 compensation structures. In these models, physicians are paid directly by the organization but are essentially self-employed independent contractors and therefore responsible for paying taxes, funding their benefits, and possibly even covering their malpractice insurance. This model, akin to locum tenens but with a few twists, offers inherent flexibility for physicians who want to manage their own practice lives and perhaps explore different locations.

"More doctors today are interested in becoming part of a 'permanent pool' of physicians while working as independent contractors," Ms. Streicher said. This inherent-flexibility trend is also exhibited by the growing number of physicians seeking telemedicine opportunities that don't require them to be fully place based. "A lot of physicians are requiring some or all telemedicine as part of their search now," she added.

Another compensation model that's gained ground in recent years, especially since the pandemic, is the direct-care model, in which physicians care for patients in employer-based clinics funded by large employers seeking more input into the care their employees receive. The appeal for physicians is that the model isn't predicated on productivity thresholds and throughput but rather on wellness strategies and outcomes, according to Bob Bregant, president of Steel Healthcare Solutions in Overland Park, Kansas, and past president of the National Association of Physician Recruiters.

"I think physicians are attracted to direct care because they see fewer patients a day — 10 to 15, not 25 to 30 — and have a predictable Monday to Friday work week," Mr. Bregant said. "Some physicians see direct care as a way to get off the productivity treadmill. About 95 percent of my recruiting recently has been for these opportunities." In these models, primarily straight salary, the compensation structure is simple and bonus that accrues is based not on productivity but on patient satisfaction and chronic disease management and prevention.

In terms of traditional compensation components, some appear to be going away, notably rich education-loan-repayment offers and highly lucrative signing bonuses, several sources observed. While this was occurring to some extent before the pandemic, it's becoming more prevalent now as hospitals try to adjust to the financial challenges the pandemic posed while reducing cash inducements and future payout commitments in a volatile revenue environment, Ms. Streicher noted.

Overall, Mr. Hadje added, hiring organizations are seeking ways to build in more flexibility in their compensation models, to protect themselves and their ability to weather financial downturns. "What we'll see, I think, is physician employment contracts that include clauses permitting employers to adjust compensation models more frequently if or as needed," Mr. Hadje said.

In Mr. Horton's view, physician compensation models, especially the way that components are measured and weighted with the compensation formula, will continue to change more rapidly than in the past. "Organizations are still focused on getting the formula right, but at the same time they're trying to incorporate more flexibility to respond to market conditions and more transparency overall," he said.

Tips for evaluating compensation models' components

Given the complexity of compensation structures and the changes afoot, it can be challenging to job-searching physicians to evaluate how a prospective employer's compensation plan will affect their own bottom line. Here are some tips for navigating the current offer environment:

Ask the organization's financial officer to explain how the model's components will figure in an actual paycheck over a year or a few years, based on their physicians' own experience. "You want to know how compensation has played out over time for other physicians in terms of bonus structures, RVU targets and thresholds, and quality incentives," Ms. Streicher said. "And ask potential colleagues about how any inducements worked out — did they get what they were promised?"

Ask about the total-compensation picture — and expect a clear answer. Physician should find out what the model will translate into in total compensation, if they perform well and meet contract-set targets, Mr. Hajde advised. "Then take that total compensation figure and compare it to national compensation-survey findings for either new physicians or veteran ones, depending on your situation, in terms of the median and other percentiles. And don't forget to take benefits value into account," he said. He notes that contracts tend to fall in one of two models — physician employment agreements, which are like standard agreements, or physician services agreements, in which physicians are more like contractors than employees. Job-searching physicians should thoroughly understand the distinctions before they start looking, he added.

If there's an income guarantee, find out what happens down the road. "Physicians should ask for concrete examples of how physicians' compensation fared after the guarantee period ended — as in, what did it look like in year three, five, or even 10?" Mr. Horton advised.

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Finding Jobs as a Dual Physician Family

By Nisha Mehta, MD, *a physician leader whose work focuses on physician empowerment, community building, and career longevity in medicine*

I'm part of a dual physician family: my husband is a plastic and reconstructive surgeon, and I'm a musculoskeletal radiologist. We've been dating since college, and every few years, one of us has had to make accommodations for the other, whether it be regarding medical school, residency, or fellowship. Finding jobs has been no different.

Approaching the job market as a dual physician (or really, any dual working member) family is tricky, because you have two members of a family who've invested a lot into their education and goals and are now trying to find a geographic location that can accommodate both of those things. Depending on what your interests are, it can feel next to impossible. Let's say one person has always wanted to incorporate policy work while another really wants to be at an academic institution that has niche expertise in a particular area of research — the city that has both opportunities available may not exist. Incorporate other factors such as family support or access to interests outside of medicine, and it becomes even more complicated.

Let's say you've narrowed your list down to a few cities, though. How do you approach that job search?

1. **Cast your net as wide as possible.** Forget about the reasons a job won't work; instead, believe in the reasons why it will. Sometimes jobs that seem outwardly incompatible can end up being different than what you imagined, or an employer may want you enough to accommodate some requests on your part that would make it a surprisingly good fit. You've put a lot into your education, so don't limit yourself as you're crossing the finish line. Worst case scenario, you've wasted a little time. Think about how much time you spent memorizing things during your college prerequisites, and it'll quickly bring it into context.
2. N**etwork widely.** Reach out to every employer in the area you have access to. Use friends, family, colleagues, or whoever else you may know that have connections to jobs in the area, and make sure they are looking for positions not just for you, but also for your significant other. Look on job boards, LinkedIn, and other professional networks. You never know where something will come up.

3. **Have a list of dealbreakers for each person.** It's important to know when to cross a job off the list. One mistake I see many physician couples making is one person falling in love with a particular job, and the other person compromising too heavily on another job. Unfortunately, while it may have seemed considerate at the time, in the long term, the person who took the significantly less appealing job may become resentful or decide to quit the job, possibly necessitating the job search process for both to start again in a different city because of noncompete issues.

Once you've got some options that work for both lined up, make sure you both stay active in each other's processes. It's easy to get so caught up in your interview process that you both go about your job searches independently. However, your family's happiness is going to rely on both of your jobs working well together, your significant other's happiness, and your happiness with each other's work environments. You presumably know each other better than anyone else, so having each other's input when making these decisions will be invaluable. So many times at job interviews, I've pointed out something my husband didn't pick up on that would've been problematic, and vice versa.

The jobs you pick together are going to shape what your life looks like, so approach this job search as a team. Together, you'll have a much better shot at creating the life in medicine that you want for your family.

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CLINICAL PRACTICE

Caren G. Solomon, M.D., M.P.H., *Editor*

Initial Management of Seizure in Adults

Phil E.M. Smith, M.D.

This Journal *feature begins with a case vignette highlighting a common clinical problem. Evidence supporting various strategies is then presented, followed by a review of formal guidelines, when they exist. The article ends with the author's clinical recommendations.*

An 18-year-old woman is brought to the emergency department after having had a seizure. She was up late with friends the night before and drank some alcohol. Shortly after waking this morning, she collapsed without warning, injuring her face. Her boyfriend witnessed her having a generalized tonic–clonic seizure with cyanosis during which she bit the side of her tongue. Her first memory was waking in the ambulance. She has had no previous seizures; specifically, she has not had any involuntary jerks of the arms and legs on awakening, blank spells, or sensitivity to flashing lights (e.g., sunlight flashing through trees, as seen while riding in a car). How should this patient be further evaluated and treated?

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THE CLINICAL PROBLEM

The incidence rate of a single unprovoked seizure among adults is 23 to 61 cases per 100,000 person-years.[1] A seizure may substantially affect a person's social interactions, employment, and driving eligibility. After a first unprovoked seizure, the overall risk of recurrence may be as high as 60% (Fig. S1 in the Supplementary Appendix, available with the full text of this article at NEJM.org), and this risk is highest within the first 2 years.[2] Epilepsy affects 0.65% of adults worldwide,[3] and this incidence is highest in developing countries. Epilepsy is diagnosed after two unprovoked seizures that occur more than 24 hours apart or after a single event that occurs in a person who is considered to have a high risk of recurrence (>60% risk in a 10-year period).[4] Abnormal findings on electroencephalography (EEG), an abnormal neurologic status, and a second seizure all increase the probability of seizure recurrence.[5] These three factors allow clinicians to stratify low, medium, and high risks (Table 1) and help in guiding decisions about the initiation of antiseizure medication.

