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Healthcare Mosaic

Provider Burnout – Addressing the Latest Healthcare Crisis With Emerging Technology Solutions

Contents

Summary

In our quarterly *Healthcare Mosaic* report, we select a far-reaching topic of interest in the healthcare space and provide a variety of data points and analyses to offer a more complete picture of what it means for the broader healthcare marketplace—and both public and private investors in the space.

In this *Healthcare Mosaic* report (now our 34th in the quarterly series), we take a deeper dive into provider burnout across the U.S. healthcare market, how it is creating capacity issues in the industry, and the potential for technology solutions and other workforce investments to help reduce provider burnout and increase access to care.

More specific, in this thematic report we analyze:

- The growing prevalence of provider burnout in the U.S. healthcare market;

- The impact of this issue on the near- and long-term supply of caregivers (and concomitantly care-capacity levels) in the United States;

- How technology solutions—including artificial intelligence—can help address these issues;

- The potential market opportunity for healthcare technology and services providers targeting the market; and

- An overview of select companies—in both the public and private markets—that we believe are well positioned to benefit from these trends.

Regarding covered companies that we believe will be most impacted by these trends, our work is most relevant to **Augmedix (AUGX), Doximity (DOCS), Health Catalyst (HCAT), HealthStream (HSTM), Phreesia (PHR), and our value-based care provider universe.**

Moreover, we believe our analysis is relevant for a wide variety of private operators in the space, such as those targeting areas including: **clinical documentation** (Abridge, DeepScribe, Suki, Intelligent Medical Objects); **workflow, capacity, and patient-flow optimization** (ABOUT Healthcare, Artisight, Commure, DexCare, Hippocratic AI, LeanTaaS, TeleTracking, Theator, Qventus); and **workforce management and productivity** (AvaSure, Hallmark Health, Laudio, PerfectServe, QGenda, SmartLinx, RLDatix, TigerConnect), among others.

In tandem with this quarter's report, *we are also hosting a fireside chat with Dr. John Doulis, vice president of data services and innovation at HCA Healthcare. HCA is one of the country's largest health systems, with nearly 190 hospitals and 2,400 alternative sites of care as of March 31, 2024.*

During the fireside conversation, Dr. Doulis will discuss how his organization is partnering with Augmedix to develop an AI-enabled ambient documentation solution to help address provider burnout and improve workforce productivity.

Please register for this live-only, virtual event, which will take place on June 25, 2024, at 1:00 p.m. Central time, via this link***.***

Introduction

Although concern about the well-being of healthcare providers has been a common topic for the past decade, the COVID-19 pandemic brought this issue to the forefront, as workplace stress, administrative burdens, and increased financial pressures all led to a massive reduction in job satisfaction for many providers. This topic was particularly evident in athenahealth's third annual Physician Sentiment Survey (PSS), which was recently completed by The Harris Poll. The survey of more than 1,000 physicians across the United States revealed what the authors referred to as "pervasive feelings of burnout and dissatisfaction."

And while we have long recognized this as a key issue for the U.S. healthcare system, we never fully appreciated the magnitude of the problem and its potential to be a crisis for the U.S. healthcare system. For example, according to the abovementioned survey:

- A record **93% of surveyed physicians indicated they feel burned out** on a regular basis;

- Nearly half (49%) of all respondents say their workload has become unsustainable (with an average of 15 hours of work required outside normal business hours);

- 64% of respondents are overwhelmed with administrative requirements and burdens that are part of their job today, and 91% say these burdens are only getting worse;

- Only 38% say they believe their practice is on solid financial footing; and

- Because of these issues, **56% said they may choose to leave the field or reduce their patient-facing work in short order.**

Healthcare employers are also seeing the impact of this on their operations in real time. For example, a recent Medical Group Management Association (MGMA) Stat Poll indicated that **staffing remains the largest roadblock facing medical groups today** (at 56%), which was higher than administrative burdens (23%), patient scheduling (13%), and all other issues (only 8%) combined. We also believe many health system executives are more focused than ever on the health and stability of their workforce—perhaps another byproduct of the pandemic, which left many systems short-staffed and in need of expensive temporary labor that dramatically pressured margins and often further reduced employee morale.

Unfortunately, this issue may only increase, as other studies, such as a recent American Medical Association (AMA) survey of more than 20,000 providers, indicate that nearly one-third of providers intended to reduce work hours, with 20% of physicians and 40% of nurses intending to leave their practice altogether. In Doximity's 2023 Physician Compensation Report, two-thirds of clinician responses indicated that they were considering an employment change as a result of feeling overworked.

Similarly, a 2023 analysis published by McKinsey & Co. indicated 45% of inpatient nurses—who account for roughly half of all nurses in the United States—reported they were likely to leave their role *within the next six months*. The top two reasons cited by nurses looking to leave the profession were not feeling valued by their organization and **not having a manageable workload.**

Similarly, in the 2022 National Workforce Survey published in *The Journal of Nursing Regulation*, 25.8% of RNs reported they feel burned out from work every day and an additional 19.4% stated they feel burned out at least a few times a week. And according to data from the 2024 Longitudinal

Nursing Leadership Insights Study, among nurse leaders, more than 50% report experiencing burnout multiple times each week, with 45% of nurse managers indicating that they are considering leaving their roles—citing burnout and lack of work-life balance as the main reasons.

We believe this turnover could even further compound the healthcare labor issue in a vicious cycle. In other words, turnover often fosters even greater feelings of overwork and burnout. Then, as workforces exhibit turnover, temporary or permanent replacements are often not familiar with the existing workflows, thus causing even more frustration with the existing staff and fueling more burnout and putting patients at risk. Thus, **we believe addressing the current burnout problem is a key strategic imperative for today's healthcare executives.**

To this end, we believe the opening commentary from Bobby Frist, HealthStream's CEO, on the company's late-April earnings call was insightful. He said:

> I do want to back up a little bit and talk about an emerging trend we are seeing that I think is worth calling out. The trend I am referring to is the increasing amount of attention that healthcare organizations are paying to their workforce, kind of broadly defined. **Now, more than ever, we believe that healthcare CEOs are embracing the fact that their workforce is really their most valuable asset and the staffing shortages that were exacerbated by the pandemic really served to reinforce the ongoing importance of taking care of your workforce** and, hopefully, from our point of view, investing in them to retain and develop them in their capabilities and capacity [emphasis added].

Government authorities have also begun to focus more than ever before on the issue. For example, the U.S. Surgeon General recently issued a report on healthcare workforce burnout (Addressing Health Worker Burnout) in the form of a Surgeon General Advisory, which is a public statement "that calls the American people's attention to an urgent public health issue." In discussing the issue, the Surgeon General highlighted that the risk of burnout can harm all Americans, stating:

> If not addressed, the health worker burnout crisis will make it harder for patients to get care when they need it, cause health costs to rise, hinder our ability to prepare for the next public health emergency, and worsen health disparities.

Overall, **we believe this issue could create both a tremendous amount of pressure and opportunities for a variety of healthcare services providers and technology companies** over the coming years. Thus, we decided to dig deeper into the topic for our second-quarter 2024 *Healthcare Mosaic* report, as we believe addressing provider burnout is now a major short- and long-term investment theme in the healthcare space.

Why Is Burnout Such a Critical Issue Today?

In our view, provider burnout and its negative consequences are critical to solve as they place the Quadruple Aim framework for the entire U.S. healthcare system at risk.

