2023 State of CNS Clinician Readiness & Rater Training
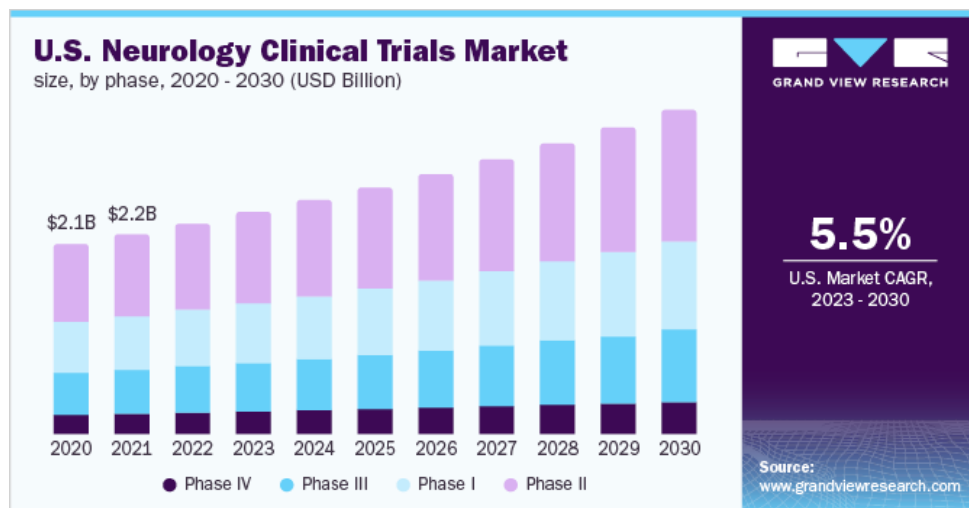
IDENTIFYING KNOWLEDGE GAPS AND ELEVATING CONSISTENCY

OCTOBER 2023

SUMMARY

Neurological disorders remain the second highest cause of death and the leading cause of disability worldwide.

According to a 2023 report by IQVIA, the central nervous system (CNS) pipeline has expanded by **31%** over the past five years and now accounts for **14%** of the overall industry, making it the second largest therapy area after oncology. Smaller biopharmas account for **84%** of pipeline today, split roughly 80/20 between neurological conditions and mental health.

U.S. Neurology Clinical Trials Market
size, by phase, 2020 - 2030 (USD Billion)

GRAND VIEW RESEARCH

$2.1B $2.2B

2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030

● Phase IV ● Phase III ● Phase I ● Phase II

5.5%
U.S. Market CAGR,
2023 - 2030

Source:
www.grandviewresearch.com

As such, the increase in the number of CNS-related clinical trials requires a robust workforce comprised of clinicians, study teams, and raters that are effectively trained and fully equipped to conduct today's increasingly complex neurology and psychiatric studies.

To understand the level of readiness in clinicians conducting clinical trials across neurological and psychiatric disorders, ArcheMedX conducted an in-depth analysis of the learning data generated by **95,724 clinician learners** across **91 CNS-related educational activities** powered by **Ready**, the industry's leading behavioral science-based training and predictive analytics platform.

The resulting analyses revealed that **85% of clinicians** lack the mastery (prior to completing training in the Ready platform) to effectively conduct clinical research or provide appropriate treatment across CNS conditions. Though baseline deficiencies in clinician mastery are concerning, training delivered within the **Ready platform** demonstrated significant improvements. After completing more tailored and interactive training in Ready, clinician mastery increased for all CNS-Related topics by **3.3x,** by **4.7x** for Rater Training-related topics, and **by more than 8x** across a subset of the most prominent CNS-related conditions.

INTRODUCTION

According to the most recent Global Burden of Disease Study, **40%** of the global population currently suffer from some form of neurological condition, and this burden is projected to nearly double by 2050, including the number of people who die from stroke globally which is estimated to increase by **50%**, to **9.7 million** deaths per year, by 2050