Occasionally, serial seizures or status epilepticus will manifest as a first seizure, and these conditions may be life-threatening. The management of these conditions is described elsewhere.[6]

An audio version of this article is available at NEJM.org

STRATEGIES AND EVIDENCE

DIAGNOSIS AND EVALUATION

Expert history taking is essential in the diagnosis of an epileptic seizure. Telephoning an eyewitness is often invaluable, and home video recordings of patients with frequent seizures can help in the diagnosis. Table 2 summarizes the main differential diagnoses of a first generalized tonic–clonic seizure and provides information on the history taking, examination, and initial investigations. Careful

KEY CLINICAL POINTS

INITIAL MANAGEMENT OF SEIZURE IN ADULTS

- The clinical diagnosis of an epileptic seizure requires a detailed history taking and, ideally, an eyewitness account of the seizure.
- Evaluation with 12-lead electrocardiography is essential in a patient who has had a first seizure or an unexplained blackout spell.
- In children and teenagers, interictal electroencephalography, ideally within 24 hours after a first seizure, is particularly important.
- All patients who have had a suspected focal-onset seizure should undergo detailed magnetic resonance imaging of the head.
- Patients who have had an epileptic seizure should be informed about factors that may provoke seizures (e.g., sleep deprivation and alcohol use), the risk of a seizure occurring while driving or engaging in solitary activities, and the risks of harm from further seizures.
- Data from long-term pragmatic trials suggest that the first-line medication for patients with focal-onset seizures is either lamotrigine or levetiracetam, although other reasonable options are available; for patients with generalized-onset seizures, the first choice is sodium valproate, except for women of childbearing potential, in whom the first-line medication is usually levetiracetam.

history taking can usually distinguish the three main causes of transient loss of consciousness: epileptic seizure (provoked or unprovoked), syncope (reflex, orthostatic, or cardiac), and psychogenic nonepileptic seizure (which mimics a seizure but is caused by psychological distress rather than abnormal electrical activity in the brain).

Provoked seizures might follow transient cerebral insults such as alcohol withdrawal, the use of illicit drugs such as cocaine and methamphetamine, and metabolic disturbances (e.g., hypoglycemia or hyponatremia). They also may suggest a structural cause such as hemorrhagic stroke, encephalitis, venous sinus thrombosis, or tumor.

Seizures and epilepsy are classified according to seizure type (generalized, focal, or unknown[8]), epilepsy type, and epilepsy syndrome.[9] Table 3 and Table S1 provide common examples of each.

The presentation of a seizure depends on its site of onset (generalized or focal) and pattern of spread. Seizures can occur at any age and in any situation. In some cases, a lack of warning suggests a generalized onset, although a lack of warning is also compatible with focal-onset seizures, especially in the frontal lobe. In other cases (usually focal-onset seizures), there is a specific but often "indescribable" aura — such as déjà vu, an epigastric "rising" sensation, or tastes or smells — usually followed by transient altered awareness.

A convulsive seizure typically has a tonic (stiffening) phase and then a clonic (convulsing) phase. Together these phases last 1 to 3 minutes, typically while the patient has open eyes, apnea, and cyanosis. Patients awaken many minutes later feeling tired and achy, and they sometimes have a lateral tongue bite.

Physical examination may reveal findings that point to a cause other than seizure or a condition predisposing to seizure. Attention should be paid to the skin (e.g., to detect facial angiofibromas, hypomelanotic macules suggestive of tuberous sclerosis, or scars from self-harm that are often associated with psychogenic nonepileptic seizures), the cardiovascular system (an aortic ejection murmur may indicate cardiac syncope, and postural blood-pressure changes may indicate orthostatic hypotension), and findings on funduscopic examination (e.g., elevated intracranial pressure).

Basic blood tests to measure levels of electrolytes, glucose, calcium, and magnesium may help to identify potential causes of seizure or coexisting conditions. An evaluation with 12-lead electrocardiography (ECG) is indicated in all patients (especially older adults) who have had a first seizure or unexplained blackout spell to look for evidence of previous myocardial infarction because of the risk of ventricular tachycardia or of rare but potentially fatal (and often familial) disorders, including hypertrophic cardiomyopathy and long QT syndromes.[10]

BRAIN IMAGING

Urgent brain imaging is warranted in patients who present with a first epileptic seizure. Computed tomography is useful and widely available. However, in most adults with a first seizure (especially a focal-onset seizure) or early epilepsy, detailed magnetic resonance imaging (MRI; ideally 3-T MRI with <3-mm slice thickness on T2-weighted imaging and fluid-attenuated inversion recovery[11]) is warranted to identify more subtle underlying causes such as hippocampal sclerosis, focal cortical dysplasia, or tumor that may be treated surgically.

Table 1. Probability of Another Seizure after a Single Seizure or Early Epilepsy and Recommendations for Use of Antiseizure Medications.*

Level of Risk and No. of Seizures	Neurologic Disorder or Abnormal EEG	Probability of Another Seizure			Usual Recommendation for Antiseizure Medication
		By 1 yr	By 3 yr	By 5 yr	
Low risk: 1 seizure	Neither	0.19	0.28	0.30	No
Medium risk					
1 Seizure	Either	0.35	0.50	0.56	Consider
2–3 Seizures	Neither	0.35	0.50	0.56	Consider
High risk					
1 seizure	Both	0.59	0.67	0.73	Yes
2–3 seizures	Either	0.59	0.67	0.73	Yes
>3 seizures	Neither	0.59	0.67	0.73	Yes

* Adapted from Kim et al.[5] EEG denotes electroencephalogram.

ELECTROENCEPHALOGRAPHY

Interictal EEG that is performed in a patient who has had a first seizure is unlikely to capture another seizure, although the procedure may provoke psychogenic nonepileptic seizures. EEG is most informative in patients younger than 25 years of age because these patients are most likely to have subclinical interictal generalized activity that may confirm a generalized seizure tendency and that strongly predicts further seizures (70% positive predictive value).[12,13]

EEG that is performed soon after a patient has had a first seizure identifies more epileptiform abnormalities than later EEG; one study involving 300 consecutive adults and children identified abnormalities in 51% of those who underwent EEG within 24 hours and in 34% of those who underwent EEG later.[14] EEG that is performed in ambulatory or sleep-deprived patients further increases the diagnostic yield in patients in whom an epileptic seizure is likely even though the routine interictal EEG findings are normal.[15] The presence of interictal epileptiform discharges in either of these investigations increases the 1-year risk of seizure recurrence by a factor of 1.5.[16]

MANAGEMENT

ANTISEIZURE MEDICATIONS

The medical management of epilepsy predominantly involves seizure suppression with the long-term use of oral medication (Table 4 and Table S2). Antiseizure medication is primarily indicated when the risk of further spontaneous seizures is judged to exceed 60% over the next 10 years.

The aim of management is no seizures and minimal adverse effects of treatment. However, if these goals prove to be impossible, then the priority is complete control of major convulsive seizures, which are potentially dangerous because they may increase the risk of sudden unexpected death in epilepsy (SUDEP) above the estimated absolute risk among patients with epilepsy overall (1.2 cases per 1000 patient-years).[23]

The initiation of long-term use of antiseizure medication is a major decision that is made by the patient and the clinician. This decision requires reasonable certainty of an epilepsy diagnosis; the use of medication for a trial period in patients in whom the diagnosis is uncertain should be avoided.

The Medical Research Council Multicentre Trial for Early Epilepsy and Single Seizures[24] showed that the risk of seizure recurrence was

