Rare Expertise

WHITE PAPER

The Education Gap: Frustrations, Consequences, and Solutions

Why the Rare Disease Knowledge Gap Persists Among Healthcare Professionals — and What Can Be Done About It

A Rare Expertise White Paper

For rare disease marketing, medical affairs, and patient advocacy professionals

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Contents

SECTION 01

Executive Summary

There are at least 7,500 identified rare diseases, affecting about 30 million people in the United States. That means approximately 1 in 10 patients seen by the average physician may have a rare disease. But often neither the doctor nor the patient knows it.

Because the number of people affected with an individual disease is relatively small and the number of rare diseases is so large, the average healthcare professional is unlikely to consider that an individual patient may have a rare disease. The challenge of diagnosing rare disease patients is further complicated by the fact that so many symptoms overlap with those of the common conditions that physicians see every day.

30M
Americans affected
~1 IN 10 PATIENTS

7,500+
identified rare diseases
POTENTIALLY 10,000+

4.8yrs
average time to diagnosis
GLOBAL GENES

For decades, medical students and residents have been taught: "when you hear hoofbeats, think of horses, not zebras" — rightly indicating that the symptoms appearing most commonly in clinical practice are usually the result of relatively common conditions. That training is reinforced by years of clinical experience, providing consistent reinforcement that most symptoms and test results are indicative of common conditions.

The result is that, on average, the diagnostic journey for rare disease patients and caregivers takes 4 to 8 years. This "diagnostic odyssey" is a hallmark of the rare disease patient and caregiver experience, and clear evidence that there is a gap in rare disease education that must be addressed if the diagnostic journey is to be improved.

1 in 10

patients seen by the average physician in the United States may have a rare disease.

But often neither the doctor nor the patient knows it.

~30 MILLION AMERICANS · 7,500+ IDENTIFIED DISEASES

SECTION 02

40 Years of Progress

The plight of patients with many rare diseases has greatly improved since the passage of the Orphan Drug Act in 1983. But despite significant advances in treatment and diagnosis, the overwhelming majority of rare disease patients still take many years to find out what is actually wrong with them.

The Orphan Drug Act (1983)

The act made drugs, vaccines, and diagnostic agents able to qualify for orphan status if they were intended to treat a disease affecting fewer than 200,000 American citizens. To encourage development of drugs for orphan diseases, the act included a number of incentives for biopharma companies, including seven-year market exclusivity, tax credits equal to half of the development costs, and accelerated approval of drugs indicated for rare diseases.

600+

orphan drugs approved since 1983

5%

of rare diseases have an FDA-approved treatment

Diagnostic Progress

Significant progress has been made in the diagnosis of diseases over the past several decades. Newborn screening of many genetic diseases is now performed in all 50 states. Each year, millions of babies in the U.S. are routinely screened for specific genetic, endocrine, and metabolic disorders — most of which are rare diseases. But in most states, only about 60 diseases are part of the regular newborn screening process.

Genetic Testing

Genetic testing for rare diseases not screened for at birth is also accelerating the diagnostic process, but these tests are underutilized in the screening and diagnosis of rare diseases. There are now more than 77,000 genetic tests currently in use, representing more than 10,000 unique test types, and many others are being developed.

> KEY FACT
>
> **An estimated 80% of rare diseases are believed to have a genetic origin. Advances in genetic testing — such as next-generation sequencing (NGS) and whole exome sequencing (WES) — have positively impacted the likelihood of obtaining the molecular cause of rare and undiagnosed diseases. But their use is still relatively uncommon.**

Despite advances in diagnosis and treatment, the underlying knowledge to diagnose patients is often available, tests that can provide valuable information could be performed, and potentially life-changing genetic tests could be ordered. But if healthcare professionals don't think to order the right tests or refer patients to an academic center, patients and caregivers will continue to struggle to find what is actually wrong with them.

SECTION 03

The Diagnostic Odyssey

For the average rare disease patient, the time between the onset of initial symptoms and an accurate diagnosis is often many years. The patient advocacy group Global Genes reports that the average time for a rare patient to receive an accurate diagnosis is 4.8 years. It is common for patients to be evaluated by 8 or more physicians and receive 2 to 3 misdiagnoses.

The process takes so long and is so well known in the rare disease world that it has its own name: "The Diagnostic Odyssey." The word "odyssey" has a special meaning for those in the rare disease community, because of the many obstacles that patients and their caregivers face along the way.

> *It feels incredibly isolating to want to help your child and not be able to because even the doctors don't know what's wrong. To not have someone who understands because there is nobody like your child. To not be able to have a treatment plan because there is no diagnosis.*
>
> Susie Stretton, The Mighty, December 2015

While each patient's journey is unique, there are many similar obstacles: frequent physician visits, endless lab tests, multiple misdiagnoses, fights with insurance companies, long waits to see specialists, costly travel, endless online searching, financial pain, and numerous missed opportunities to receive potentially life-changing treatments.

CRITICAL CONSEQUENCE

The diagnostic inefficiencies not only result in wrong, ineffective, and unnecessary treatments, but they can also push the patient beyond viable treatment windows — resulting in significant morbidity and, potentially, premature death.