A Growing Health Crisis
The projected number of people with dementia, *millions*

High-income countries ▪ Low- & middle-income countries
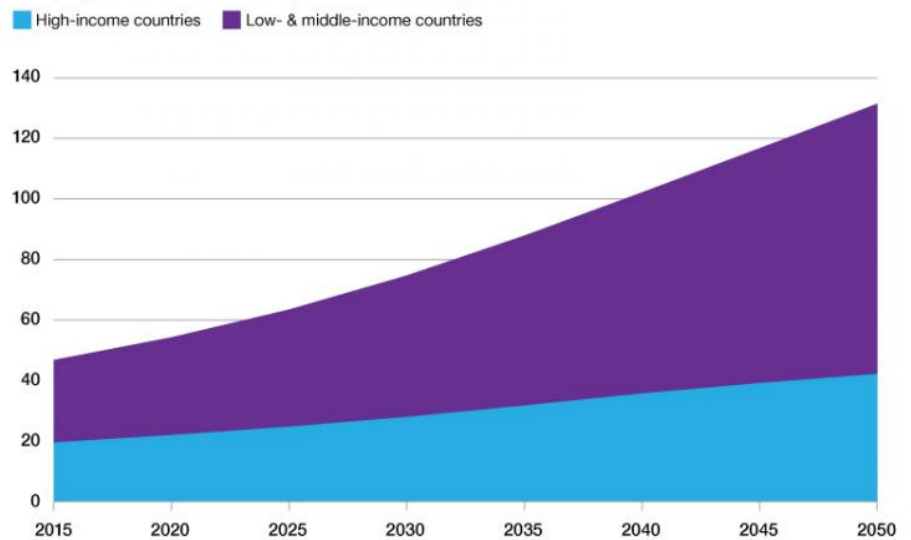
Source: Alzheimer's Disease International – World Alzheimer Report 2015

The massive burden caused by neurological disorders is expected to increase significantly due to the aging and growth of the global population.

A new wave of innovative treatments and therapies are closer to enabling our ability to treat, and possibly cure, many neurological and CNS-related disorders. Recent developments in genomics and immunology, coupled with new diagnostics and digital therapies, are unlocking profound advances in neuroscience. Global sales of CNS therapeutics totaled over **$116 billion in 2020** and are on pace to reach **$205.7 billion by 2028**.

LATER STAGE PIPELINES OFFER HOPE FOR MILLIONS

According to Evaluate Pharma, the annual R&D spend in CNS will top **$32 billion in 2026**, generating more than **4,000 clinical trials** across conditions, with later stage studies in Alzheimer's, Parkinson's, ALS, MS, Epilepsy, and Huntington's disease leading the way (see chart below).
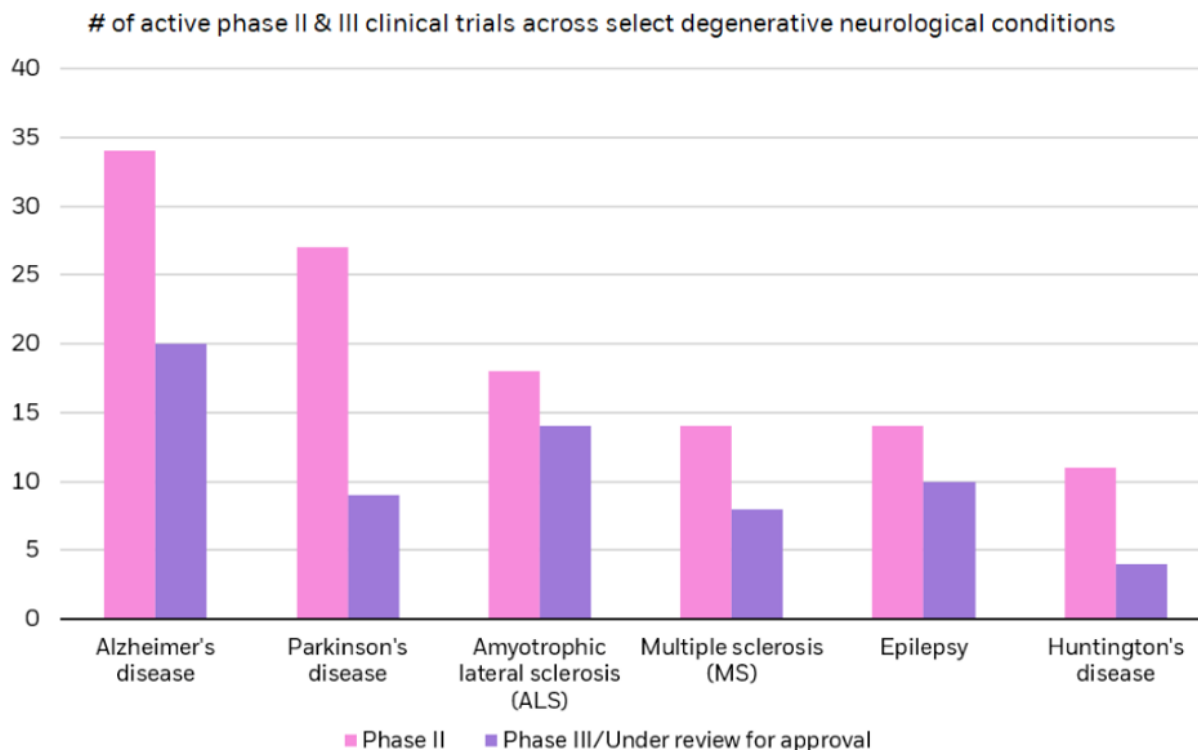
# of active phase II & III clinical trials across select degenerative neurological conditions

