

First-Hand Perspectives in Rheumatoid Arthritis:

Insights to Improve Healthcare
Research & Value Assessment



The Innovation and Value Initiative, the Arthritis Foundation, and people living with rheumatoid arthritis have partnered to highlight the need for healthcare research and value assessment that reflect patient experiences and outcomes. Without these early and authentic insights, we cannot adequately evaluate the full costs and impacts of serious health conditions like rheumatoid arthritis. This paper is an invitation to change our approach and focus on the needs and priorities of people who should matter most in healthcare.

Overview

The Innovation and Value Initiative (IVI) and the Arthritis Foundation (AF) partnered with individuals living with rheumatoid arthritis (RA) to explore how insights from first-hand patient experiences can inform healthcare research, specifically its application to value assessment (also referred to as health technology assessment). This effort is part of IVI's ongoing work related to an open-source value assessment model for rheumatoid arthritis, first released in 2017.

Through our collaboration, we identified common themes associated with patient RA experiences and areas that are not adequately measured in existing healthcare research data collection efforts or considered in methods to inform value assessment/health technology assessment (VA/HTA). These insights include:

- Traditional clinical trials and research do not always capture the full complexity of living with RA, including comorbid conditions, fatigue, mental health, and the impact of hormonal changes.
- Access to effective treatment may be driven by insurance coverage or haphazard testing of treatments rather than by clinical guidelines.
- Costs related to RA include far more than direct medication costs and need to be captured.
- While RA is a progressive disease, people living with it are seeking independence and normalcy versus just symptom management.

This work also reveals the unmet needs of patients living with RA across clinical improvement, quality-of-life impact, and direct and indirect cost domains. As researchers and policy makers continue to invest in research and practices to help people living with RA, this paper offers insights to ensure that future endeavors measure the areas most important to patients.



When I was first diagnosed, and for the first five years after my diagnosis, my entire family had to stop what they were doing to take care of me. My parents moved in with us. My sister lived down the street. I could not even hold my own child. I advocate because I have a family that could help me — so many people have no one.

—Stacy Courtney



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IVI is a 501(c)(3) nonprofit research organization committed to advancing the science, practice, and use of value assessment in health care to make it more meaningful to those who receive, provide, and pay for care. IVI envisions value assessments founded on the principles of patient-centricity, transparency, and open-source modeling.

The Arthritis Foundation is boldly pursuing a cure for America's #1 cause of disability while championing the fight to conquer arthritis with life-changing science, resources, advocacy, and community connections.



Why Patient Perspectives Matter

The global experience of the COVID-19 pandemic continues to heighten awareness of the differences in how people experience illness and respond to treatments. Less discussed in the public sphere but no less important are the range of priorities individuals living with a serious chronic health condition must balance in evaluating treatment options in real life. Such factors include caring for others, insurance coverage, related non-medical costs of care (e.g., transportation), and treatment side effects. This variability based on different patient characteristics is known as patient heterogeneity.

Despite this growing recognition of the importance of patient heterogeneity, a lack of consensus remains in accounting for patient differences in healthcare research, policy, and clinical practice. There is also increasing recognition that a lack of understanding or accounting for patient differences can result in (and perpetuate) a failure to address health equity issues — especially disparities in access to, quality of, and type of care.

This awareness certainly exists at the federal level. The Food and Drug Administration's Patient-Focused Drug Development approach is one important example, “to help ensure that patients’ experiences, perspectives, needs, and priorities are captured and meaningfully incorporated into drug development and evaluation.”ⁱⁱ

The Patient-Centered Outcomes Research Institute (PCORI) is another. First authorized by Congress in 2010, PCORI funds studies that can help patients and those who care for them make better-informed healthcare choices. PCORI's mandate was expanded during its 2019 re-authorization to include support of comparative effectiveness research. This underscores the widespread recognition that healthcare research does not yet adequately address patients’ priorities and needs. Patients are not commonly included from the outset in designing scientific research to measure clinical and quality-of-life outcomes and economic impacts relevant to their experiences.