The Quadruple Aim is a framework for healthcare organizations that want to progress to value-based care in the United States. It was developed by the Institute of Healthcare Improvement (IHI) in 2014 in response to the Affordable Care Act's demand for quality care at a lower cost, and it consists of four key objectives: 1) improve the patient experience, 2) improve population health, 3) reduce costs, and 4) improve provider satisfaction.

The Quadruple Aim is an expansion of the original Triple Aim infrastructure introduced in 2007—with the fourth goal, on improving provider satisfaction, included in the updated framework. In our view, this was a logical addition to the model, as providers are the key lynchpin to achieving this objective, and burnout is a key hurdle to making this a reality, in our opinion.

Myriad studies indicate that organizations with higher provider burnout produce lower patient experiences—often with worse health outcomes and higher costs. As an example, one meta-study of 82 research publications, inclusive of more than 200,000 healthcare providers, found a statistically significant (negative) relationship between burnout and quality. And the range of issues was quite broad—as burnout was associated with items ranging from increased medical errors and rates of hospital-acquired infections (HAIs) to patient dissatisfaction and increased patient and family complaints (and subsequently more legal liabilities, as disgruntled families were more likely to seek legal remedies for medical errors as well). Moreover, in units with higher burnout scores, there was a deterioration of teamwork climate, safety, and overall job satisfaction.

Similarly, the AMA reports that **more than 87% of individual medical errors can be attributed to cognitive overload among physicians** (lack of attention to tasks at hand, alert fatigue, associated burnout, etc.), which is amplified when providers are burdened with myriad tasks outside direct patient care. Conversely, only 13% of errors are caused by an actual lack of skill or knowledge in care delivery.

And burnout not only increases patient harm and drives unnecessary direct costs of care, but also costs the overall U.S. healthcare system at least $4.6 billion annually in indirect costs (with ranges that go as high as $9 billion a year for nurses and $2.6 billion a year for doctors).

Here, studies indicate that items such as reduced capacity, the costs to recruit and replace providers, increased administrative needs (training, credentialing, privileging, etc.), and lost revenues from turnover are all contributors to the indirect costs of burnout. And, at an organizational level, an *Annals of Internal Medicine Study* also indicates that the annual economic cost associated with burnout related to turnover and reduced clinical hours is about $7,600 per employed physician each year.

Lastly, we believe **provider burnout may also have negative impacts on the overall growth and stability of the provider workforce (and thus care capacity) in the future,** which is already expected to face shortages in the coming years because of an aging U.S. population with a higher prevalence of chronic conditions.

By 2036, the total U.S. population is expected to grow by roughly 8.5%, and the population aged 65 and older will increase by more than 34% over the same time frame (with even greater growth, of 55%, in the over-75 population). Moreover, 42% of all physicians today are between age 55 and 64 (22%) or age 65 or older (20%) and are likely to leave their practice over the next two decades.
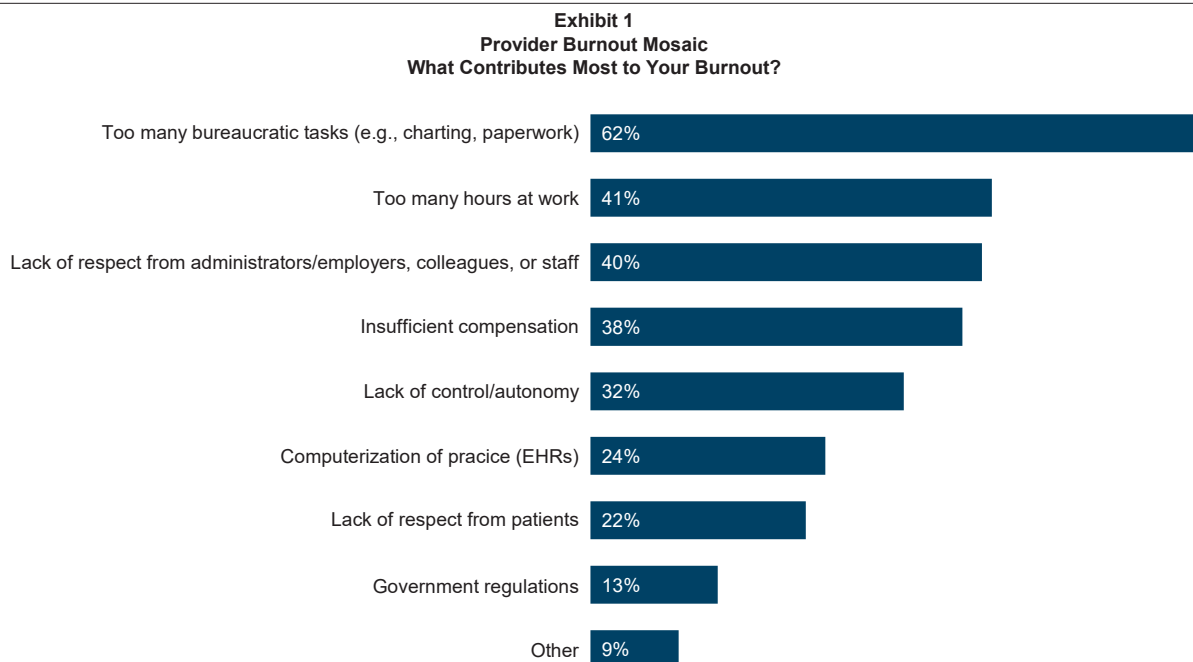
In our view, this idea creates a dire need to replace not only the pure numbers of providers but also their decades of medical knowledge. Even without assumptions of higher burnout rates going forward, new data released in March 2024 from the Association of American Medical Colleges (AAMC) indicates that the United States could face a shortage of between 13,500 and 86,000 physicians by 2036.

The problem is particularly acute for PCPs, which could face a projected shortage between 10,100 and 19,900 over the same time frame, according to the AAMC report. Accordingly, we believe the need to both address burnout and increase overall provider efficiency has reached near-crisis levels today.

What Is Driving Provider Burnout?

Before diving deeper into potential solutions to the problem, we believe it is informative to first review several of the root causes of the issue.
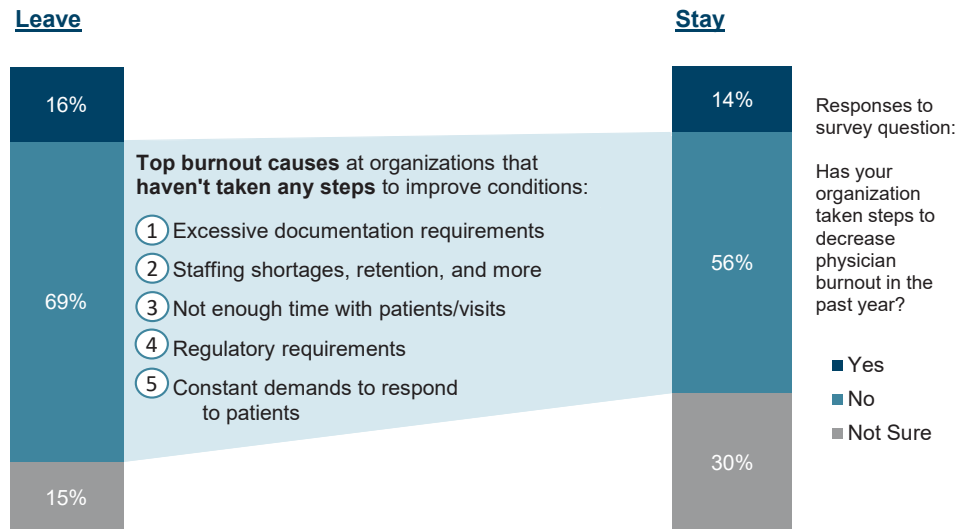
We first turn to Medscape's annual report on healthcare providers to hear directly from practicing physicians themselves. Medscape surveyed more than 9,200 physicians across nearly 30 medical specialties to complete its 2024 report (accessible after establishing an account at this link: *Medscape Physician Burnout & Depression Report 2024: 'We Have Much Work to Do')*. When asked what contributes most to their burnout (with the ability to select up to three answers), the top three issues were too many bureaucratic tasks (62%), too many hours at work (41%), and lack of respect from others (40%), with all other areas garnering less than 40% of responses (see exhibit 1).