Table 2. Differential Diagnosis of Generalized Tonic–Clonic Seizure in Adults.*

Variable	Generalized Tonic–Clonic Seizure	Focal to Bilateral Tonic–Clonic Seizure	Frontal-Lobe Seizure	Reflex (Vasovagal) Syncope	Orthostatic Syncope	Cardiac Syncope	Psychogenic Nonepileptic Seizure	Panic Attack	Non-REM Parasomnia†
Typical demographic characteristics	Young (<25 yr); often no seizure history reported (although on direct questioning, patient may describe absences, myoclonus, photosensitivity, or all these symptoms)	Any age; often with previously unrecognized episodes of déjà vu, epigastric "rising" sensation, blank spells with automatism (e.g., lip smacking and picking at clothes), and tongue biting on waking	Any age, although patients are often children (median onset, 14 yr); possible family history of frontal-lobe seizure (autosomal dominant)	Young; often healthy, with history of fainting	Older age, especially in patients with autonomic failure (diabetes or autonomic neuropathy) or use of vasodilator medications	Older age, with vascular risk factors (especially previous myocardial infarction)	Any age; often with coexisting depression, panic disorder, drug or alcohol dependence, self-harm, or adverse childhood events	Any age; possibly with coexisting depression, anxiety, drug or alcohol dependence, self-harm, or adverse childhood events	Young; usually with onset in childhood and remittance in adolescence; often a family history of parasomnia
Occurrence in specific situations	Usually occurs within 1 hr after waking	May occur at any time, including during sleep	Usually occurs during sleep	Commonly situational (e.g., may occur in bathroom or restaurant) and often provoked (e.g., while standing, with the sight of blood, after exertion)	May occur with standing after lying down	Rarely situational, occasionally occurs during exertion	Commonly situational, especially when patient is awake and not alone; often occurs with stressful situations, but patient may report no trigger	Commonly occurs in stressful situations	Always occurs during sleep, especially during first third of the night; worse with sleep deprivation, alcohol use, and stress
Warning prodrome	Uncommon	Common, occurs with preceding minor seizure (aura)	None; occurs when patient is asleep	Common; preceding nausea is strongly suggestive; occurs in hot environment, with lightheadedness, visual blackout, or both	Common; occurs with lightheadedness, visual blackout, or both	Uncommon	Common; occurs with fear, panic, and altered mental state, or patient may report no warning	Almost invariable; occurs with fear, panic, and altered mental state	None; occurs when patient is asleep
Onset and signs	Sudden onset; highly stereotypical: tonic (stiffening) phase, then clonic (convulsing) phase, together lasting 1–3 min, typically with eyes open, apnea, and cyanosis	Gradual or sudden onset; stereotypical: aura or focal seizure may precede convulsion; in tonic phase, head and gaze deviation to the side contralateral to seizure focus, or "sign of four" (one arm extended, the other flexed)	Sudden onset; variable although highly stereotypical within an individual patient (e.g., dramatic presentation with screaming, semipurposeful motor automatism, including running, or asymmetric tonic posturing with kicking and cycling)	Gradual onset; brief loss of consciousness (<1 min), pallor, sometimes limb jerks and posturing	Gradual or sudden onset; brief loss of consciousness (<1 min), pallor, sometimes limb jerks and posturing	Sudden onset; usually brief but occasionally prolonged loss of consciousness, pallor, and sweating; sometimes limb jerks and posturing	Gradual onset; often prolonged (>2 min) with eyes closed, breathing and color maintained, rapid shaking (especially head and arms), back arching; fluctuating severity	Gradual onset; variable duration, with eyes closed, breathing maintained or rapid, and color maintained	Onset during sleep; variable complexity, not highly stereotypical, lasting seconds to 30 min; confusional arousals; sleepwalking with semipurposeful behavior (e.g., dressing or eating) or sleep terrors
Consciousness and responsiveness	Not during episode	Partial during warning (aura) but not during episode	May be at least partially retained	Not during episode	Not during episode	Not during episode	Variable, even within episode; stimulation can terminate episode	Variable; patient may be responsive	Patient poorly responsive during episode
Incontinence	Common	Common	Common	Occasional	Occasional	Occasional	Occasional	Rare	Rare
Injury	Common, including lateral tongue biting, facial injury, or posterior shoulder dislocation	Common, including lateral tongue biting; warning limits risk of injury	Common, despite retained awareness	Occasional minor, rare tongue biting	Uncommon (with warning)	Common, including tongue biting	Occasional tongue and cheek biting, wrist injury, carpet burn; occasional directed violence	Occasional minor tongue and cheek biting	Uncommon
Recovery	Slow; patient is drowsy, confused, and has muscle aches	Slow; patient is drowsy, confused, and has muscle aches	Rapid	Rapid regaining of consciousness, but patient often fatigued	Often rapid, unless patient remains in upright position during episode	Often rapid	Often slow	Usually rapid	Patient typically returns to sleep

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CLINICAL PRACTICE

Table 2. (Continued.)

Variable	Generalized Tonic–Clonic Seizure	Focal to Bilateral Tonic–Clonic Seizure	Frontal-Lobe Seizure	Reflex (Vasovagal) Syncope	Orthostatic Syncope	Cardiac Syncope	Psychogenic Nonepileptic Seizure	Panic Attack	Non-REM Parasomnia†
Findings on examination and initial tests	Lateral tongue biting, facial injury; interictal EEG shows spike–polyspike-and-wave patterns; MRI of head normal, indicated particularly for atypical features (including persistence of seizures despite use of antiseizure medication); 12-lead ECG used to exclude propensity for cardiac arrhythmia mimicking seizure	Lateral tongue biting, cranial scars from previous injury or surgery, hemiatrophy (suggesting mild cerebral palsy); MRI of head may show underlying structural cause; interictal EEG may show focal sharp, spike, and slow waves; 12-lead ECG used to exclude propensity for cardiac arrhythmia mimicking seizure	Cranial scars from previous injury or surgery; MRI of head may show underlying structural cause; EEG may show focal sharp, spike, and slow waves or muscle artifact only, even during seizures (deep focus); video may capture typical event if frequent	Low blood pressure; bedside postural blood-pressure reading usually not necessary or helpful; 12-lead ECG used to exclude propensity for cardiac arrhythmia; head-up tilt-table test (if doubt remains after history, examination, and ECG) may show abrupt bradycardia and hypotension after 15–30 min	Bedside blood pressure decreases over a period of a few minutes while patient is in upright position, without compensatory tachycardia; 12-lead ECG used to exclude propensity for cardiac arrhythmia; ambulatory blood-pressure monitoring if doubt remains	Signs of congestive cardiac failure, ejection systolic murmur (aortic stenosis or hypertrophic cardiomyopathy), or both; 12-lead ECG used to identify propensity for cardiac arrhythmia (especially if patient has had previous myocardial infarction); transthoracic echocardiography used to identify underlying structural cardiac cause; consider urgent cardiology referral	Scars from self-harm; carpet burns; video of events if frequent to look for gradual onset, long duration; patient has eyes closed, rapid breathing, absence of cyanosis, limb thrashing, back arching; EEG may capture typical event (especially with photic stimulation) with only ictal movement artifact	Patient appears anxious; video of events if frequent to look for gradual onset, long duration; patient has partial awareness, anxious expression, eyes closed, rapid breathing; EEG may capture typical event (especially with photic stimulation) with only ictal movement artifact	Normal examination; video of events used to distinguish from frontal-lobe epilepsy; EEG while patient is asleep may capture typical event

* ECG denotes electrocardiography, MRI magnetic resonance imaging, and REM rapid eye movement.
† Data are from Derry.[7]

Table 3. Common Types of Seizures in Adolescents and Adults.*

Seizure Type	Description and Common Examples
Generalized onset	The patient's symptoms or description of the seizure by a witness do not indicate an anatomical localization of the seizure. It is thought to start within and rapidly engage bilaterally distributed cerebral networks.
Motor	Myoclonic seizures manifest as involuntary "jumps" of the arms, legs, or head, especially shortly after waking and with sleep deprivation; generalized tonic–clonic seizures typically occur without warning, although they may follow myoclonic or absence seizures and are most likely to occur within 1 hr after waking and with sleep deprivation.
Nonmotor	Typical absences manifest as a brief loss of awareness, with an abrupt onset and offset, provoked by hyperventilation, often with eyelid flickering, and ictal 3-Hz generalized spike-and-wave activity on EEG; atypical absences have a less abrupt onset and offset, with an atypical, generalized spike-and-wave activity on EEG that is slower (<2.5 Hz) than that in typical seizures.
Focal onset	Most new-onset seizures in adults, including tonic–clonic seizures, are of focal onset. There is clinical evidence of seizure onset localized to one part of the brain, regardless of whether it subsequently involves the remainder of the brain. The site of onset determines the features: temporal lobe (epigastric "rising" sensation, déjà vu, and smell or taste), frontal lobe (features are often sleep-related, with adversive head turn, arm and leg jerking, and speech arrest), occipital lobe (elementary visual hallucinations in the contralateral visual field), parietal lobe (lateralized sensory symptoms, including pain), or insular cortex (laryngeal constriction, dyspnea, and contralateral somatosensory symptoms).
Awareness	In focal-onset aware (formerly called simple partial) seizures, awareness of the self or environment is retained; in focal-onset impaired awareness (formerly called complex partial) seizures, awareness of the self or environment is impaired.
Motor features	Motor seizures include automatisms (e.g., lip smacking and picking at clothes) and atonic, tonic, clonic, and myoclonic features; nonmotor seizures include autonomic, behavior arrest, cognitive, emotional, and sensory features.
Secondary generalization	In focal to bilateral tonic–clonic (formerly called secondarily generalized) seizures, the focal seizure develops into a tonic–clonic seizure. Such seizures often first occur during sleep.
Unknown onset	The origin of a seizure is often uncertain, especially after only one seizure.