Chart: https://www.ishares.com/us/insights/neuro

DRUG DEVELOPMENT CHALLENGES IN CNS

While the increased investment is welcome news, the discovery and development of drugs for a variety of CNS indications has yielded **one of the lowest success rates of any therapeutic area**.

According to the analysis by Tufts Center for the Study of Drug Development in 2018, CNS drug development is **20% more time-consuming** and takes **38% longer** to get approved than non-CNS drugs. Many of the challenges involved in conducting CNS studies are driven by the complexities in CNS study design (i.e., subjective endpoints), difficulty selecting and activating experienced sites, and successfully recruiting and screening hard-to-find patients.

Overcoming these obstacles cannot be solved solely by new eClinical tools and wider adoption of decentralized clinical trials (DCTs), rather they are rooted in underlying process inefficiencies and performance challenges that are caused in large part **by training deficiencies**. These issues are magnified today with rising staffing shortages, more subjective endpoints, and the increased use of patient-reported outcomes across CNS-related clinical trials.

TRIAL COMPLEXITY

According to the Tufts Center for the Study of Drug Development, the greater the trial complexity, the worse the performance - across all measures. And with protocol procedures up **44%** since 2009 and study endpoints expanding by **86%** from 2005-2015**, trial complexity is already at an all-time high and is growing.**

The more complex the study or treatment, the better prepared each individual engaged in conducting the study must be. This is especially true when turnover rates across study sites are **35%** and most study sites and research teams are understaffed and overworked.

Identifying and **understanding how well prepared each clinician** is to conduct clinical research and to perform their role in adherence with the study protocol represents a critical step in planning for study startup, delivering effective study training, and achieving trial milestones and endpoints.

84% Ready

68% At Risk
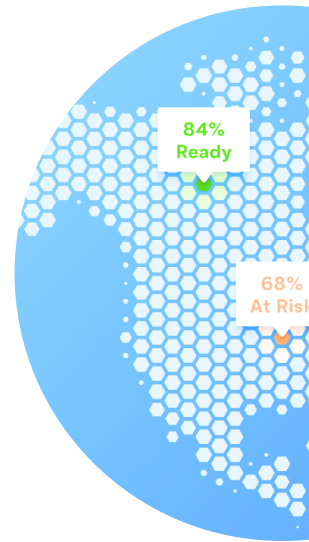
CHALLENGES IN RATER CONSISTENCY

CNS-related clinical trials face unique challenges compared to other therapeutic areas, contributing to higher failure rates. **A major cause of CNS trial failure is the reliance on subjective endpoints** such as neurological, impairment, and caregiver scales. Since CNS studies rely heavily on ratings accuracy to demonstrate the efficacy and safety of investigational products, the subjectivity and inconsistency in rater assessments creates variability within raters over time and between raters across sites that negatively impacts the reliability and validity of the results.

Unfortunately, there is no accepted standard for training raters which leads to differences applying scales commonly used in clinical practice vs. clinical trials, overlooking study specific requirements when using common scales, and discounting diverse cultural and language realities. The lack of standardized and effective training causes rater bias, rater drift, rater errors, and rater variability. These challenges frequently **place the quality of clinical data and the entire CNS trial at risk**.