Exhibit 1
Provider Burnout Mosaic
What Contributes Most to Your Burnout?

Category	Percentage
Too many bureaucratic tasks (e.g., charting, paperwork)	62%
Too many hours at work	41%
Lack of respect from administrators/employers, colleagues, or staff	40%
Insufficient compensation	38%
Lack of control/autonomy	32%
Computerization of pracice (EHRs)	24%
Lack of respect from patients	22%
Government regulations	13%
Other	9%

Source: Medscape Physician Burnout & Depression Report 2024

Similarly, an earlier athenahealth study looked at which providers will stay at, versus leave, their organizations due to burnout, and asked what areas were the top causes of burnout *that had not been addressed* by their employers. While informative, in our view, this data is largely consistent with the Medscape data presented above.

Exhibit 2
Provider Burnout Mosaic
Physicians Who Anticipate Leaving or Staying Within Three Years

Leave   **Stay**

16%   14%

Top burnout causes at organizations that haven't taken any steps to improve conditions:

1. Excessive documentation requirements
2. Staffing shortages, retention, and more
3. Not enough time with patients/visits
4. Regulatory requirements
5. Constant demands to respond to patients

69%   56%

15%   30%

Responses to survey question:

Has your organization taken steps to decrease physician burnout in the past year?

■ Yes
■ No
■ Not Sure

Source: AthenaHealth

We believe many of these issues are interconnected and highlight perhaps the key issue for providers today: **They simply do not have enough time to spend directly with patients, which often leads to longer hours and lower job satisfaction.** We believe this is generally driven by the overwhelming number of administrative burdens placed on them each day (inputting data into EHRs, submitting prior authorizations, completing insurance appeals, writing letters of patient support, reporting quality data, etc.).

According to the athenahealth survey referenced earlier in this report, it is estimated that physicians now spend 15 hours each week working outside normal business hours, mostly focusing on these administrative tasks. And, as mentioned earlier, **91% of all respondents in the survey stated that the burden of regulatory requirements is getting worse.** This, combined with a reverberation of the COVID-19 impact on the market, has led to a near all-time high in burnout and depression among providers (exhibit 3, on the following page).

Exhibit 3
Provider Burnout Mosaic
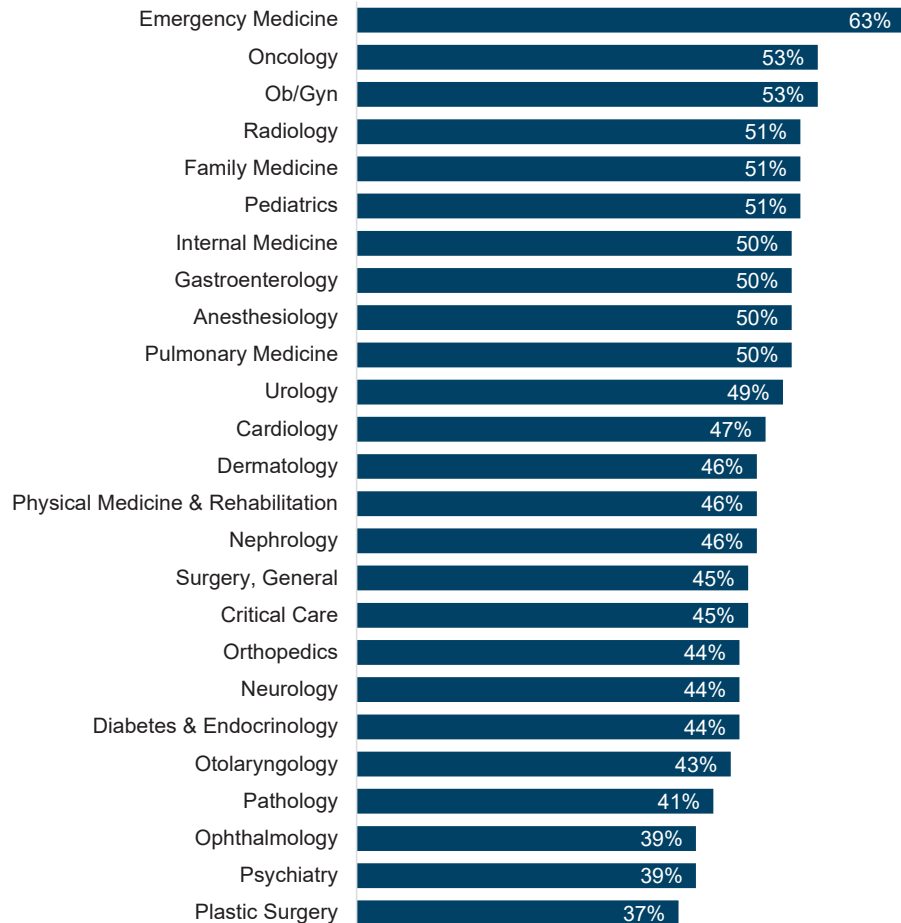**Burnout and Depression Rates Among Physicians**
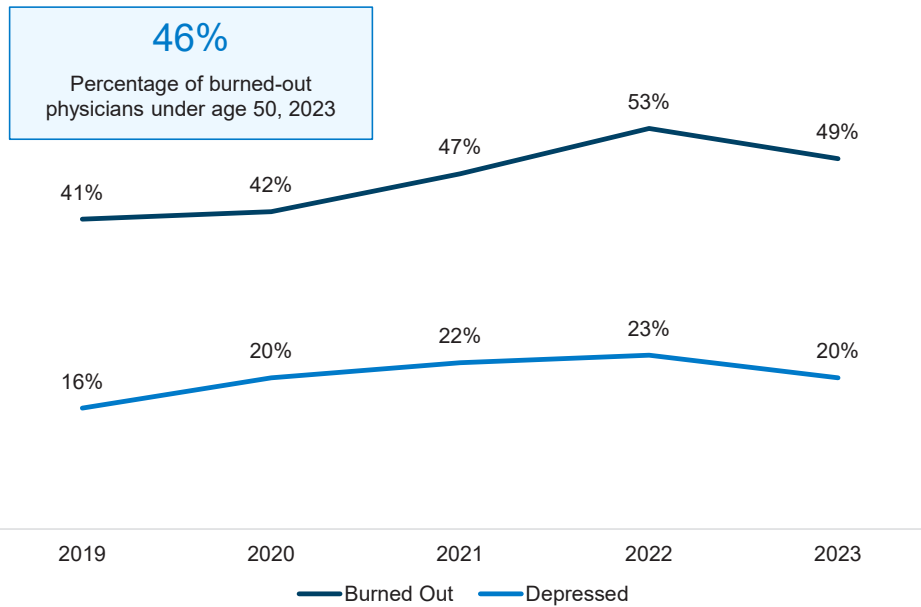
Source: Gist Weekly

It also appears that burnout is present across all medical specialties, but there is a wide range in the percentage of providers reporting burnout—with the highest levels in emergency medicine, ob/gyn, oncology, pediatrics, and family medicine and the lowest level in areas such as plastic surgery, ophthalmology, and psychiatry (exhibit 4, on the following page).