* Data are from Fisher et al.[8]

lower in the first 2 years after the first seizure among patients who received immediate initiation of medication (generally carbamazepine or sodium valproate) than among those who received delayed treatment pending a second seizure (32% vs. 39%), but earlier initiation of treatment did not affect longer-term seizure remission. Adverse events were significantly more common with immediate treatment than with delayed treatment (in 39% and 31% of the patients), and quality-of-life measures were similar in the two groups. Therefore, clinicians usually advise withholding medication in patients who have had a single seizure unless the recurrence risk is particularly high.[4] Despite a low estimated risk of recurrence, some patients choose to receive medication because they have had a particularly severe or injurious first seizure or because they live in areas such as the United Kingdom where a second seizure might extend the driving restriction from 6 months to 12 months.

FACTORS GUIDING MEDICATION CHOICE

The choice of medication should be guided by the type of seizure and epilepsy syndrome (broadly, valproate or levetiracetam is used in patients with generalized-onset seizures and lamotrigine or levetiracetam is used in those with focal-onset seizures) as well as by the effectiveness, adverse-event profile, and pharmacodynamic and pharmacokinetic properties of a given drug. Coexisting conditions must also be considered. For example,

Table 4. First-Line Antiseizure Medications.

Medication and Indication	Mechanism and Pharmacokinetic Profile	Dose in Adults	Adverse Effects	Interactions	Comments
Lamotrigine (Lamictal) for focal-onset seizures[17,18]; effective for generalized-onset tonic–clonic seizures but may exacerbate myoclonus and absences	Stabilizes voltage-dependent sodium channels; 50% protein-bound; metabolized in liver; half-life of 12–60 hr	Monotherapy: start 25 mg daily (introduce slowly to avoid rash); initial maintenance therapy, 100–200 mg daily, in 1 or 2 doses	Dose-related effects: drowsiness, insomnia, headache, diplopia; idiosyncratic effect: rash (in approximately 3.5% of patients[19]) sometimes severe in children (Stevens–Johnson syndrome), especially when taken with valproate; teratogenicity: dose-related low risk of major malformations and oral clefts	Effect on other agents: increases carbamazepine epoxide (dizziness, diplopia); with higher doses (>300 mg daily), lowers contraceptive pill concentration (uncertain mechanism) but no definite evidence of contraception failure; effect of other agents: valproate inhibits its metabolism, so that only half the usual dose of valproate is necessary; hormonal contraceptives and pregnancy lower its concentration, potentially with breakthrough seizures	Slowly introduced to avoid rash, so therapeutic dose not reached for 4–6 wk, and additional antiseizure medication may be warranted in that time; important interactions with other antiseizure medications (notably valproate or carbamazepine) warrant dose adjustments; data support safety in pregnancy (early concern regarding increased risk of cleft defect not supported by subsequent studies); serum concentration decreases in pregnancy, so consider measuring serum concentration and temporary dose increases to avoid breakthrough seizures
Levetiracetam (Keppra, Roweepra, and Spritam) for focal-onset seizures[18,20] or generalized-onset seizures[21]; first-line treatment for focal-onset seizures in selected patients and for generalized-onset seizures in women of childbearing potential	Binds to synaptic vesicle glycoprotein 2A; not protein-bound; not metabolized in liver; excreted by kidneys largely unchanged; half-life of 6–8 hr	Start 250 mg daily; initial maintenance therapy, 1000–2000 mg daily divided into 2 doses	Dose-related effect: fatigue; idiosyncratic effects: irritability, anxiety, and mood changes; teratogenicity: low risk of major malformations	Effect on other agents: no major effects, but monitor for toxic effects (e.g., double vision and dizziness) if added to carbamazepine; effect of other agents: no major effects	Effective for both focal-onset and generalized-onset seizures; therapeutic dose achieved quickly, so widely used for rapid seizure control; no medication interactions, so suitable for patients receiving other medications (e.g., warfarin); data support good safety profile in pregnancy
Sodium valproate, valproic acid (Depakene, Depakote, Epilim, and Stavzor) for generalized-onset seizures (except in women of childbearing potential)[21,22]; also effective for focal-onset seizures but not widely used for this indication	Increases γ-aminobutyric acid concentration (uncertain mechanism); 90% protein-bound; metabolized in liver; half-life of 12–17 hr, but therapeutic effect longer	Start 200–500 mg daily; initial maintenance therapy, 500–1500 mg daily, in 1 or 2 doses	Dose-related effects: gastrointestinal upset, tremor, irritability, poor sleep, confusion; idiosyncratic effects: hair loss, weight gain, polycystic ovaries, hyperammonemia (occult urea-cycle disorders), hepatotoxic effects (especially in children with *POLG1* mutations or the Alpers syndrome [in 1/50,000 children]); high risk of teratogenicity: major malformations, including spina bifida, in up to 10% of infants, neurodevelopmental delay identifiable in up to 40% of children	Effect on other agents: enzyme inhibition increases lamotrigine concentration (care in combination), increases carbamazepine-10,11-epoxide concentration, and increases sedation with alcohol; protein-bound displacement increases free concentration of other medications (e.g., warfarin); effect of other agents: enzyme-inducing medications lower total valproate concentration (e.g., carbamazepine, phenytoin); protein-bound medications (e.g., aspirin) displace and increase free valproate concentration	Highly effective for generalized-onset seizures, but powerful teratogenicity and neurodevelopmental delay severely limit its use in young women; enzyme inhibitor, so use caution with alcohol and other medications metabolized by the liver; contraindicated in patients with some mitochondrial diseases (liver failure may occur in patients with *POLG1* mutations)

patients with substantial anxiety may prefer lamotrigine over levetiracetam, whereas those with obesity or migraines may choose topiramate, which can suppress appetite and reduce the incidence of headaches. An overriding consideration for women is the effects of medication on potential pregnancy.

Although a detailed discussion of the use of antiseizure medication in women who may become pregnant is beyond the scope of this article, sodium valproate carries high risks in pregnancy. Approximately 10% of babies exposed to sodium valproate in utero have major congenital anomalies,[25] and up to 40% have measurable neurodevelopmental delay.[26] In the European Registry of Antiepileptic Drugs and Pregnancy (EURAP) Study Group prospective study involving 7555 pregnancies,[27] 10.3% of the infants had major congenital malformations after in utero exposure to valproate, 5.5% had these malformations after exposure to carbamazepine, 3.9% after topiramate, 3.0% after oxcarbazepine, 2.9% after lamotrigine, and 2.8% after levetiracetam (as compared with a 2.6% risk among infants who had not been exposed in utero to antiseizure medication[28]). The possible contribution of maternal seizures to the risks of congenital anomalies and neurodevelopmental delay remains unclear.

The EURAP study also showed that major congenital malformations associated with valproate were dose-related and included cardiac defects and hypospadias, each of which was found in 2% of infants with exposure to valproate; cleft lip; gastrointestinal, renal, and neural-tube defects; and polydactyly. Cognitive assessments in 6-year-old children who had had in utero exposure to valproate showed significant dose-related inverse associations with IQ, verbal ability, and nonverbal ability; these effects were not observed in children with in utero exposure to other antiseizure medications.[26] Thus, valproate should generally be avoided in women of childbearing potential; if valproate is used, effective measures should be taken to prevent pregnancy unless the woman is fully informed about the risks. As part of a licensing requirement since 2018 in the United Kingdom and the European Union, women who receive valproate must use highly reliable contraception (a hormonal implant or an intrauterine device) or undergo monthly pregnancy tests, and they must sign an annual risk-acknowledgment form.[29]

Data from pregnancy registries have shown no consistent safety signals for lamotrigine or levetiracetam[30] and no clear evidence of neurodevelopmental delay associated with these agents.[31] In observational studies, maternal folate supplementation has been associated with a reduced risk of neurocognitive abnormalities among babies with in utero exposure to antiseizure medications,[32] and such supplements are routinely recommended in women who may become pregnant while receiving such medication.

EFFECTIVENESS OF MEDICATIONS

A single-center observational study involving 525 patients with epilepsy of various types showed that approximately half became seizure-free for at least 1 year after they began to receive a first antiseizure medication.[33] Many randomized, controlled trials of the efficacy of new antiseizure medications have assessed their use as add-on medications in patients with treatment-resistant epilepsy. In these short-term trials, these new medications reduced the frequency of seizures 2 to 4 times more than placebo[34] but often at doses that were higher than those generally used in practice.