RA is a salient example of a chronic health condition that reflects broad patient diversity and high impact on health, well-being, and costs. An estimated 1.7 million

Americans have RA,ⁱⁱⁱ a systemic, inflammatory form of arthritis and autoimmune disease where the immune system attacks the lining (synovium) of a person's joints such as those in the hands, wrists, shoulders, knees, and ankles. RA can also affect other parts of the body such as the eyes and cardiovascular and respiratory systems.

People living with RA often experience severe pain, and the illness can result in irreversible joint damage and deformity.^{iv} RA is known to have particularly high heterogeneity among its patient population, with significant variability in severity, life impact, and treatment response.^{v,vi}

Over the past two decades, available treatment options for RA have exploded. Alongside these new treatments, decision-makers have focused attention on whether these new technologies have adequate “value” relative to cost. The Arthritis Foundation (AF) came to be an early expert, providing patient experiences and insights to value assessors. AF brought to value assessors’ attention the notion that effective measures of value must include patient experience to be relevant for decision-makers.^{vii} Broadly, value assessment can be defined as the comparison of the costs of a given healthcare technology to the relative benefits (see Table 1).

The Innovation and Value Initiative (IVI) develops open-source economic models^{*viii} to enable researchers and decision-makers to better understand optimal treatment sequences, and the range of costs associated with a given disease. IVI developed a value assessment model for RA that was first released in 2017 and updated in 2019.^{ix}

Patient Heterogeneity is defined as the variation across patients due to the characteristics of those individuals. Characteristics include:

- **Demographics** e.g., race, ethnicity, gender, age, insurance coverage, geographic location, etc.;
- **Preferences** e.g., risk tolerance, mode of treatment, treatment goals, side effect tolerance, etc.; and
- **Clinical responses** e.g., genetic profile, severity of disease, co-occurring conditions, etc.ⁱ

^{*}In open-source modeling, modelers release simulation models for which the full source code, underlying data, and supporting documentation are free to access, review, use, modify, and redistribute with attribution to the original developers.

Rather than simulating the experiences of an average patient or those at the population level for a discrete amount of time,^x IVI models simulate cohorts of patients with different sociodemographic and clinical characteristics and longer-term treatment profiles. IVI's hypothesis is that economic models that account for patient differences and capture a patient-centered understanding of economic costs can provide better insights into the comparative value of healthcare technologies.

Our work — and that of other value assessors such as the National Comprehensive Cancer Network and the Institute for Clinical and Economic Review — continues to show that the available data often fail to represent real-world patient populations and that elements important to those populations are not measured. The resulting cost-effectiveness models — and decisions those models help inform — are insufficient and potentially biased.

At their best, economic evaluations can help inform decision-making and promote access to equitable, efficient, and high-quality healthcare. But the relevance of any economic model is limited by the type and quality of available data. For example, as health technology assessments are often conducted when novel therapies launch, clinical trial data may be the only available source. Without real-world data, it is difficult to adequately incorporate patient preferences, real-world patient experiences (e.g., those with co-occurring conditions), and less measured costs (e.g., caregiver burden, transportation costs, etc.). Such concerns are often not incorporated into economic models — partly from a lack of data and partly from uncertainty about how to do so.

There are real difficulties translating qualitative patient experiences into measurable inputs. We see these simultaneous challenges — the lack of robust data and the need for better cost-effectiveness measurement of new healthcare treatments — as an opportunity to change healthcare research approaches. Economic modeling and healthcare research writ large need more agile approaches in addressing complex treatment pathways, the range of patient preferences, and the full costs associated with a given disease.

We do not have all the answers, and our respective organizations continue to wrestle with how best to incorporate qualitative data into the healthcare

research arena. We believe including people with lived experiences in a given disease area from the outset, in both research and conceptualization, can have a “ripple” effect throughout the industry.^{xii} This paper explores how the experiences of individuals living with RA can illuminate opportunities for future research and economic evaluation methods that better address their diversity and the value factors important to them.