Clearly, the intensity associated with some specialties (e.g., emergency care and oncology) may naturally lead to higher burnout rates, but we also note that lower levels of burnout appear to be in areas more focused on private-pay (e.g., plastic surgery) or those with fewer government reporting and administrative requirements (e.g., ophthalmology). Regardless, the data above can be instructive for investors, as solutions focusing on the top specialties facing burnout may offer particular value in the marketplace, in our view.

Exhibit 4
Provider Burnout Mosaic
Which Specialties Have the Greatest Burnout Rates

Specialty	Rate
Emergency Medicine	63%
Oncology	53%
Ob/Gyn	53%
Radiology	51%
Family Medicine	51%
Pediatrics	51%
Internal Medicine	50%
Gastroenterology	50%
Anesthesiology	50%
Pulmonary Medicine	50%
Urology	49%
Cardiology	47%
Dermatology	46%
Physical Medicine & Rehabilitation	46%
Nephrology	46%
Surgery, General	45%
Critical Care	45%
Orthopedics	44%
Neurology	44%
Diabetes & Endocrinology	44%
Otolaryngology	43%
Pathology	41%
Ophthalmology	39%
Psychiatry	39%
Plastic Surgery	37%

Source: Medscape Physician Burnout & Depression Report 2024

What Can Be Done to Address the Issue?

In our view, understanding the key drivers of provider burnout can help in identifying solutions to address the issue.

At the most basic level, however, we believe employers and system executives must recognize the magnitude of the problem and fully embrace the fact that their workforce is the key asset in their care delivery systems. Without this fundamental acknowledgment at the highest executive levels, any other efforts to reduce burnout with novel technology solutions or administrative improvements may fall flat.

Unfortunately, when asked if their employers seem to even recognize burnout problems, only 28% of the respondents in the Medscape survey said "yes," so clearly there is work to be done to address this issue.

We also believe there are a number of discrete areas, ranging from staffing and training tools to automation and AI-driven solutions, that can help increase provider efficiency and address provider burnout (and all of which we discuss in separate sections below).

Before that, however, we highlight a recent report from the National Academy of Medicine, *National Plan for Health Workforce Well-Being,* which highlights seven key focus areas that must be addressed to improve workforce satisfaction and reduce burnout (which we summarize below, as we believe they also are indicative of potential areas for investment):

1. Create and sustain positive work and learning environments and culture.
2. Invest in measurement, assessment, strategies, and research.
3. Support mental health and reduce stigma.
4. Address compliance, regulatory, and policy barriers for daily work.
5. Engage effective technology tools.
6. Institutionalize well-being as a long-term value.
7. Recruit and retain a diverse and inclusive health workforce.

Key Solution Sets, Product Offerings to Help Address Provider Burnout

A Brief Comment on Generative Artificial Intelligence (gen AI)
Before diving into specific solutions, a brief discussion of gen AI is warranted, as we believe it will likely serve as a backbone of many future solutions (or dramatically improve existing technologies) as they relate to both provider- and consumer-facing applications.

Gen AI was initially viewed skeptically by most providers across the United States, given concerns such as patient privacy, the accuracy of data, and losing the provider-patient connection over time. This skepticism appears to be waning, however, as novel solutions are introduced and providers witness the potential value in gen AI–enabled technologies.

In an April study by Wolters Kluwer Health, 40% of all U.S. physicians indicated that they would be comfortable using gen AI in interactions with patients by the end of 2024. And roughly 70% of all providers acknowledged that gen AI will likely be embedded in doctor/patient interactions at the point of care within the next five years (36% indicating it could occur in the next one to two years and 34% within the next three to five years).

Moreover, overall *views regarding the use of AI in healthcare appear to be improving rapidly*, with 68% of providers having favorably changed their opinion on the value of gen AI over the past year alone (versus 7% who view it more skeptically today and 25% with no change in opinion).

When asked how gen AI could help save time, or improve interactions or decision-making at the point of care, providers indicated that the following areas held the most promise: 1) improving care team interactions with patients (81%), 2) saving time by quickly searching medical literature (68%), 3) saving time by summarizing electronic health record data on patients (59%), and 4) saving at least 20% of their time when looking for specific data to assist in clinical decision-making.

Still, providers appear to be focused on a responsible approach to using gen AI for clinical purposes, with nearly 90% stating they would be more likely to use it in clinical decisions "if the vendor was transparent about where the information came from, who created it, and how it was resourced."

Also of particular note, **76% of providers would be more comfortable using gen AI knowing it came from established vendors in the healthcare sector**—in our view, indicating a clear role for incumbents in the space to develop partnerships, as opposed to technology vendors directly selling solutions into the provider market.

We also believe providers must use caution in implementing such technologies, as some initial rollouts have been met with hesitation among staff. In late April, members of the California Nurses Association protested outside Kaiser Permanente's San Francisco Medical Center, given their belief that the system's "adoption of AI tools undermines their profession and put patients at risk." They said, "What we are witnessing in our hospitals is the degradation and devaluation of our nursing practice through the use of these untested technologies."

We believe this underscores the critical importance of health system executive leadership demonstrating to staff that the AI tools being implemented are safe and effective. And, even more important, they need to empower their workforce by emphasizing that while such tools are being used to help improve patient outcomes and staff satisfaction, providers remain the ultimate decision-makers for any and all care-delivery decisions.

Again, we conclude our report by discussing some of the most promising solutions to help address provider burnout.

Clinical (Ambient) Documentation

Clinical documentation, or the process of completing post-visit medical notes and uploading the documents into the electronic health record (EHR), is often cited as among the most burdensome administrative tasks for physicians. Accordingly, **we believe solutions that address this issue via technology are perhaps the most promising near-term interventions to address provider burnout** (ironically a novel technology that helps address burnout caused by an existing technology…).

In general, estimates for the amount of time that physicians spend in their EHRs typically range between three and five hours per day, depending on factors such as patient panel size, medical specialty, and the efficiency of a particular physician in their workflow. As an example of one analysis completed by athenahealth, researchers found a range for weekly EHR hours of 17.9 for orthopedic surgery to 23.3 for primary care physicians (PCPs).

Recent studies report that the EHR workload is trending higher, particularly for PCPs. Over about a four-year period through March 2023, the average time PCPs spent in the EHR per eight hours of clinic time increased by nearly 28.4 minutes, or roughly 8%. This was driven by increases in time spent in several areas, including orders, inbox management, chart review, and medical notes.

We also believe there is a strong correlation between the burden of "pajama time," referring to the fact that much of this EHR work is completed after normal business hours, leading to increased physician burnout and dissatisfaction with their job.

To be fair, some of the EHR work completed by physicians directly supports patient care (e.g., reviewing past medical history in advance of a patient visit), and thus we would not expect providers to eliminate time spent in the health record; however, we believe a meaningful portion of physicians' EHR burden reflects purely administrative tasks that are ripe for innovation through ambient clinical documentation solutions (again supported by AI).

With respect to clinical documentation, we believe the value proposition is also compelling on several dimensions other than pure ROI, including cost avoidance, incremental revenue opportunities (via better coding), and faster time to cash flow generation (through avoidance of claims denials via better documentation).

Furthermore, reducing the time spent on administrative tasks could allow physicians to increase their patient volumes. Industry leader Augmedix estimates that its solutions save physicians about three hours per day, which we believe could be filled with additional patients to help offset the cost of the service to the health system (again leading to rapid ROI realization). Lastly, **Augmedix** estimates its services can drive a 20% increase in revenue capture for a health system, based on better-quality documentation and charge capture for revenue cycle management (RCM). This also helps minimize payer denials, which can delay the time to cash flow for claims payments.