Numerous studies have shown that rater training improves rater competency and is a well-recognized mechanism for improving the signal-to-noise ratio by minimizing inconsistency, errors, and variability (e.g., inter- and intra-rater reliability) and bias in trials. In CNS studies, training assumes a pivotal role, ensuring the reliability of measurements and the sensitivity to detect changes throughout the course of a trial.

ASSESSING THE READINESS OF CNS CLINICIANS

To understand the level of readiness in clinicians and raters conducting clinical trials across neurological and psychiatric disorders, ArcheMedX analyzed learner mastery data generated by **95,724 clinician learners** across **91 CNS-related educational activities** and over **300 paired assessment questions** powered by the **Ready platform**.

The resulting **analyses revealed** that **85% of clinicians** lack the mastery to consistently formulate a differential diagnosis, develop individualized treatment plans, or navigate the complexity of CNS care teams to effectively conduct clinical research or provide appropriate treatment.

Percentage of Clinicians in Mastery Across All Topics

6.8%	29.7%	19.5%	29.0%	15.1%
Misinformed	Uninformed	Guessing	Doubt	Mastery
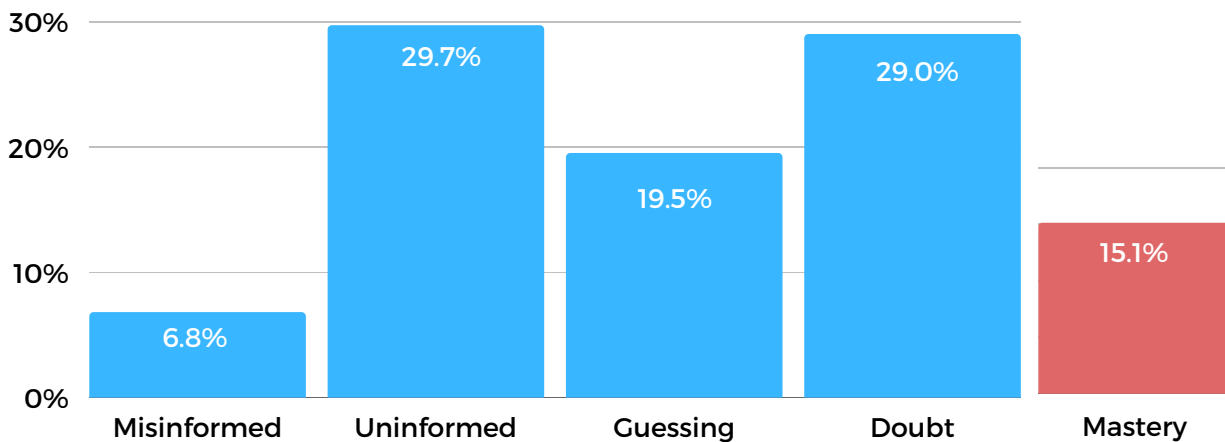
In a subset of activities and assessment questions specifically addressing Rater Training in CNS-related content areas, the baseline deficiencies in clinician mastery were even more profound. **Less than 10%** of clinicians are equipped to effectively implement rating scales.

Percentage of Clinicians in Mastery Across Rater-Related Topics

6.6%	32.9%	22.3%	28.6%	9.6%
Misinformed	Uninformed	Guessing	Doubt	Mastery
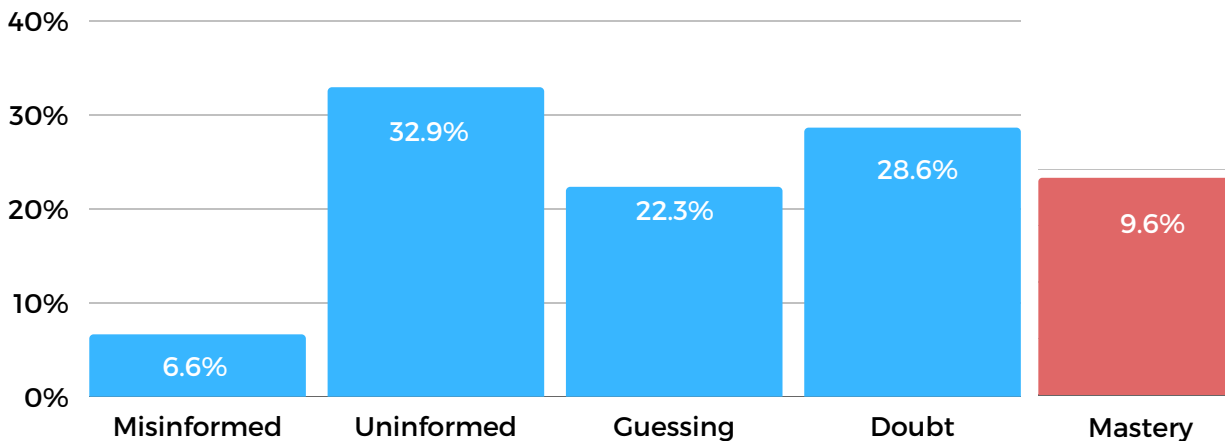
DEFICIENCIES IN CLINICIAN MASTERY