TABLE 1
Relevant Terms in Measuring Value

Value assessment (VA)
Comparison of the relative benefits to the costs of a given technology or service for a specific person or population.

Health economic modeling
A set of analytic approaches in health economic analysis that synthesize clinical, epidemiological, and economic evidence from different data sources into an evaluation framework that enables researchers or decision-makers to generate estimates for specific outcomes of interest. Models are simplified representations of the real world to inform decision-making.

Health technology assessment (HTA)
A multidisciplinary process that uses explicit methods to determine the value of a health technology at different points in its life cycle. A health technology is the application of organized knowledge and skills in the form of devices, medicines, vaccines, procedures, and systems developed to solve a health problem and improve quality of life for individuals affected.

Cost-effectiveness analysis
A method to examine both the costs and health outcomes of one or more interventions. An intervention is compared to another intervention (or the status quo) by estimating the cost of gaining an additional unit of a health outcome such as a life year gained or a case prevented.



Approach

Following the release of the updated Open-Source Value Project economic model focused on RA,^{xiii} IVI sought to incorporate patient input that would enable modelers to better reflect patient heterogeneity. In November 2019, IVI and AF convened a focus group of 12 individuals living with RA to identify clinical and quality-of-life experiences that were shared, and those that differed. Using the economic model literature as a guide, participants were asked two driving questions:

- How do individual differences affect RA patients' treatment experiences?
- In your experience, what are the most important factors that lead to different outcomes or responses to treatment?

The 12 focus group individuals, along with four individuals participating in case study interviews, included 11 women and three men (two individuals participated in both focus group and case study interviews). Participants lived in multiple geographic regions across the U.S.; two individuals were non-white.

At the time, our findings revealed the diversity in patient experience that was expected, such as duration and severity of symptoms, durability of treatment effect, and quality-of-life impact. While early diagnosis and treatment access are critical to successful long-term outcomes,^{xiv} there was significant variation of both time to diagnosis and time to effective treatment.

Even in this small group, age of onset varied greatly (age two to 60), as did time to diagnosis (one to six years), and time to effective treatment (six months to never). Most, but not all, participants reported medication failure after some period of effectiveness. Some individuals preferred inpatient infusions while others preferred oral medications. One individual reported using no medications. Some participants had joint replacement surgery while others did not. All participants reported that symptoms included significant levels of joint pain,

difficulty in movement, significant fatigue (both as a result of RA and treatment), and at least some level of psychological impact.

For use in economic modeling, we were unable to identify existing databases that included the key factors associated with patient heterogeneity in treatment experiences. This is a common problem in developing economic models and a major focus of research and methods development for IVI.^{xv,xvi}

In 2021, IVI conducted 30- to 60-minute guided interviews with three individuals living with RA and one individual living with inflammatory osteoarthritis. The goal was to identify patient preference and experience elements that might help prioritize future clinical research and quality measurement. Appendix A includes the guided interview questions, which were derived from the initial focus group findings and a targeted review of literature.

IVI then reviewed the focus group and interview transcripts to identify common themes. We also conducted a limited PubMed search[†] using key themes from all patient-engaged discussions to identify both existing research and areas for future study.

Combined, our dialogues revealed four thematic areas to drive future research and inform value assessment: the **experience of living with RA**, the **experience of accessing treatment, less-measured costs**, and **treatment priorities**.

“

When I was in college, I never thought about pay or my dream job, I thought about what kind of job I could get that had good health insurance. In fact, I took a lower paying job with better health insurance when I was in my twenties.

—Shannan O'Hara Levi

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[†] Identified studies prioritized publications dated between 2016-2021, in English, with a preference for U.S. based studies.