What makes the diagnostic odyssey even more painful is that about two-thirds of rare disease patients are children. Families and kids travel all over the country and the world seeking answers, looking to connect with specialists who can provide more clues about what's wrong with their child. During the odyssey, the patient may deteriorate, suffer multiple new symptoms, and often experience severe mental health issues. Patients also face long waits due to a shortage of medical geneticists and genetic counselors.

If they are fortunate enough to receive an accurate diagnosis, the care of children with rare diseases usually requires numerous visits to specialists in multiple locations. Most conditions may only have a handful of experts or specialty centers able to manage the disease — and the current wait to see specialists in academic centers is often 6 to 12 months.

Nothing about rare diseases is simple — not the diagnosis, not the daily care, not the long term.

Elizabeth Grehl Breden, The Mighty

SECTION 04

The Economic Impact of Rare Diseases

The burden of rare diseases is massive — at least $1 trillion per year in direct and indirect costs in the United States. A 2022 study estimated significantly higher costs — more than $2.2 trillion — and found that the average cost per patient to the healthcare system is approximately 10 times the cost associated with "mass-market" diseases.

$1T+

annual burden in the US

DIRECT & INDIRECT COSTS

10x

cost per patient vs. common disease

HEALTHCARE SYSTEM COSTS

8+

physicians seen before diagnosis

WITH MULTIPLE TESTS EACH

The Costly Diagnostic Journey

The direct costs start with the long and frustrating diagnostic journey. Because patients with rare diseases so often go undiagnosed for long periods of time and are often misdiagnosed, they are intense users of the healthcare system. As patients go from doctor to doctor, with additional tests ordered at each appointment, the costs continue to add up — multiple sets of lab tests, x-rays, CT scans, MRIs, other imaging methods, and in some cases, biopsies.

Ongoing Treatment Costs

Once accurately diagnosed, managing rare diseases is extremely expensive. Patients require specialized care from healthcare providers with expertise in their specific condition. The burden of direct medical costs can reach millions of dollars annually for many rare diseases, with cost drivers that include outpatient visits, hospitalizations, emergency visits, medications, palliative care, rehabilitation care, home health care, medical devices, social services, and the use of outside caregivers.

Indirect Costs

In addition to the direct costs, rare diseases often cause high indirect costs for caregivers and families. In most cases, caregivers must dedicate a large proportion of their time to the management of family members with rare diseases, requiring that they miss a large number of work days or stop working completely. Individuals with rare diseases may experience significant disability, leading to missed workdays, decreased productivity, and reduced earnings.

> IMPORTANT INSIGHT
>
> Better education about rare disease may actually reduce overall healthcare spending by eliminating the unnecessary testing and treatment that patients receive before an accurate diagnosis is made. The economic impact of lack of rare disease awareness — with resulting delays in diagnosis, numerous misdiagnoses, and associated ineffective treatments — accounts for a significant portion of the $1 trillion+ impact.

THE DIAGNOSTIC JOURNEY

Common Obstacles Patients Face During the Diagnostic Odyssey

1. **Frequent physician visits** across multiple specialties and locations
2. **Endless lab tests** and imaging — x-rays, CT scans, MRIs, biopsies
3. **Multiple misdiagnoses** — each believed to be the "right answer" at the time
4. **Insurance battles** and coverage limitations for out-of-network care
5. **Long specialist waits** of 6-12 months at academic centers
6. **Costly travel** across the country or world seeking answers
7. **Missed treatment windows** resulting in disease progression and harm

Source: Global Genes Rare Disease Impact Report; NORD Barriers Survey 2022

SECTION 05

Diagnosis: The Challenge for Healthcare Professionals

About 1 out of 10 patients in an average clinical practice will, at some point in their lives, have a rare disease. But the average physician hasn't been trained to consider the possibility that many of their patients — who probably have symptoms consistent with common diseases — may have an unknown rare disease.

SURVEY FINDING

According to a 2019 survey by NORD, 50% of patients and caregivers attributed diagnostic delays to a lack of HCP disease awareness. And a majority of physicians acknowledged that they need to know more about rare disease — research indicates that more than 80% of specialists and more than 60% of PCPs want to learn more about rare diseases.

In medical school and residency, physicians are rightly taught that they should first consider a common diagnosis, not a rare one. Consequently, although most physicians will have to diagnose or manage patients with a rare disease at some point in their professional lives, many assume that they are unlikely to ever see a rare disease patient in their practice.

The Testing Challenge

There are more than 7,500 identified rare diseases, and perhaps as many as 10,000. Genetic and phenotypic variability add to the incomplete knowledge of rare diseases, which complicates the process of diagnosis. No healthcare professional could be expected to have the knowledge level needed to consider and accurately diagnose every rare disease that has been identified.

Physicians may also not be aware of what tests to order — and when. The rapid technological advancements in genomics, sequencing, and genetic testing make it virtually impossible for the average clinician to stay up-to-date on the availability and potential value of genetic tests for hundreds of diseases. Even when clinicians consider genetic testing, most refer patients to a medical geneticist — a specialty that currently faces extremely high demand, with typical wait times of more than 3 months and another 2 to 3 months to receive test results.