In addition to the variations in mastery identified across all topics, the data demonstrated that more than **85% of clinicians** in clinical areas such as Alzheimer's, Bipolar/Schizophrenia, Migraine, MDD, MS, and Pain Management lack the clinical mastery to effectively conduct clinical research, consistently apply scales and assessments, or provide appropriate treatment.

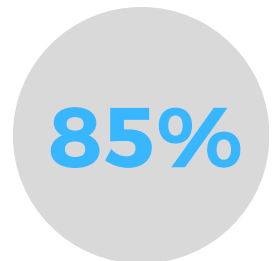| CLINICAL AREA	BASELINE MASTERY
Alzheimer's	15%
Bipolar/Schizophrenia	5%
Migraine	9%
Major Depressive Disorder (MDD)	9%
Multiple Sclerosis (MS)	14%
Pain Management	15%

Representative insights from the resulting analyses found:

In **Alzheimer's/Dementia**, more than **9 in 10 clinicians** demonstrate deficiencies in accurately diagnosing the disease, and more than **4 in 5 clinicians** demonstrate deficiencies in understanding and implementing new and emerging treatments.

In **MS**, more than **9 in 10 clinicians** demonstrate deficiencies in early screening of cognitive dysfunction in patients with MS, and more than **3 in 4 clinicians** demonstrate deficiencies in accurately developing individualized treatment plans.

In **Bipolar/Schizophrenia**, more than **9 in 10 clinicians** demonstrate deficiencies in effectively diagnosing patients with either condition.

In **Migraine**, more than **8 in 10 clinicians** demonstrate deficiencies in effectively diagnosing patients with Migraine, and more than **4 in 5 clinicians** demonstrate deficiencies in understanding and implementing new and emerging treatments.
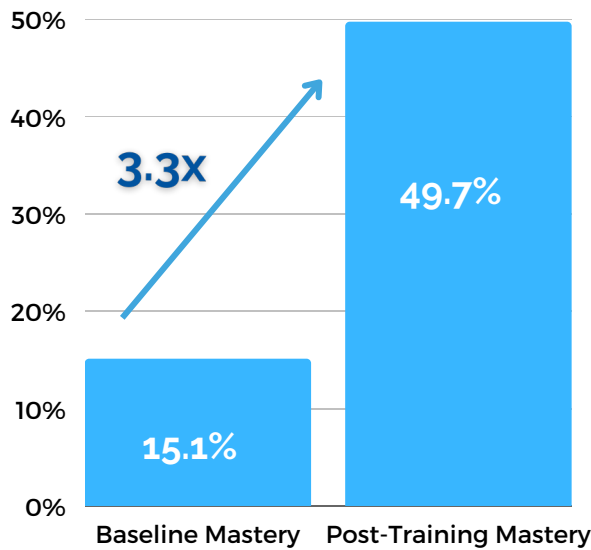
85%
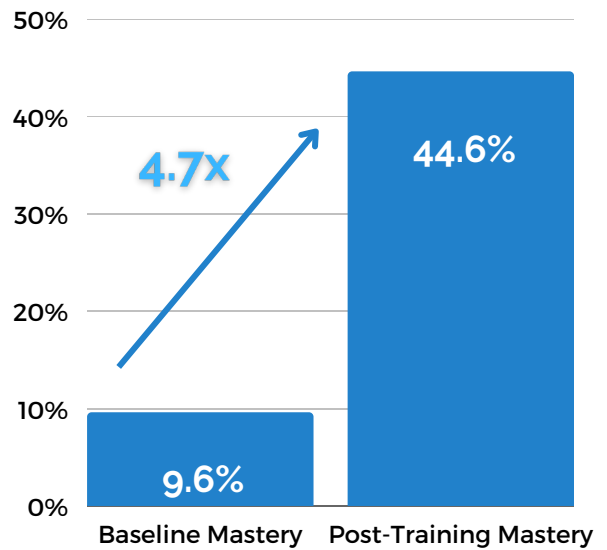
of clinicians lack baseline mastery