Moving Towards a Patient-Defined Research Agenda

Experiences of Living with RA



Some days I don't feel like going on like this. I feel like this [pain] can't be my life forever. But changing that dosage has revolutionized my life and my perspective. There's still pain, but I can walk up and down the stairs now.

—Raquel Masco



Conversations with individuals living with RA provide a real-life perspective on the long-term, debilitating nature of the disease — including weakness, stiffness, and joint pain — that can impede basic life skills and self-care. Many people living with RA report multiple health conditions and complicating outcomes; recent research points to certain conditions increasing the risk of RA.^{xvii}

While research finds that over 75% of people living with RA are white females, it also finds that racial and ethnic minorities, men, and older adults have more severe symptoms and lower levels of functioning.^{xviii} People from lower socio-economic backgrounds have lower functional status and faster declines in health.^{xix} Themes from both the focus group and interviews included:

- While severity of RA and response to treatment vary among individuals, commonly experienced symptoms include significant joint pain and weakness, stiffness, and fatigue.
- Most participants described fatigue as a largely unaddressed impact of RA, and a factor further exacerbated by many of the RA treatments as a side effect.^{xx}
- Multiple individuals pointed to hormonal changes (puberty, pregnancy, menopause, etc.) as “triggers” to the onset of symptoms or treatment failures.
- Nearly every participant described significant psychological impacts of the disease, including depression, anxiety, and social isolation.
- Co-occurring conditions are common, and when present, complicate outcomes. Multiple participants

reported co-occurring health conditions, including type 1 diabetes, fibromyalgia, spondyloarthropathy, lupus, anxiety, and depression.

CASE EXAMPLE

Shannan O'Hara Levi, New York[†]

Shannan was first diagnosed with RA at age three. Since juvenile RA is so rare, doctors first told her mother it was “growing pains” or that Shannan was just being sensitive. When she was finally diagnosed, the doctors told her parents she would be in a wheelchair by age six and there was little they could do.

The first biologics for RA were not available until Shannan was nearly an adult, but even these treatments have not fully eliminated her symptoms. She graduated from college with a degree in social work and even though she was not in remission, worked full time through her 20s and early 30s. In her early 30s, she had two bilateral shoulder replacements. Prior to surgery, the pain was so excruciating that Shannan could not lift a coffee cup or hold a toothbrush. While the surgery was successful, she has not been able to return to work.

Some RA treatments are contraindicated for pregnancy but there is little research on their long-term impact on conception. “When I was a teenager, I wrote to Seventeen magazine asking if treatments for RA could make it difficult to get pregnant – I mean, there was no Google back then!” she says. For Shannan, the ups and downs of RA made it difficult to even consider having children. But now she is risking less aggressive RA treatments in hopes of starting a family. Shannan wishes there was more information and options for people who hope to have children and for children when they are diagnosed with RA.

[†]Shannan Case Example Background: Current medication: various vitamins and supplements as recommended by her rheumatologist. Examples of medications tried: prednisone, methotrexate, gold injections. Treatment considered effective? No. Other Diagnoses: JIA, RA, OA, fibromyalgia, chronic fatigue.



Experiences in Accessing Treatment



Since I was diagnosed with RA at age three, my parents had to constantly fight insurance companies to get access to treatments that are normally prescribed for older adults. I cannot even count the number of hours spent trying to get insurance companies to pay for my treatments.

—Shannan O'Hara Levi



Even with a cohort of just 14 people, there were wide ranges in the time to diagnosis (six months to five or more years) and time to effective treatment (one year to never). Multiple participants discussed challenges in both securing coverage for specific treatments of RA and in maintaining insurance coverage. Accessing treatment appears to be highly connected to the RA experience but may not be considered a factor in research design. The limited available research finds that non-white individuals have more difficulty accessing treatment or receiving correct diagnoses,^{xxi,xxii} and that people with lower incomes have worse health outcomes.^{xxiii}