The Emotional Impact on Clinicians

Another dimension often overlooked is the frustration and emotional impact on healthcare professionals themselves. Trained to identify and solve problems and empathetic to the suffering of patients and families, HCPs are often as frustrated by the mysteries of rare diseases as patients and families. Diagnosing rare pediatric diseases can be especially difficult, complex, and fraught with sensitive emotional issues.

> *Nothing about rare diseases is simple — not the diagnosis, not the daily care, not the long term.*
>
> **Elizabeth Grehl Breden, The Mighty**

The age of many patients, the uncertainty surrounding the diagnosis, the fear of disease progression, and the potential lack of treatments all contribute to an extremely stressful environment for healthcare professionals.

50%

of patients and caregivers attributed diagnostic delays to a *lack of HCP disease awareness*.

NORD SURVEY · 2019

SECTION 06

How the Gap Can Be Closed

Rare disease patient identification is difficult for physicians and other healthcare professionals — symptoms often overlap with more common diagnoses, and most physicians will encounter relatively few patients with rare diseases in their entire career. Even if they suspect a rare disease, most physicians lack the time to thoroughly research the possibilities.

> THE SCALE IS MANAGEABLE
>
> Although there are at least 7,500 identified rare diseases, 150 conditions account for approximately 80% of rare disease patients, and another 200-300 diseases account for an additional 15-18%. Providing improved education about the "most common" 400-500 rare diseases could make a significant impact on the diagnostic journey for a large majority of patients.

Moreover, it's possible to focus rare disease educational initiatives to make them as relevant as possible to specific specialties. By matching diseases to the specialties most likely to be involved in their diagnosis and management, the number of rare diseases that most individual healthcare professionals would need to learn about becomes manageable.

Strategies for Closing the Gap

Start Earlier

Medical students and residents should be provided with more intensive rare disease education. Optimally, this training should include case-based discussions, patient encounters, and skill-building exercises.

Improve Continuing Medical Education (CME)

Although there are dozens of online CME courses for individual rare diseases, courses should be designed to increase general awareness and rare disease vigilance across specialties.

Leverage the Novelty of Rare Diseases

Take advantage of the interest that most healthcare professionals have in science by designing educational programs that leverage the inherent novelty of rare diseases to engage and intrigue participants.

Engage Through Clinical Puzzles

One of the things that intrigues medical professionals is the challenge of clinical diagnosis. By creating content that engages HCPs in solving unusual cases, they can be engaged and informed about rare diseases — especially those that may present like more common conditions.

Invest in Online Resources

Online resources — webinars, podcasts, blogs, and e-learning modules — can provide healthcare professionals with current information on rare diseases in formats that fit into their professional lives.

The challenge of improving rare disease knowledge by healthcare professionals is daunting — but critical. As more epidemiological data become available, it's clear that the number of people who have rare diseases is great. The value of improving the knowledge level about rare diseases for healthcare professionals has enormous scientific, human, and economic value, and should be a high priority for society.

SECTION 07

Conclusions

The rare disease knowledge gap refers to the lack of information and understanding about rare diseases among physicians, researchers, and the general public. Despite their "rarity," rare diseases collectively affect tens of millions of people in the United States, and many of them are life-threatening or severely debilitating.

Estimates indicate that of the 30 million people in the United States who have — or will have — a rare disease, only a small minority have been accurately diagnosed.

Doctors and other healthcare professionals have committed their lives to doing everything they can to improve the lives of their patients — and research indicates that they want to do more to help rare disease patients. But training and education about rare diseases has rarely been a priority of the healthcare system, and historically, more common diseases have received the vast majority of attention and education.

> *The world has changed, and more rare diseases are increasingly being identified and diagnosed, but there is a large gap between the knowledge that exists in academic medicine and everyday clinical practice. Closing the gap can make a major contribution to improving the lives of millions.*

The Key Missing Elements

Recognition

Recognition of the possibility that some patients may actually have a rare disease.

Awareness

Awareness and knowledge of the clues that can help uncover a rare disease diagnosis.

Education

Education about the specific symptoms and clues that can lead to faster diagnosis.

The rare disease knowledge gap highlights the need for increased awareness to improve outcomes for affected individuals and families. Improving education and training for clinicians at the primary, secondary, and tertiary care level is the first step to an accurate diagnosis. Despite technological advancement and increased data sharing, the majority of rare disease patients still experience extensive diagnostic odysseys, and many remain undiagnosed. Better outcomes are possible with a relatively small investment in rare disease education.

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Rare Expertise

Rare Expertise is a strategic consultancy focused on helping companies developing and marketing products for patients with rare diseases. Our mission is to shorten the diagnostic and treatment journey in people with rare diseases through better education.

Rare Expertise and the Rare Medical Network work at the intersection of rare disease knowledge, clinical practice, and trusted professional networks. Our focus is on supporting healthcare professionals with credible information and access to expertise — when it matters most.

FOUNDED

Rare Expertise was founded in 2015 by Jack Davis and Jeff Sweeney, who are parents of children with rare diseases, and who both have extensive professional experience in marketing communications and medical education in rare disease markets.