The management of epilepsy, which is a long-term condition, is largely informed by the Standard and New Antiepileptic Drugs (SANAD) trials, which involved long-term, head-to-head, unblinded comparisons of existing standard agents with newer medications. The first SANAD trial involving patients with generalized and unclassified epilepsies compared valproate (then the standard of care) with lamotrigine or topiramate and showed the superiority of valproate over topiramate with respect to treatment failure and the superiority over lamotrigine with respect to 12-month remission.[22] For focal epilepsies, lamotrigine was superior to carbamazepine (then the standard of care), gabapentin, and topiramate with respect to treatment failure and was noninferior to carbamazepine with respect to 12-month remission.[17] More recently, the SANAD II trial involving patients with generalized and unclassified epilepsies did not show noninferiority of levetiracetam to valproate with respect to 12-month remission; valproate resulted in a higher incidence of 12-month remission (36% vs. 26%) and a similar incidence of adverse events, and it was more cost-effective.[21] For focal epilepsies, zonisamide but not levetiracetam was noninferior to lamotrigine with respect to 12-month remission; however, as compared with both levetiracetam and zonisamide, lamotrigine resulted in lower incidences of treatment failure and adverse events, and it was more cost-effective.[18]

Thus, the first-line medication for patients with generalized-onset seizures is sodium valproate, or levetiracetam for girls and women of childbearing potential. For patients with focal-onset seizures, lamotrigine is usually the first-line medication, although levetiracetam or other agents may have advantages in some patients (Table 4 and Fig. S2).

The main disadvantage of lamotrigine is its low starting dose, with increases to the full treatment dose over a period of several weeks. This gradual dose adjustment is necessary to reduce the risk of the Stevens–Johnson syndrome and toxic epidermal necrolysis (from 1.0% to approximately 0.01 to 0.10%)[35]; initial coverage with another antiseizure medication may be warranted. The main adverse effects of levetiracetam are irritability and anxiety, especially in patients with preexisting anxiety.

LIFESTYLE FACTORS

Clinicians should engage in joint decision making with patients and share verbal and written information. Information on driving eligibility is particularly important. In the United Kingdom and the European Union, a 6-month driving restriction is mandated for patients who have had a single seizure with a low risk of recurrence, and a 12-month restriction is mandated for patients with epilepsy, including those who have had a single seizure and who have a high risk of recurrence (e.g., those with an abnormal EEG, neurologic deficit, or both). In the United States, eligibility for a driver's license in persons who have had a single seizure or in those with epilepsy varies among states,[36] although the rules are generally less restrictive than those in Europe.

Advice from clinicians regarding other activities depends on the characteristics and frequency of the patient's seizures; these factors are balanced against individual priorities. Clinicians should inform patients of the risks associated with seizures, including drowning and SUDEP; the likelihood of seizure recurrence (Table 1); and suggested lifestyle modifications (e.g., avoiding being alone during certain activities such as caring for children or bathing, so that another person can help if a seizure occurs, and appreciating the risks of ladders and heights).

Patients should be encouraged to adhere to the regimen of antiseizure medication and a regular sleep schedule and to limit the use of alcohol. Considerable observational data provide support for a relationship between insufficient sleep and seizure risk or abnormal EEG activity.[37] A short-term randomized trial[38] involving 84 patients with medication-resistant focal epilepsy in whom the dose of antiseizure medication was being tapered showed no significant differences in seizure frequency between the group of patients with sleep deprivation and the control group. However, these trial findings may not be applicable to patients with early epilepsy, and the promotion of sleep hygiene in patients with epilepsy remains prudent. Alcohol use is an important seizure precipitant, mainly because of the risk of seizure during alcohol withdrawal and the tendency of alcohol to disrupt sleep, interfere with adherence to antiseizure medications, or both. A meta-analysis of observational studies showed a dose–response relationship between the amount of alcohol consumed daily and the probability of development of epilepsy; for an average of 4, 6, and 8 drinks daily, the relative risks were 1.81 (95% confidence interval [CI], 1.59 to 2.07), 2.44 (95% CI, 2.00 to 2.97), and 3.27 (95% CI, 2.52 to 4.26).[39] Alcohol abstinence is probably unnecessary, but consumption should be limited to modest amounts. Illicit drugs that disrupt sleep, especially cocaine and amphetamine, should be avoided, but high-quality data on the recreational use of cannabis in persons with epilepsy are lacking.

AREAS OF UNCERTAINTY

The clinical diagnosis of epilepsy may be incorrect in up to 20% of patients[40] unless episodes are captured on EEG with video. Many patients with a diagnosis of epilepsy are later recognized to have psychogenic seizures, and additional psychogenic seizures may later develop in persons with established epilepsy. Clinicians must repeatedly question the diagnosis in patients with medication-resistant epilepsy.

The potential long-term effects of new antiseizure medications, which are typically prescribed as lifelong treatments, warrant further study. Notoriously, for 8 years after licensing, vigabatrin was used worldwide to manage seizures until it was recognized that long-term use of this agent caused permanent visual-field defects in more than half of patients.[41] Data are lacking to inform pregnancy and offspring outcomes associated with new antiseizure medications; several worldwide pregnancy registries regularly update clinicians on the teratogenicity of these agents (Table S3).[30]

Genetic characterization has enabled both targeting of more effective treatments for some complex epilepsies (e.g., stiripentol for the Dravet syndrome[42] and a ketogenic diet for glucose transporter type 1 deficiency syndrome[43]) and screening for the HLA-B*1502 allele in Han Chinese populations to predict the carbamazepine-induced Stevens–Johnson syndrome.[44] Further understanding of the effect of genetic factors on the risk of recurrent seizures and on the efficacy and risks of various medications is needed to guide treatment decisions.

GUIDELINES

In 2015, the American Academy of Neurology and the American Epilepsy Society provided joint guidelines on the management of unprovoked first seizure in adults.[2] The 2012 guidelines[45] of the National Institute for Health and Care Excellence in the United Kingdom are undergoing revision. The current recommendations differ from these older guidelines with respect to specific medications recommended, since the results of the SANAD II trial were published after these guidelines were issued.

CONCLUSIONS AND RECOMMENDATIONS

In the patient described in the vignette, the first generalized tonic–clonic seizure developed after sleep loss and alcohol use. Careful questioning revealed that this was an isolated event, with no previous myoclonic jerks or absences. Evaluation should include MRI of the head, interictal EEG, and 12-lead ECG. I would discuss with the patient lifestyle factors such as the importance of regular sleep and limiting alcohol consumption, the risks associated with seizures (including drowning and SUDEP), and driving eligibility. Antiseizure medications are not routinely recommended for patients who have had a single seizure;

however, if interictal EEG showed spike-and-wave activity, indicating a high risk of recurrent seizure, I would recommend initiation of an antiseizure medication. Provided that this patient did not have depression or anxiety, I would favor levetiracetam administered with a folate supplement since the patient is of childbearing potential. I would arrange follow-up in 2 months to review the patient's response and adherence to the medication regimen and any adverse effects.

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Disclosure forms provided by the author are available with the full text of this article at NEJM.org.

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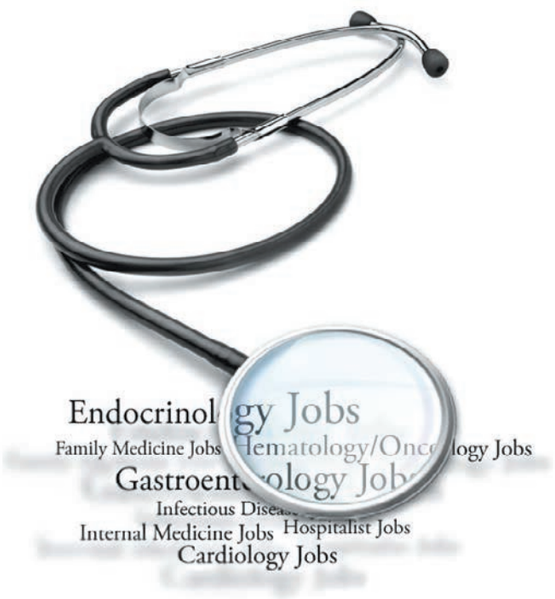

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  Team-based care that makes it easier to improve health by meeting patients where they are – right at home.
- **Geisinger Medical Center Muncy**
  Brand-new, state-of-the-art, fully licensed hospital with an emergency department and a full range of specialties and services.
- **Geisinger Healthplex CenterPoint**
  Improving availability and convenience of a variety of in-demand outpatient health services – from surgery to eye care.
- **Frank M. and Dorothea Henry Cancer Center at Geisinger Wyoming Valley Medical Center**
  Four-story expansion combines leading-edge cancer treatments, skilled and compassionate clinical teams, and the latest technological advances, with a goal of keeping cancer care close to home.
- **New behavioral health facilities**
  In a joint venture with Acadia Healthcare, we'll provide comprehensive inpatient services to adult, older adult, adolescent and pediatric patients.