- Participants reported that treatment choices appeared to be based on trial and error or insurance coverage, rather than clinical guidelines or assessment by their clinician.^{xxiv, xxv}
- Many had difficulty finding effective treatment over time. Most were concerned about the durability of treatment and the lack of clarity about what might trigger sudden change or failure of a treatment. Several reported never finding a fully effective treatment option despite extensive regimen testing.
- Multiple individuals were concerned about running out of treatment options; there was a sense that each treatment had a “shelf life” or limited time horizon.
- Participants reflected a common experience or understanding that insurance coverage, socioeconomic status, and race impact the quality of and access to treatment.
- Participants described the impact of treatment on choices to have children, how having children impacts treatment options, and the ability to have children.

CASE EXAMPLE

Raquel Masco, Texas[§]

Raquel started experiencing symptoms in her early 30s — inexplicable hair loss, numbness, and tingling in her limbs. The pain progressed to leg pain, back pain, fatigue, and difficulty walking, though doctors were dismissive of her symptoms. In 2015, she was in a serious car accident and had an MRI as part of the insurance claim. Although her accident injuries were minimal, the doctor told her she had arthritis without specifying type or what the diagnosis meant. A rheumatologist confirmed an inflammatory osteoarthritis diagnosis. Initially, the doctor only prescribed ibuprofen and later, a low dose of Cymbalta. Only recently, during the pandemic, did Raquel receive a higher dose of medication that has decreased — but not eliminated — her pain.

At times when she did not have health insurance, Raquel had significant out-of-pocket costs, including doctor's visits, the full costs of medications, as well as physical therapy or other types of treatment. When she had less insurance, healthcare providers were hesitant to meet with her, prescribe treatment, or review her lab work in any detail. Healthcare providers and office staff have refused to speak with her or treat her with respect. Raquel cannot help but wonder if this was because of her insurance status, the color of her skin (she is a person of color), or both.

“For me, the side effects of not having enough treatment, or not having my experience taken seriously, are far worse than the side effects of the treatment. I have walked into healthcare offices and had only one person really see me and see the excruciating pain I was experiencing. People, even if they don’t look like they have a disability, want to be seen.”

—Raquel Masco

[§] Raquel Case Example Background. Diagnosis: Inflammatory osteoarthritis. Current medication/treatment: Cymbalta, physical therapy



Patient-Important Costs and Economic Impacts



If you ask me the biggest indirect cost of RA, I would tell you it's time — time to get treatments, time to recover from treatments, and time to do basic self-care activities. There is so much of my time that is centered on RA, and worrying about RA, that it prevents me from doing other things in my life.

—Stacy Courtnay



Recent research has calculated RA patients' annual direct medical costs as approximately \$3,700, and over \$12,500 in total medical costs.^{xxvi} With the advent of biologics and other RA treatments, cost areas have shifted^{xxvii} and patients continue to have an extraordinarily high level of indirect costs. Insurance companies continue to restrict access to medications and first-line medications are not always the most clinically indicated.^{xxviii} Other areas of less frequently measured costs that have high impact on patients' experiences and outcomes include:

- Time spent in seeking, receiving, and recovering from treatment, with some calculating this cost to be upwards of a month a year.
- Diminished ability to work and lost wages due to early retirement or career impact, including choosing lower paying jobs to ensure health insurance access.^{xxix,xxx,xxxi}
- Heavy burden of RA on caregivers (spouses, parents, and siblings), such as anxiety, missed work time, childcare, and job choice based on health insurance.^{xxxii}
- Ancillary costs of seeking and receiving treatment, including transportation costs, non-medical supportive expenses (e.g., assistive devices), and non-covered benefits.

CASE EXAMPLE

Rick Phillips, Indiana**

Rick first noticed his RA symptoms at age 42. His oldest son came to visit in a new sports car and Rick simply could not get in it. By the next spring — when he took his younger son for a college tour at his alma mater — his legs were so stiff he couldn't move. As someone living with Type 2 childhood diabetes, Rick thought his stiffness and pain were related to that health condition. But after eight months, he was diagnosed with RA.