Putting this all together, we believe there is a clear market opportunity for technology solutions to optimize clinical documentation. Historically, we believe the largest segment of physicians in the market have used legacy solutions, such as dictation technology, to support documentation. In this segment, the leading provider is **Nuance** with its Dragon suite of products. Though a smaller segment of physicians uses in-person medical scribes, **ScribeAmerica**—which we believe has the largest market share in this segment—reports more than 25,000 clinician users in its client base.

Traditionally, documentation products relied on some level of human intervention between a scribe or the physician. With a growing set of use-cases for digital tools in healthcare, companies like Augmedix have developed a new market segment for ambient documentation solutions. These products combine speech-recognition software, a proprietary technology stack, and virtual scribes that are generally located overseas (to provide a labor cost arbitrage versus domestically located in-person scribes). The virtual scribes listen to a patient encounter—either in real time or after the visit—and produce an initial draft of the note for the clinician to review.

Given the rapid improvement in gen AI technologies in recent years, we believe the next wave of innovation for documentation is focused on tools that reduce the need for intervention from physicians, scribes, or other documentation specialists. In other words, we believe the market is progressing toward a fully automated medical note. The goal here is to develop products that rely on a combination of AI, large language models (LLMs), and speech-recognition software to automate the medical note, ideally at a lower cost and higher incremental margin than legacy solutions.

One such example in our coverage universe is Augmedix and the company's Go class of products, which were released for the ER space in late April and were already generally available for the ambulatory setting near the start of the year. Nuance, another industry bellwether that was acquired by Microsoft in 2022, is also expanding on its legacy documentation suite of products to drive more automation. The company's DAX Express leverages GPT4 through the Azure OpenAI Service. The company also has a strategic partnership to integrate DAX Express into Epic workflows.

Recent funding activity. Given the compelling value proposition for documentation and the need for growth capital to develop AI models for automation in this space, there has been a meaningful uptick in growth capital deployment in the market. **Thus, for this solution set, in particular, we review recent funding activity below.**

In April 2023, Augmedix raised some $12 million in new equity, led by Redmile (the company's largest institutional holder) and HCA (its development partner for Augmedix Go), to support AI product development. The organization subsequently raised an additional $26 million in November 2023 in a follow-on offering based on the strong demand it is experiencing in the market and a desire from HCA to accelerate product development.

Moreover, venture and private equity funding for clinical documentation support assets has also been robust in recent years (exhibit 5, on the following page). Over the past three years, PitchBook's deal volume data indicates a steady flow of deal activity and private funding for this industry, albeit

with a notable spike in the first quarter of 2022 (an outlier year for most subsectors). **The total number of VC and PE-growth deals involving clinical documentation assets was 79 in 2021, 78 in 2022, and 54 in 2023.** And while the first quarter of 2024 marked a similar level of deal volume activity as experienced in recent quarters, there was a meaningful uptick in total capital deployed, led by two larger strategic rounds (**Abridge** and **Ambience**). The $328 million of total capital invested in this period nearly matched the $366 million raised across all of 2023.

Exhibit 5
Provider Burnout Mosaic
Private Funding Activity: Clinical Documentation
$ in millions
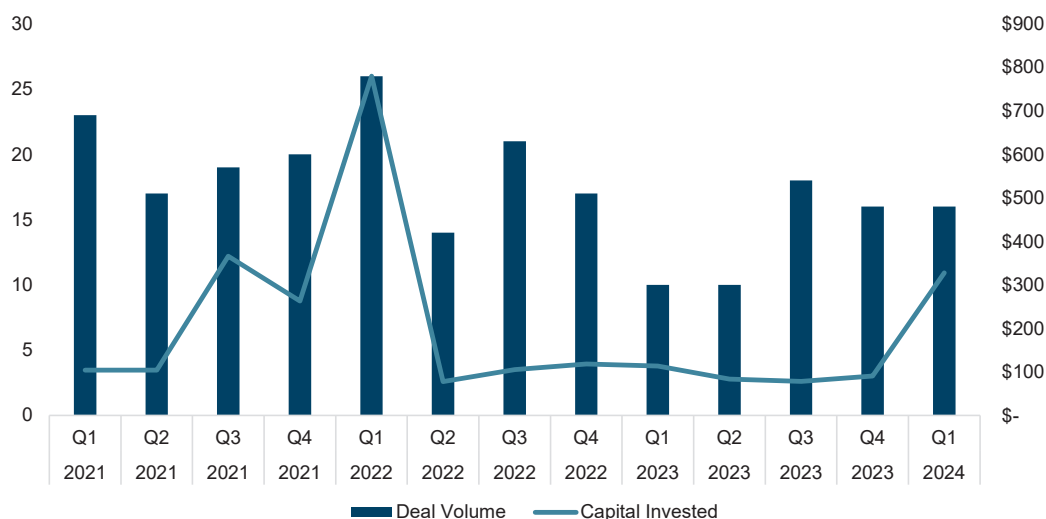
Note: Deals filtered for "clinical documentation" and related keywords; deals without size included in count only; data as of 3/25/2024
Sources: PitchBook Data, Inc.; William Blair Equity Research

In exhibit 6, on the following page, we highlight (in rank order, by size of the funding round) some of the leading capital raises for this market segment over the past 18 months, according to data retrieved from PitchBook.

Exhibit 6
Provider Burnout Mosaic
Top 15 U.S. Clinical Documentation Funding Rounds (dollars in millions)

Companies	Primary Industry Group	Deal Type	Deal Date	Deal Size	Raised to Date
Abridge	Healthcare Technology Systems	Later Stage VC	2/22/2024	$150	$214
Ambience Healthcare	Healthcare Technology Systems	Early Stage VC	2/6/2024	$70	$101
CodaMetrix	Healthcare Technology Systems	Early Stage VC	2/27/2023	$57	$57
CodaMetrix	Healthcare Technology Systems	Later Stage VC	2/29/2024	$40	$97
Abridge	Healthcare Technology Systems	Later Stage VC	10/20/2023	$30	$64
Memora Health	Healthcare Technology Systems	Later Stage VC	4/18/2023	$30	$80
VERO Biotech	Healthcare Devices and Supplies	PE Growth/Expansion	1/11/2023	$30	$233
Parker Health	Healthcare Technology Systems	Early Stage VC	7/12/2023	$25	$25
Kode (Medical Records Systems)	Healthcare Technology Systems	Early Stage VC	10/31/2023	$20	$23
OnPoint Healthcare Partners	Healthcare Services	PE Growth/Expansion	1/25/2024	$19	$22
ForeSee Medical	Healthcare Technology Systems	Later Stage VC	4/10/2023	$14	$37
AvoMD	Healthcare Technology Systems	Seed Round	6/23/2023	$13	$16
DigitalOwl	Healthcare Technology Systems	Later Stage VC	1/9/2024	$12	$41
Codex	Healthcare Technology Systems	Seed Round	2/1/2024	$11	$11
Digitail	Software	Later Stage VC	1/12/2023	$11	$14

Notes:1. Filtered for "clinical documentation," "coding support," "virtual medical assistant," "ai-scribe," "scribe, "medical conversation"
2. Excludes incomplete transactions; Data as of 3/25/2024
Sources: PitchBook Data, Inc.; William Blair Equity Research

Lastly, in exhibit 7, we provide a snapshot of some of the leading providers of clinical documentation solutions in the marketplace today.