These are just some of the ways we're constantly pushing for better health for our patients and the communities we serve. And when you finish your day here at Geisinger, you'll still have time for a hike, bike or run at one of our beautiful state parks.

Visit **whygeisinger.org** or reach out to **physiciancareers@geisinger.edu**.

Only at Geisinger.

EOE/AA: disability/vet

Classified Advertising Section

Sequence of Classifications

Addiction Medicine
Allergy & Clinical Immunology
Ambulatory Medicine
Anesthesiology
Cardiology
Critical Care
Dermatology
Emergency Medicine
Endocrinology
Family Medicine
Gastroenterology
General Practice
Geriatrics
Hematology-Oncology
Hospitalist
Infectious Disease
Internal Medicine
Internal Medicine/Pediatrics
Medical Genetics
Neonatal-Perinatal Medicine
Nephrology
Neurology
Nuclear Medicine
Obstetrics & Gynecology
Occupational Medicine
Ophthalmology
Osteopathic Medicine
Otolaryngology
Pathology
Pediatrics, General
Pediatric Gastroenterology
Pediatric Intensivist/ Critical Care
Pediatric Neurology
Pediatric Otolaryngology
Pediatric Pulmonology
Physical Medicine & Rehabilitation
Preventive Medicine
Primary Care
Psychiatry
Public Health
Pulmonary Disease
Radiation Oncology
Radiology
Rheumatology
Surgery, General
Surgery, Cardiovascular/ Thoracic
Surgery, Neurological
Surgery, Orthopedic
Surgery, Pediatric Orthopedic
Surgery, Pediatric
Surgery, Plastic
Surgery, Transplant
Surgery, Vascular
Urgent Care
Urology

Chiefs/Directors/ Department Heads
Faculty/Research
Graduate Training/Fellowships/ Residency Programs

Courses, Symposia, Seminars
For Sale/For Rent/Wanted
Locum Tenens
Miscellaneous
Multiple Specialties/ Group Practice
Part-Time Positions/Other
Physician Assistant
Physician Services
Positions Sought
Practices for Sale

Classified Advertising Rates

We charge $9.95 per word per insertion. A 2- to 4-time frequency discount rate of $7.40 per word per insertion is available. A 5-time frequency discount rate of $7.10 per word per insertion is also available. In order to earn the 2- to 4-time or 5-time discounted word rate, the request for an ad to run in multiple issues must be made upon initial placement. The issues do not need to be consecutive. **Web fee:** Classified line advertisers may choose to have their ads placed on NEJM CareerCenter for a fee of $120.00 per issue per advertisement. The web fee must be purchased for all dates of the print schedule. The choice to place your ad online must be made at the same time the print ad is scheduled. **Note:** The minimum charge for all types of line advertising is equivalent to 30 words per ad. Purchase orders will be accepted subject to credit approval. For orders requiring prepayment, we accept payment via Visa, MasterCard, and American Express for your convenience, or a check. All classified line ads are subject to the consistency guidelines of NEJM.

How to Advertise

All orders, cancellations, and changes must be received in writing. E-mail your advertisement to us at ads@nejmcareercenter.org, or fax it to 1-781-895-1045 or 1-781-893-5003. We will contact you to confirm your order. Our closing date is typically the Friday 20 days prior to publication date; however, please consult the rate card online at **nejmcareercenter.org** or contact the Classified Advertising Department at 1-800-635-6991. Be sure to tell us the classification heading you would like your ad to appear under (see listings above). If no classification is offered, we will determine the most appropriate classification. Cancellations must be made 20 days prior to publication date. Send all advertisements to the address listed below.

Contact Information

Classified Advertising
The New England Journal of Medicine
860 Winter Street, Waltham, MA 02451-1412

E-mail: ads@nejmcareercenter.org
Fax: 1-781-895-1045
Fax: 1-781-893-5003
Phone: 1-800-635-6991
Phone: 1-781-893-3800
Website: **nejmcareercenter.org**

How to Calculate the Cost of Your Ad

We define a word as one or more letters bound by spaces. Following are some typical examples:

Bradley S. Smith III, MD.....	= 5 words
Send CV	= 2 words
December 10, 2007	= 3 words
617-555-1234	= 1 word
Obstetrician/Gynecologist ...	= 1 word
A	= 1 word
Dalton, MD 01622	= 3 words

As a further example, here is a typical ad and how the pricing for each insertion is calculated:

MEDICAL DIRECTOR — A dynamic, growth-oriented home health care company is looking for a full-time Medical Director in greater New York. Ideal candidate should be board certified in internal medicine with subspecialties in oncology or gastroenterology. Willing to visit patients at home. Good verbal and written skills required. Attractive salary and benefits. Send CV to: E-mail address.

This advertisement is 56 words. At $9.95 per word, it equals $557.20. This ad would be placed under the Chiefs/Directors/ Department Heads classification.

Classified Ads Online

Advertisers may choose to have their classified line and display advertisements placed on NEJM CareerCenter for a fee. The web fee for line ads is $120.00 per issue per advertisement and $200.00 per issue per advertisement for display ads. The ads will run online two weeks prior to their appearance in print and one week after. For online-only recruitment advertising, please visit nejmcareercenter.org for more information, or call 1-800-635-6991.

Policy on Recruitment Ads

All advertisements for employment must be non-discriminatory and comply with all applicable laws and regulations. Ads that discriminate against applicants based on sex, age, race, religion, marital status or physical handicap will not be accepted. Although the *New England Journal of Medicine* believes the classified advertisements published within these pages to be from reputable sources, NEJM does not investigate the offers made and assumes no responsibility concerning them. NEJM strives for complete accuracy when entering classified advertisements; however, NEJM cannot accept responsibility for typographical errors should they occur.

Classified Ad Deadlines

Issue	Closing Date
November 11	October 22
November 18	October 29
November 25	November 4
December 2	November 10

Cardiology

WELL-ESTABLISHED RESPECTED PRIVATE PRACTICE — Seeking BC/BE Interventional cardiologist around Newport Beach, California. Proficiency in structural heart and vascular interventions a plus. Competitive salary, benefits, partnership track. E-mail CV to: drocheartandvascular@gmail.com

Gastroenterology

SUCCESSFUL PRIVATE PRACTICE GI GROUP — Located within 45 minutes of Boston and Providence working in a single 149-bed community teaching hospital looking to add two new Partners (General and Advanced/Therapeutic) to our current six Gastroenterologists and four Advanced Practice Providers. Full Anesthesia Endoscopy support along with both Inpatient and Outpatient Advanced Practice Provider support. Call: 1:6. Currently available candidates and 2022 Grads welcomed to apply. Excellent salary and compensation package including generous retirement benefits. Please forward CV to: aaminilbc@gmail.com; or call: 508-277-3913.

PERMANENT GASTROENTEROLOGY/HEPATOLOGY PHYSICIAN IN NEW JERSEY (NY METRO) — Physician led, owned, and governed multispecialty group seeks a Gastroenterologist/Hepatologist to join our team in Fair Lawn, New Jersey. A full-time opportunity to join three physicians and one nurse practitioner. Candidate must be BC/BE in Gastroenterology and Hematology. Be part of an established, growing Gastroenterology department in a newly opened facility with therapy services and diagnostic imaging on site. Interest in esophageal disease preferred, though not mandatory. Must be willing to travel locally and share in group's vision for expansion. Provider will share call and other responsibilities equally with other providers. Graduating fellows completing training are welcome to apply. Comprehensive benefits package. Email CV to: annu.bikkani@HVAMedicalGroup.com

THREE-MEMBER GROUP IN CARY, NC, AREA — Looking for fourth partner. Practice with state-of-the-art endoscopy center with pathology lab. ERCP/EUS experience preferred to start EUS program. Send CV to: singh@centerfordigestivediseases.com

Hematology-Oncology

HEMATOLOGY/ONCOLOGY PHYSICIAN IN NEW JERSEY (NY METRO) — Physician led, owned, and governed multispecialty group seeks a hematologist/oncologist to join our team in Fair Lawn, New Jersey. A full-time opportunity to join three physicians, one NP. Candidate must be BC/BE in Hematology and Oncology. Be part of an established, growing Hematology/Oncology department in a newly opened facility with therapy services and diagnostic imaging on site. Affiliated with a major academic medical center. Physician will share call and other responsibilities equally with other providers. Graduating fellows are welcome to apply. Comprehensive benefits package. Email CV to: annu.bikkani@HVAMedicalGroup.com

Infectious Disease

NORTHEASTERN OHIO INFECTIOUS DISEASE ASSOCIATION — An eight-physician group, including five Nurse Practitioners that is 100% private in northeast Ohio, is seeking a ninth member. 90% Inpatient practice. Minimal HMO penetration. Private practice affiliated with Level 1 trauma center as well as three other moderate size teaching hospitals with two of them having LTACs. Teaching and clinical research opportunities available. Benefits included. Competitive and negotiable salary, depending on experience. Great income potential. J-1 Candidates are invited to apply. One hour away from two large metropolitan areas. Great school systems, yet low cost of living. Interested candidates should fax their CV to: 330-744-1728. Our mailing address is: Northeastern Ohio Infectious Disease Association, 540 Parmalee Avenue, Suite 610, Youngstown, OH 44510. Our phone is: 330-744-4369.