IMPROVING CLINICIAN MASTERY

Placing these results in context, the variations in clinician mastery and deficiency in readiness create material risk and can **delay patient enrollment**, **increase rater inconsistency**, and **lead to missed endpoints** in clinical trials conducted across CNS-related disorders. Though baseline deficiencies in clinician mastery are concerning, training delivered within the **Ready platform** demonstrated significant improvements.
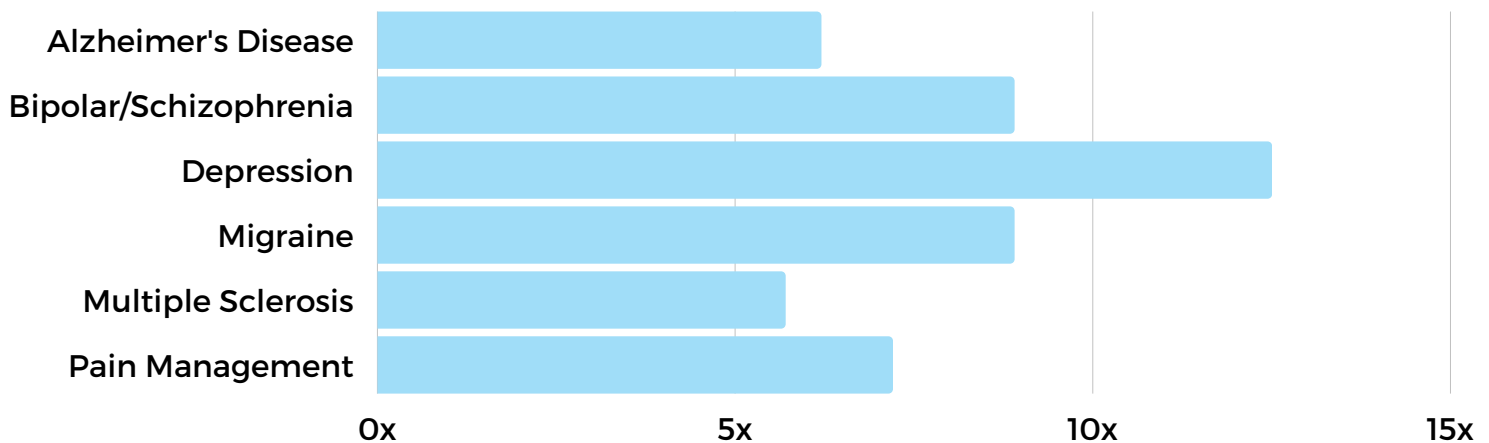
All CNS-Related Topics

3.3x

15.1% — Baseline Mastery
49.7% — Post-Training Mastery

Rater-Related Topics

4.7x

9.6% — Baseline Mastery
44.6% — Post-Training Mastery

Across the **95,724 clinicians** who completed more interactive and effective education powered by Ready, mastery increased for All CNS-Related topics by **3.3x** and by **4.7x** for Rater Training-related topics. In education across specific CNS conditions, the average rise in mastery **increased more than 8X.** These data demonstrate how Ready can significantly improve training outcomes.

Mastery Rise in Specific CNS Topics

- Alzheimer's Disease
- Bipolar/Schizophrenia
- Depression
- Migraine
- Multiple Sclerosis
- Pain Management

0x — 5x — 10x — 15x

IMPROVING CLINICIAN MASTERY

As stated earlier, the variations in clinician mastery and deficiency in trial readiness create material risk and can **delay patient enrollment**, **increase rater inconsistency**, and **lead to missed endpoints** in clinical trials conducted across CNS disorders.