Exhibit 7
Provider Burnout Mosaic
Clinical Documentation

Source: William Blair Equity Research

Inbox Message Management

Another frequent driver of provider burnout is the feeling that they need to be constantly available to communicate with patients—especially now that patient portals allow consumers to directly email their providers.

For example, in the abovementioned athenahealth provider survey, nearly 60% of respondents indicated that they are expected to be available "all hours of the day, every day of the week"—another key driver of fatigue and burnout. According to AMA data, physicians today receive 57% more patient portal messages than they did before the pandemic—likely as the pandemic shifted communication patterns toward digital channels that persist today.

In a recent *JAMA* study, Stanford Medicine indicated that its providers had experienced a 157% increase in patient portal messaging since the pandemic. And, while this may not seem like a major issue, some providers have indicated that it would take several hours a night to reply to all these patient messages, and the AMA even sponsored a recent conference concentrated on solutions to "inbox overwhelm." Moreover, Stanford stated that this had become "a leading factor in clinician burnout," in our view indicating this is a major problem for providers that also needs to be addressed with novel IT solutions.

To this end, we highlight a recent study published in JAMA in late May, which reviewed the use of artificial intelligence (Chat GPT-4) to generate automatic replies to patient inbox messages. In a study of 162 clinicians using the product, the mean draft utilization rate was 20%, and "there were statistically significant reductions in burden and burnout score derivatives." This ultimately led researchers to conclude that "the use of large language models in clinical workflows was spontaneously adopted, usable, and associated with improvement in clinician well-being." In turn, we see this as another area for health executives to consider, especially for more generic inquires such as appointments and prescription refills or to help triage inbound messages for providers (potentially diverting some to other providers or administrative staff to further reduce provider burdens).

Leading providers. Unlike with clinical documentation, it appears that most of the leading providers in this space are EHR and CRM vendors that are adding ChatGPT capabilities to their existing platforms. For example, **Well Health** (a leading HCIT vendor in Canada) recently launched WELL AI Inbox Admin, **IKS Health** now offers IKS's Inbox Management Solutions, and a number of providers are leveraging their **Epic** EHR platforms along with ChatGPT to develop custom solutions.

We also note that Epic recently launched an open-source tool (in late May) that allows its clients to test and monitor artificial intelligence models used on its platform (the Epic AI validation software suite). Of note, Epic clients can use the tool to validate AI models that integrate with its EHR systems, and the launch is Epic's first-ever open-source tool.

Still, there are a few emerging vendors in the space that offer inbox management or areas such as conversational AI (including areas such as symptom checkers that can be used to triage patients) for healthcare, such as **klara, hyro, Steer Health, HealthTalk A.I., Orbita,** and **98point6 (now owned by Transcarent).**

Exhibit 8, on the following page, shows some of the leading vendors in the sector today.

Exhibit 8
Provider Burnout Mosaic
Inbox Message Management

Source: William Blair Equity Research

Physician Writing Assistants

Prior authorization (PA) is a common utilization management tool for payers, which requires healthcare providers to obtain preapproval to make a referral or administer a drug for a covered patient. From payers' perspective, PA is a key tool to help align medical practices with the latest medical guidelines and to ensure appropriate use of services.

However, providers often find the process burdensome (spending up to 13 hours a week on PA paperwork and submissions), and it also can negatively impact patients by delaying the time to treatment. Here, we highlight a 2022 physician survey by the AMA, which determined that 86% of respondents reported that PA resulted in increased use of healthcare resources, leading to waste rather than the cost savings claimed by insurers.

About two-thirds of respondents also indicated that PA requirements led to either diversion to ineffective initial treatments (64%) or additional office visits (62%). And, according to this survey, practices completed an average of 45 PAs per physician per week, with physicians and their staff spending an average of 14 hours on PAs each week. In turn, we believe it is another major source of frustration and burnout in the provider community.

One early adopter of the solution is **Doximity,** which now has dozens of enterprise clients using its Doximity GPT solutions. The solutions are made for healthcare and trained on healthcare-specific prose for its responses. Moreover, the application is rapidly compiling a growing library of pre-established medical prompts to allow providers to select a frequent PA need and a specific payer and to quickly develop a PA letter. For example, in a Doximity blog post, the authors describe how one user produced a PA letter simply by typing the following into the company's chatbot:

> Write a letter to United Healthcare asking them to approve an echocardiogram on a patient with systemic sclerosis. Make reference to supporting scientific literature and list the appropriate articles.

Another unique benefit of the DoximityGPT is the solution's ability to sync to the free Doximity eFax solution, so the document (**once reviewed and edited**) can be automatically transmitted to the payer over Doximity's HIPAA-compliant platform (which is used by hundreds of thousands of

providers already). This can help overcome the inefficiencies of traditional file sharing, as Doximity management often cites the data point that 76% of healthcare documents in the U.S. today are still sent via fax and snail mail.

We also believe many leading **revenue cycle management (RCM) vendors** are integrating this into their RCM offerings, and there are several pure-play vendors in the space as well, including operators such as **Valer, Infinx, HELIOS, ZeOmega, RXNT, Myndshft, Cohere Health, Rhyme (fka PriorAuthNow), maxRTE,** and **OSP Labs.** We highlight these leading providers in exhibit 9.

Exhibit 9
Provider Burnout Mosaic
Physician Writing Assistants

Source: William Blair Equity Research

Patient Intake Solutions

We also view patient intake platforms and related solutions as a means to improve provider efficiency while also enhancing the patient care experience. These solutions not only expedite the patient intake process by delivering patients' information directly to their providers (typically via integration in the EHR), but also reduce the need for patients to repeat data requests during the same (or subsequent) visits. Furthermore, by moving the administrative burden of patient intake requirements to the patient rather than the provider office, it frees staff to perform more productive/profitable activities.

Similarly, many patient intake platforms offer ancillary solutions like appointment reminders (so providers do not have gaps in their office schedules that reduce efficiency) and visit accelerators (which automatically communicate with patients to fill open slots in providers' schedules, often due to cancellations). And some solutions even offer pre- and post-visit patient education materials and pre-visit patient questionnaires (including areas like social determinants of health), which often make the actual visit with a provider more productive and rewarding for both parties.

Our recap of leading operators in this sector is presented in exhibit 10, on the following page.

Exhibit 10
Provider Burnout Mosaic
Patient Intake Solutions

Source: William Blair Equity Research

Provider Workforce Management (e.g., Training, Credentialing, and Scheduling Solutions)
As part of health systems' broader governance, risk, and compliance (GRC) strategies, we view physician workforce management solutions, inclusive of training, credentialing and enrollment, and staff scheduling, to be mission-critical tools for hospitals. We discussed this market segment in great detail in a June 2020 edition of our *Healthcare Mosaic* report, which includes a more in-depth discussion of GRC topics.

Within the workforce management theme, we believe scheduling and training solutions are likely to be a top investment priority for health systems. As mentioned in the introduction of this report regarding a recent MGMA survey, staffing is a top-of-mind issue for medical groups with respect to managing burnout of the clinical workforce. In our view, this supports demand for enhanced scheduling platforms, in particular, which afford medical groups opportunities to improve both overall employee engagement and retention.

For example, according to a HealthStream white paper published in late 2023 *(Healthcare Workforce in Crisis),* flexible scheduling supports higher employee engagement and job satisfaction. This report suggests that 51% of provider human resources (HR) leaders agreed that flexible scheduling "can lead to improved employee engagement" and 43% strongly agreed that flexible scheduling "can help reduce employee burnout."