Internal Medicine (see also FM and Primary Care)

A PRIMARY CARE PRACTICE IN SILVER SPRING, MD — Is looking for a BC/BE Internist or family physician for outpatient clinic. Competitive salary and benefits, full/part-time options available. Submit resume to: DrSaedi@gmail.com

PRIVATE PRACTICE — For sale in sunny Boca Raton, Florida. Retiring Internist; 98% traditional Medicare, outpatient and optional inpatient care. Plus office condo 1575-sq-ft, near hospital for sale. E-mail: IMOFFICESALE@GMAIL.COM

Nephrology

WASHINGTON, DC, SUBURBS — Busy and large, high-quality Nephrology practice in northern Virginia, looking for a motivated and hard-working individual, FT/PT to join our practice. Please e-mail CV to: janiced@nanvonline.com

NEPHROLOGY GROUP OF UNIVERSITY TOWN OF ATHENS, GEORGIA — With medical school and residency program like to add additional associate to meet growing need. Competitive salary and benefits. J1 and H1 can apply. Send resume at: Ngncmd@gmail.com

NEPHROLOGIST BC/BE, JACKSONVILLE, FLORIDA — Long-standing established seven-person practice in Nephrology, seeking new associate. Good benefits. Please e-mail: drkidney@bellsouth.net

NEPHROLOGYUSA REPRESENTS NEPHROLOGY OPPORTUNITIES NATIONWIDE WITH GROUP PRACTICES — Excellent compensation, benefits with partnership, and joint venture potential. For additional information, call Martin Osinski at NephrologyUSA: 305-271-9225. E-mail: mo@nephrologyusa.com; website: www.NephrologyUSA.com

SEEKING NEPHROLOGIST — To join a group of young enthusiastic nephrologists in Olympia, Washington, considered the Best Practice by the Pacific NW Renal Network and earned "High Performing" ratings by the 2021–22 *U.S. News & World Report*. Olympia is a safe place to raise a family with excellent schools, near Seattle, snow-capped Mt. Rainier, beautiful Pacific beaches, and wonderful parks, lakes, rain forest, with nearby airport/direct flights to Asia and Europe. Two-year partnership track. Call split between physicians. Competitive salary and benefits package. Please contact: Mikkic@memorialnephrology.org

Pediatric Intensivist/Critical Care

PEDIATRIC INTENSIVIST — Baystate Medical Practices, Inc. (BMP), has a position available in Springfield, MA, for a physician to provide internal medical care to critically ill hospitalized pediatric ICU patients. Completion of ABMS pediatric critical care fellowship required. Apply to: Carolynn Hartman, PI21, Office of Physician & Advanced Practitioner Recruitment, Baystate Health, 280 Chestnut St., 1st Fl., Springfield, MA 01199.

Surgery, Orthopedic

HOSPITAL MEDICAL FOUNDATION OF PARIS, INC., D/B/A HORIZON HEALTH — Is seeking a full-time Physician (Orthopedic Surgery/Sports Medicine) in Paris, Illinois, to examine, diagnose, and treat diseases and injuries to the musculoskeletal system, and diagnose and treat athletic injuries. Contact: Nan Dunning, Human Resources Manager, 721 E. Court Street, Paris, IL 61944.

Practices For Sale

MEDICAL CONDO FOR SALE — Adjacent to Stamford Hospital Tully Health Center. Two exam, two offices, and reception/admin. 90 Morgan St, Stamford, CT 06905. Contact: salliegro@kw.com; 203-962-5758.

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We are expanding services to meet the demands of our growing community.

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We have both the physician and APC openings:

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- OB/GYN
- Breast Surgeon
- Palliative Care
- Hospitalist
- Infectious Disease
- General Surgery Call Coverage
- Primary Care
  - Both Family & Internal Medicine

For more information contact:
Physician and Provider Recruitment
Phone: (603) 580-7131
Email: ProviderRecruitment@ehr.org

Kelsey-Seybold Clinic®

HOUSTON'S LEADER IN PATIENT CARE

Kelsey-Seybold Clinic, Houston's finest private, multispecialty physician group, is a leading innovator in preventative medicine and ambulatory services, encompassing some 55 different specialties and sub-specialties founded in 1949 by Dr. Mavis Kelsey in the world-renowned Texas Medical Center.

A Houston tradition in patient-centered care, Kelsey-Seybold Clinic is a physician-led, multispecialty clinic with over 25 locations and comprised of more than 500 physicians providing primary and specialty care in a collaborative manner. We treat more than 500,000 patients utilizing innovative technology and teamwork, including members of managed care plans and employer groups.

Physician – Hematology/Oncology

We are currently seeking a BC/BE physician interested in practicing general hematology/oncology to join our comprehensive and QOPI certified cancer center. Practice the whole breadth of medical oncology and malignant/benign hematology with a physician group of greater than 8 at our campus in The Woodlands/Spring northwest of Houston. Call will be 1 in 8 weeks.

Qualifications include:

- Graduate of an approved training program in the United States.
- Board-certified or eligible.
- Licensed or willing to be licensed in the State of Texas.

For more details on our defined Pathway to Partnership, benefits, compensation, and clinic locations visit

www.kelsey-seyboldproviders.com

Kelsey-Seybold Clinic is an equal opportunity employer, and all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, national origin, disability status, or protected veteran status. Kelsey-Seybold is a VEVRAA Federal Contractor and desires priority referrals of protected veterans.

PLAZA FAMILY CARE, PC

Internal Medicine Physician
Chester/Hackettstown, NJ

We are currently recruiting a full-time Internal Medicine physician at Plaza Family Care, P.C. located in Chester/Hackettstown, New Jersey.

At Plaza Family Care, we offer a friendly work environment and a strong infrastructure, including an EMR and professionally managed staff. You will work with a dedicated staff committed to providing a diverse patient population with excellent, high-quality care.

Enjoy a 5-day work week with outpatient care and a manageable call schedule.

Schedule:
- Full-Time, 5-day work week.
- Requires one evening with 1 out of 3 ½ day Saturday

Responsibilities:
- Board Certified Internal Medicine M.D. or D.O.
- EMR: Greenway
- No hospital rounding
- Compassionate, professional and approachable
- Office hours in two office locations

Compensation:
- Permanent, W-2 position
- Competitive annual salary with RVU bonus incentive
- Benefits include full medical, dental/vision, 401K, Malpractice coverage, CME support and PTO
- Paid NJ licensing, CDS, DEA
- Sign on bonus available
- Job Type: Full-time

***Please forward C.V. to* jnocilla@pfcmd.com**

NEJMCareerCenter.org

Specialty Physicians of Illinois, LLC

PRIMARY AND SPECIALTY CARE OPPORTUNITIES ARE AVAILABLE IN SOUTH SUBURBAN CHICAGO

Specialty Physicians of Illinois, LLC has assembled an unmatched team of accomplished physicians to provide comprehensive healthcare services to patients of all ages across a broad spectrum of specialties and disciplines. The south and southwest suburbs now have a physician group comprised of physicians that have developed experience and expertise in specific specialties.

In addition to developing clinical expertise in their specialties, Specialty Physicians of Illinois, LLC physicians strongly embrace the philosophy that comfort, compassion and patient satisfaction are key elements of quality care. So, we take our time. We listen. We counsel. We personally attend to our patients through the entirety of their care.

New graduates and experienced providers who share our mission of quality, compassionate care and outstanding customer service are encouraged to apply.