The **Ready platform** significantly improves training outcomes and increases study team performance by enabling trial sponsors and CROs to:

- Transform content (i.e., protocols, rater training) into **interactive and tailored** learning experiences
- Automate training assignments and **personalize learning** paths
- Nudge individuals to **focus and reflect** on key information
- Deliver **targeted remediation** on-demand and over time
- Provide real-time, **actionable insights** to study leaders
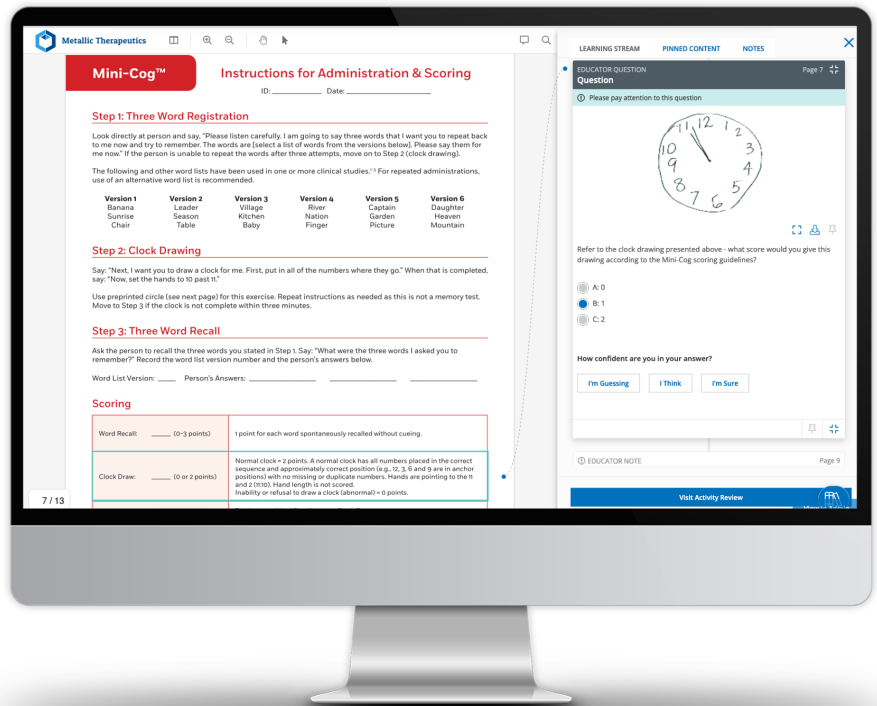
Rater Training in the **Ready Platform**

ArcheMedX has continued to demonstrate with major players researching and treating neurological conditions, including **Biogen, Pfizer, AstraZeneca, Lilly, Otsuka**, and many others, that there is a better way to educate clinicians on their therapies and prepare them to conduct clinical research.

As the data presented in the sections above validate, utilizing the **Ready platform** to deliver education and training significantly improves clinician capabilities regardless of clinical area. By engaging in more effective on-demand training powered by the Ready platform, these clinicians increased their mastery on **average more than 8x** across a subset of the most prominent CNS-related conditions. They are now **more capable and confident** in accurately screening and diagnosing complex conditions, implementing new and emerging treatments, and consistently applying scales and assessments in today's increasingly complex CNS-related studies.

CONCLUSION

More than **85%** of clinicians and raters lack the clinical mastery to effectively conduct clinical research in CNS-related conditions. Fortunately, more tailored and interactive training can significantly improve clinician mastery and increase the ability for clinicians and raters to effectively conduct clinical trials.

The **Ready platform** transforms clinical education and study content into more interactive and tailored learning experiences that have demonstrated improved training outcomes, on average, **by more than 8x** across a subset of the most prominent CNS conditions.

21 of the top 25 pharmaceutical firms, emerging biotechs, and global CROs rely on Ready to improve study team training and overall clinical performance.

Ready's unique training capabilities and predictive insights enable trial leaders to accelerate enrollment, increase rater consistency, and avoid costly delays.

Learn how Ready reveals study risks sooner and delivers more tailored, role specific training at www.archemedx.com/ready.

**82%
Ready**

**68%
At Ri**

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BY THE NUMBERS

80%

80% of clinical trials are delayed

"The greater the trial complexity, the worse the performance - across all measures"

85% of clinicians are not prepared to conduct clinical research in CNS

85%

"Trial risks are magnified as clinicians struggle to effectively diagnose, screen, and treat patients with neurological disorders."

8X

Completing training powered by the Ready platform can increase mastery 8x.

58% At Risk

82% Ready

80 Rea

ArcheMedX