Beyond flexible staff scheduling solutions, we also believe there will be considerable demand for training and learning management platforms to help support clinical staff. As discussed throughout this report, burnout contributes to relatively high labor turnover across the healthcare industry, and this turnover typically comes at a high-cost burden for health systems. On average, industry experts peg the cost of turnover across all healthcare jobs at about $60,000 per position, as hospitals are forced to deal with incremental staffing costs (e.g., overtime payouts, traveling nurses), training for new positions, accident rates, medical staff dissatisfaction from the constant cycle of turnover, and onboarding of new hires.

In our view, this translates into a compelling value proposition for organizations to invest in solutions to train, develop (i.e., upskill), and support their existing workforce, which has been shown to empower staff and lower turnover and burnout. We also believe the development of clinical workforces can help alleviate the burnout-related issues caused by staff shortages in certain areas (e.g., cross-training nurses across departments).

Lastly, we also include provider credentialing, privileging, and enrollment within the theme of workforce management. Credentialing is essentially a background check conducted by payers before entering a relationship with providers, involving primary source verification (PSV). PSV refers to the process of collecting data to check the background of an individual clinician, such as checking proof of residency, internship completion, undergraduate and graduate school transcripts, state licenses, practice history, and other background documentation. The privileging process is the approval and authorization of a healthcare provider to perform specific medical services for a specific provider.

Enrollment refers to the direct relationship between a payer and provider. For a doctor to be considered a part of a third-party payer's network, the payers must first complete a verification (i.e., conduct a background check) of that clinician's identity and experience and then contract with that provider for his/her services at negotiated rates (steps generally performed in separate silos at most payer organizations, translating into an overly complex process, in our view).

As recently as 2018, based on the results of an AMA survey, only 13% of providers indicated usage of credentialing software, while another 13% relied on email to submit provider data. We believe more recent industry data points suggest that these processes still tend to be full of manually intensive, legacy workflows that require staff to compile and verify provider data (e.g., education, work history, and medical licenses), which leads to a significant amount of administrative time for clinical and nonclinical staff.

We view this segment of the market as well positioned for growth as providers incrementally invest in novel, cloud-based platforms to streamline the process. A recent report from Medallion (*2024 State of Payer Enrollment and Credentialing)* suggests that **40% of provider enrollment workflows are mostly manual, while 52% of credentialing tasks are entirely manual.**

The biggest pain points, in our view, in the credentialing, privileging, and enrollment workflow are typically associated with collecting data from providers. Thus, it is no surprise to us that *automation* and *efficiency* are key investment priorities for health system leaders; the aforementioned Medallion report indicates that 53% of healthcare professionals say automating and creating more efficient processes are top priorities in 2024. We expect this demand momentum will persist over the coming years as healthcare employers seek solutions to empower and support their workforces.

We offer a snapshot of leading providers in this subsector in exhibit 11, on the following page.

Exhibit 11
Provider Burnout Mosaic
Workforce Management

Source: William Blair Equity Research

Value-Based Care Enablement

While not a pure technology solution, the movement away from fee-for-service medicine (or volume-based care) to value-based care delivery also holds significant potential to reduce provider burnout, in our opinion.

The primary reason for this is that under VBC models, providers are paid for the *quality* of care delivered rather than the quantity of care provided (i.e., number of visits completed per day). In turn, this allows providers to spend more time with patients in actual care delivery and relationship building functions, which has been shown to dramatically increase provider satisfaction, lower turnover, and reduce burnout. Recent data from CVS Health indicates that the 600 providers in its Oak Street Health VBC business "spend 3x longer with patients, and spend more time coordinating holistic, connected care," which we believe is a key factor supporting lower provider turnover and high satisfaction among the Oak Street Health provider base.

As another example, physicians using value-based payment (VBP) models reported "burnout relief" in a recent study ([Evaluating Value Based Payment in Reducing Administrative Burden](#)) from EHR company Elation Health and the American Academy of Family Physicians (AAFP). This burnout relief increased as more patients entered value-based care models, as providers had smaller patient panel sizes, longer patient visits time frames, and lower administrative burdens.

We also note that higher net promoter scores, better provider retention rates, and stronger overall workforce engagement rates are all common themes among the public value-based care providers we cover.

Again, we believe these VBC enablers can become stewards of provider value creation and reduce burnout at partner practices. Moreover, we do not believe most providers have the scale, IT infrastructure, contracting knowledge, or financial expertise to move into at-risk arrangements on their own. Therefore, we believe VBC enablers, such as those listed in exhibit 12, on the following page, can play a key role in reducing provider burnout—especially at the PCP level—over time.

Exhibit 12
Provider Burnout Mosaic
Value-Based Care Enablement

Source: William Blair Equity Research

Workflow Streamlining and Automation

As providers continue to embrace technology tools such as AI, we believe there will also be significant interest in solutions that automate and streamline existing workflows. At a high level, revenue cycle management and clinical workflow optimization were recently cited in Bain & Company and KLAS Research's 2023 provider executive survey as among the top three IT priorities for both health systems and physician groups, and we believe automation is at the center of those investment themes.

Moreover, we believe the digitization of healthcare is increasingly providing access to previously unstructured or unused data, which, in turn, can be used to unlock insights for areas of improvement through automation or efficiency gains. For example, ambient clinical documentation solutions allow health systems to take data that was previously limited (clinical note summaries were based on what the doctor thought was relevant during a visit) and turn it into a structured dataset that could be queried for other use-cases, such as improved coding or clinical decision support solutions during the patient visit.

A recent survey published by Zebra Technologies (*Critical Supplies, Critical Outcomes)* helps further frame the level of interest among health system executives in investing in automation capabilities; the report found that *84% of nonclinical health system leaders believe integrating automated and digitized inventory tracking systems is a key priority*. Moreover, 74% of hospital leaders surveyed by the company acknowledged that they experienced procedure cancellations due to out-of-stock or low-stock for supplies used in surgery. In our view, this is a headache for clinicians as it creates a schedule disruption. In addition, 77% of respondents agreed that clinical staff **spend too much time searching for medical equipment, materials, or supplies when needed,** and 75% say it is a challenge to recover all recalled or expired items—creating further frustrations for clinicians.

A May 2023 report published by McKinsey & Co. asked nurses to break down the time spent across various activities during a typical shift. Based on this analysis, McKinsey estimates that **65% of the time nurses currently spend during the workday could be either delegated or optimized with technology**. Again, we believe this would not only provide a better overall work experience for nurses, and thus stem the risk of a decline in the supply of nurses, but also allow them to provide better care quality by spending more time with patients.

Similarly, the ideal work environment, as described by nurses surveyed by McKinsey, indicates that they would prefer to have more time to spend on patients and less time spent on administrative actions, which we believe could be achieved through investments in technology and automation. Overall, according to McKinsey, nurses in the ideal state would spend about 73% of time on either direct patient care or training and development activities (including breaks), versus 64% in the current state. The report further suggests that technology enablement could drive up to 20% net time reduction for nurses across a 12-hour shift; in our view, the activities that are likely most impacted through technology enablement would include documentation, alarm management and response, and data collection (i.e., hunting or gathering).