Contact us for more information about our current opportunities:
(844) 375-3627
practice@franciscanalliance.org

Whether you are beginning your career or exploring leadership opportunities, TeamHealth can help you **navigate the next step of your professional journey**.

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SCHOOL OF MEDICINE
WHERE TRADITION MEETS INNOVATION

The Brady Urological Institute (BUI) at the Johns Hopkins School of Medicine is conducting a broad and inclusive search for a full-time, tenure-track, assistant professor position focusing on prostate cancer genetics and genomics. The BUI has a long tradition of discovery in Hereditary Prostate Cancer and has a rich annotated biospecimen biorepository. It is expected that the successful candidate will utilize and maintain this resource as a basis for continued discovery.

The successful candidate must have a M.D. and/or Ph.D., or equivalent degree with post-doctoral experience in a relevant discipline. In addition, the successful candidate is expected to establish and maintain an externally funded research program. Johns Hopkins University is committed to increasing the diversity of its faculty and the Brady encourages candidates from underrepresented groups in higher education to apply. We are committed to identifying candidates who, through their research, teaching and service will contribute to the diversity and excellence of the academic community.

Interested individuals should submit a curriculum vitae and a statement of research interests to:

Dr. William Isaacs @ wisaacs1@jh.edu

Atrius Health

Dedham Medical Associates, Granite Medical Group, Harvard Vanguard Medical Associates, and PMG Physician Associates

Atrius Health is a well-established, Boston based, physician led, healthcare organization and for over 50 years, we have been nationally recognized for transforming healthcare through clinical innovations and quality improvement.

At Atrius Health we are working together to develop and share best practices to coordinate and improve the care delivered in our communities throughout eastern Massachusetts. We are a teaching affiliate of **Harvard Medical School/Tufts University School of Medicine** and offer both **teaching and research opportunities**.

Our physicians enjoy close clinical relationships, superior staffing resources, minimal call, a fully integrated EMR (Epic), excellent salaries and an exceptional benefits package.

We have openings in the following specialties:

Clinical Staff

- **Breast Surgery**
- **Dermatology**
- **Gastroenterology**
- **Hematology/Oncology**
- **Maternal Fetal Medicine**
- **Nephrology**
- **Neurology**
- **Non Invasive Cardiology**
- **OB/GYN**
- **Outpatient Primary Care**
  - **— Internal Medicine**
  - **— Family Medicine**
- **Pediatrics**
- **Pulmonary & Sleep Medicine**
- **Psychiatry**
  - **— Adult**
  - **— Child**
- **Physiatry—Pain Management**
- **Reproductive Endocrinology**
- **Rheumatology**
- **Urgent Care (Weekday)**
- **Urgent Care – per diem (Weekend)**

Visit our website at **https://atriushealthproviders.org**, or send confidential CV to:
Brenda Reed, 275 Grove Street, Suite 3-300, Newton, MA 02466-2275
E-*mail*: **Brenda_Reed@atriushealth.org**

Clearwater Cardiovascular Consultants

Clearwater Cardiovascular Consultants (CCC) is seeking a BC/BE Coronary/PV Interventional cardiologist who has a passion for patient care, excellent clinical skills and fellowship training in peripheral vascular interventions. The position will enjoy coronary interventional and peripheral vascular opportunities in our participating hospitals as well as our practice owned ASC and OBL. Research participation is also available.

We are the premier private practice cardiology group in the Tampa Bay Area, serving our community for over 45 years. CCC has three large, fully equipped offices with state-of-the-art equipment and excellent support staff. We have a strong group culture, solid family values and enjoy significant leadership positions at our outstanding hospitals. Our central office includes a practice owned dedicated cardiovascular CT lab, a dedicated outpatient cath lab and a cardiovascular ASC. We offer a competitive salary, a full benefits package and the opportunity to become a shareholder in the group after three years.

Clearwater is a beautiful city on Florida's Gulf Coast, with year-round recreation weather and one of the nation's best beaches. It has a diverse economy and is conveniently located in Pinellas County, part of the Tampa Bay area. The Tampa Bay is home to the Tampa Bay Buccaneers (NFL), Tampa Bay Rays (MLB), Tampa Bay Lightning (NHL), several MLB spring training sites, performing arts, outdoor activities and many great restaurants.

Visit our website at www.cccheart.com and send your CV to:
simmonsf@cccheart.com

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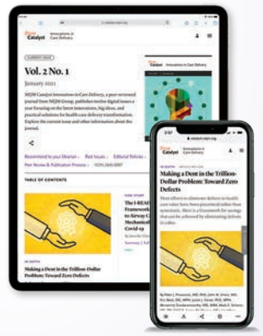
A journal for transforming health care delivery

NEJM Catalyst Innovations in Care Delivery, a peer-reviewed digital journal for health care leaders, explores the best ideas and strategies with the most potential for change. Learn more today.



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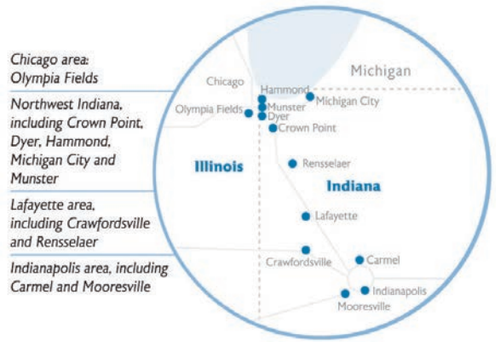
Franciscan HEALTH

Inspiring Health. Empowering Careers.

Franciscan Health is one of the largest Catholic health care systems in the Midwest, with 12 hospitals and a number of nationally recognized Centers of Health Care Excellence. Franciscan Physician Network and Specialty Physicians of Illinois offer opportunities in primary and specialty care throughout the Franciscan Health system.



PRIMARY AND SPECIALTY CARE OPPORTUNITIES ARE AVAILABLE THROUGHOUT INDIANA AND CHICAGO SOUTHLAND

Franciscan Health employs more than 1,000 physicians and advanced practice providers associated with our hospitals and access points across Indiana and Illinois. We care for more than 4 million patients at more than 260 locations each year.

Franciscan Health strives to create a flexible and realistic work-life balance for our providers. Both full-time and part-time opportunities are offered with benefits, which could include:

- **Competitive compensation tailored to the market, including:**
  - **Income guarantee, with bonus incentives**
  - **Generous commencement and retention bonuses**
- **Relocation allowance**
- **Paid malpractice insurance**
- **Time off and continuing medical education (CME) support**
- **Full benefits package, including health, life, dental, vision and legal insurance**
- **Retirement options, including 403(b), 457(b) and 401(a)**
- **Short- and long-term own occupation disability**
- **Customized marketing support**
- **Leadership development through board and committee opportunities**

844-FPN-DOCS (376-3627)
practice@franciscanalliance.org

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Nationally recognized, world-class care that is making better health easier

See how we've been recognized for leading healthcare change at **whygeisinger.org**

THE WALL STREET JOURNAL.

As noted in *The Wall Street Journal*, we are proud to be the first health system to do large-scale genomic sequencing with our MyCode® Community Health Initiative, the world's largest biobank.

Modern Healthcare

Geisinger and Medline's partnership rethinks innovative ways hospitals can enable sustainable cost controls while improving overall quality.

Harvard Business Review

"Geisinger focuses on innovating with the patient at the center."

FORTUNE

"If data is the oil of modern day, Geisinger — which serves 3 million patients in rural Pennsylvania — may just be healthcare's Saudi Arabia."

"The country looks to Geisinger as a leader in bringing world-class care and coverage to everyone we serve. I am incredibly proud of the progress we are driving in expanding our value-based care model. Geisinger has a bright future ahead, and I am committed to building upon our legacy working with our dedicated and talented physicians and staff."

Jaewon Ryu, MD, JD
Geisinger President and CEO

We're proud of the acknowledgement we receive for the work we do and the care we provide at Geisinger.

Our Employee Resource Groups (ERGs) provide opportunities for all Geisinger employees to build strong networks and develop professionally.

- **VETNET** – Support network for service members, veterans and their families
- **G-PRIDE** – Geisinger People Ready for Inclusion, Diversity and Equality
- **Women LEAD** – Legacy, Empowerment, Advocacy, Development
- **GAIN** – Geisinger Ability Inclusivity Network
- **BOLD** – Black Outreach Leadership Development

MILITARY FRIENDLY 2021 EMPLOYER

We've been recognized for our commitment to U.S. military veterans and their families.

HEALTHCARE EQUALITY INDEX LGBTQ HEALTHCARE EQUALITY 2020 TOP PERFORMER

We ensure equal care to LGBTQ patients and their families at Geisinger.

Geisinger