Exhibit 13
Provider Burnout Mosaic
Ideal Work Balance Preferred by Nurses (% of total time spent on tasks)
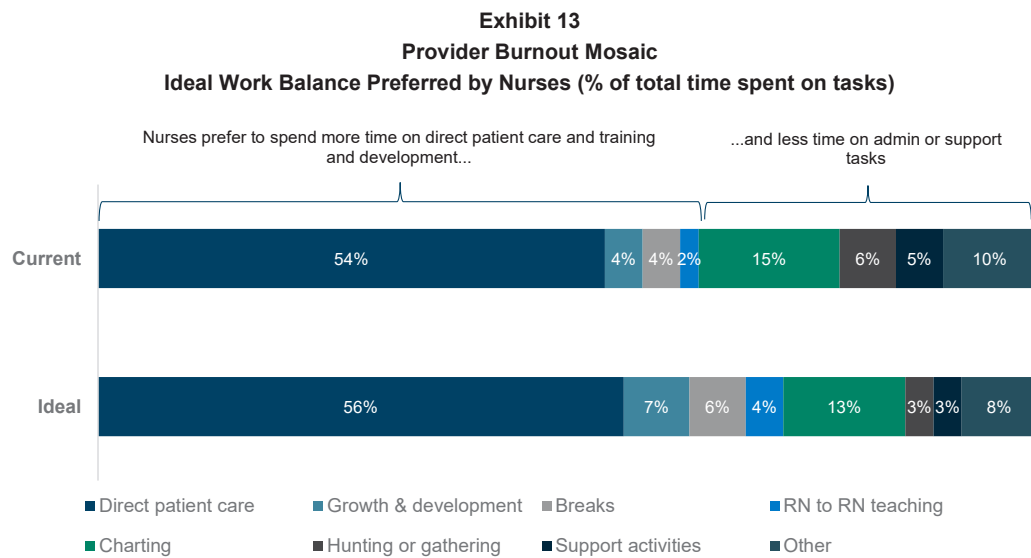
Sources: McKinsey & Co., William Blair Equity Research

It is important to note that we also view data-driven insights as the key to identifying the bottle-necks in nurse workflows that are causing many headaches experienced by clinical staff today. As mentioned above, we see opportunities to use algorithms that can compile data across differ-ent sources to identify opportunities for improvement; as another example, a recent presentation at the HIMSS 2024 industry conference, summarized in a May 2024 *Healthcare IT Today* article, showcased the potential for data interoperability to unlock new insights in the inpatient setting. The presentation highlighted how algorithms can compile data across various systems in an in-patient room with a hospital's nurse call system to identify bottleneck areas where nurses may be spending too much time. This would allow hospital leaders to understand where to invest in workflow tools to achieve the most significant efficiency gains and have the biggest impact on the work experience of their nursing staff.

As discussed at the beginning of this section, we believe gen AI also presents several opportunities to improve healthcare workflows as clinicians increasingly embrace the technology. Here, we be-lieve the use-cases are particularly compelling to drive automation and, in turn, drive productivity gains and improve the patient and provider experience. One such example is the iQueue Autopilot solution from **LeanTaaS,** which leverages gen AI for hospital operations, marketed by the orga-nization as an "air traffic controller" for healthcare. As Bain & Company stated in its recent *2024 Global Healthcare Private Equity* report, generative AI "promises to cut the time spent on docu-menting patient visits and reimbursement-related communication, which would reduce clinician burnout and lower administrative costs."

In our view, there are several logical tasks that could be automated, at least to some extent, such as appointment scheduling, billing, and prescription refills, all of which could translate into meaningful time savings for clinical staff and drive operating efficiencies for health systems. As another example, **Tennr**, which recently raised $18 million in series A funding, provides a platform that enables automation across critical revenue cycle functions, such as referral processing, payment posting, claims auditing, and medical record management. It also provides tools to automate data extraction from faxes to automate patient intake and insurance communications to lower provider burdens.

As another example, Beacon Health System, a nonprofit health system serving patients in Indiana and Michigan, recently implemented **Noble's** AI platform to streamline patient scheduling for diagnostic procedures. When a provider orders a diagnostic scan, there is often a bottleneck in the care delivery process until the patient actually schedules the examination. These queues are often tracked manually, marking yet another administrative task that requires human intervention in the care journey. By implementing Noble, Beacon will leverage AI to scan patient records and identify all pending orders that have yet to be scheduled, automate the outreach to patients with personalized messages, and provide a tool to allow patients to schedule their appointment.

We also see compelling opportunities to embed AI tools to reduce administrative work time in specialty areas such as radiology. For example, **Rad AI,** which provides an AI-supported platform to help radiologists generate report summaries from images, recently closed a $50 million series B funding round to support growth and expansion.

Similarly, we see opportunities to embed demand forecasting algorithms that could better distribute patient bed assignments, preventing a small number of clinicians from becoming overwhelmed with patient loads. In our view, AI can also help alleviate the clinical burden on physicians through novel remote monitoring technologies in the inpatient setting. More specific, AI and remote monitoring can continuously monitor an admitted patient's vitals, which saves the workforce time from manually collecting this data, and ideally allow the clinical staff to intervene earlier before acute events occur.

As an example of this in practice, *KFF Health News* recently reported on a successful integration of AI in the inpatient setting at Houston Methodist Hospital (*Forget Ringing the Button for the Nurse. Patients Now Stay Connected by Wearing One*). As part of the program, admitted patients received a monitoring device called BioButton, from Medtronic, which tracked vital signs and transmitted the data to a 24-hour control room or to nurses at home; the software then uses AI to track the data and look for signs that a patient's condition might be deteriorating. With the continuous monitoring of BioButton, nurses can wait to collect vital signs every eight hours versus every four, the more typical practice, which we believe translates into meaningful time savings.

Transcarent, which recently announced a $126 million series D round, offers another compelling example of embedding AI into workflows to embower clinicians. For doctors who connect to the platform, the AI tools could identify a patient's potential condition based on reported symptoms. The platform could then sift through the patient's records to identify any relevant data from the patient's history (e.g., that a patient may suffer from regular seasonal sinus infections). The AI tools could then consider past prescriptions that the patient has used to help point the doctor toward the optimal script (and even identify pharmacies that might be more convenient for the patient to ensure the script is actually filled).

In our view, this section only scratches the surface of the compelling use-cases to automate specific processes in healthcare with the goal of supporting the healthcare workforce. We show several leading providers in this space in exhibit 14, on the following page.

Exhibit 14
Provider Burnout Mosaic
Workflow Streamlining and Automation

Source: William Blair Equity Research

Conclusion

As discussed throughout this report, we view the current staffing crisis facing U.S. healthcare providers as a major issue—**one that could create both a tremendous amount of pressure and opportunities for a variety of healthcare services providers and technology companies** over the coming years.

Moreover, we believe the provider burnout phenomenon and its associated negative consequences are critical to solve, as they place the entire Quadruple Aim framework for the U.S. healthcare system at risk. And, as we view this issue as both a near- and longer-term headwind for providers, we believe stakeholders will need to invest in HCIT solutions—such as those related to clinical documentation, inbox message management, physician writing assistants, patient intake processes, workforce management, value-based care enablement, and workflow streamlining/automation, among others—to help combat this issue. In turn, we expect this to be an area of increased investor interest, both in the public and private markets, over the coming years.

For more detailed analyses of our covered (public) companies, see our research reports or contact the author of this report at rdaniels@williamblair.com.

The prices of the common stock of other public companies mentioned in this report follow:

Augmedix, Inc. (Outperform)	$1.12
Doximity, Inc. (Outperform)	$27.42
HCA Healthcare	$315.34
Health Catalyst, Inc. (Outperform)	$6.65
HealthStream, Inc. (Outperform)	$26.99
Medtronic plc (Market Perform)	$81.39
Microsoft Corporation (Outperform)	$427.00
Phreesia, Inc. (Outperform)	$22.46

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