In addition to spending up to \$10,000 annually on direct medical costs, Rick and his wife spend countless hours attending medical appointments and managing his illnesses. He estimates spending at least one month a year convalescing from treatments. When he received his diagnosis, the couple sold their house and downsized to a more accessible condo. At age 53, RA forced Rick to stop working. While his company has helped cover health insurance, he has not worked for over 12 years. Even not calculating raises he would have received, lost wages are in the hundreds of thousands of dollars.

Rick emphasizes RA's impact on his wife. While she continued to work and retired with benefits, her life, according to Rick, has been consumed with worry and concern. He doesn't know how to quantify a lifetime of anxiety, but it's a significant cost to him and his family.

** Rick Case Example Background: Current medication: Remetrix. Examples of medications tried: Methotrexate, Remicade, Salsalate, Certolizumab (Cimzia), Golimumab (Simponi), multiple TNF inhibitors, and others. Treatment considered effective? Yes. Other diagnoses: Type 1 diabetes, ankylosing spondylitis



Treatment Priorities



I have been married for 44 years, and especially with all my health problems, that takes work. I just want to spend time with my wife, go on walks, go on bike rides, and spend time with my grandkids.

—Rick Phillips



Patient heterogeneity refers not only to differences in demographics and treatment responses, but to differences in treatment goals and preferences, such as tolerance for side effects, mode of treatment, desire for a family, and level of pain tolerance. Some people may prioritize independence or fatigue reduction over pain mitigation. Research suggests that people from lower socio-economic backgrounds and people of color are

less likely to be included in research studies and bear a heavier burden of disease.^{xxxiii, xxxiv, xxxv}

These perspectives can help guide both clinical and post-market research design and help define factors important to measuring value. While individual treatment goals vary for people living with RA, common themes that emerged through our dialogues included:

- An emphasis on slowing disease progression and increasing quality of life rather than recovery.
- Pain reduction is strongly associated with independence.
- A common priority is seeking to live as “normally” as possible for as long as possible.
- Life choices — such as having children, treatment delivery modality, and career decisions — factor into treatment preferences.

CASE EXAMPLE

Stacy Courtney, Georgia^{††}

Stacy’s symptoms started in her mid-20s, just after she got married, with acute pain in her feet. The pain moved to her hands and became so extreme she could no longer hold a toothbrush. A correct RA diagnosis took a year, which she considers a better-than-average length of time.

Knowing that she and her husband wanted children, Stacy chose to delay newer treatments so she could have a baby. She used prednisone during pregnancy, which provided a slight reprieve from symptoms. After giving birth to her son, Stacy started a serious search for medications to alleviate her pain and swelling.

After five more years and at least four other treatments, Stacy finally found a medication that worked. As a person living with RA she considers herself “lucky” — the medication has worked for over 11 years, and she has lived nearly symptom-free during that time.

Stacy’s husband’s health insurance has covered most direct costs for her RA treatment. When asked about less measured costs of RA, she offers one word: time. “People don’t realize how much time chronic illness takes,” she says. In addition to a daily nap because of ongoing fatigue, her one-hour monthly infusion takes up at least half a day, including travel time to and from the infusion center. She often feels more fatigue for several days following treatment.

When thinking about her treatment priorities, they focus on two areas — pain relief so she can care for her son and living as independently as possible. Stacy recalls her son’s birth when she could not even hold him, and her parents moved in to help her with basic functioning. She works and seeks treatment to prevent that from happening again.

^{††} Stacy Case Example Background: Diagnosis: Rheumatoid arthritis. Current medication: Orencia. Examples of medications tried: Prednisone, Humira, Enbrel, Remicade, Methotrexate. Treatment considered effective? For the past 12 years, Stacy had considered her treatment of Actemra effective. In September 2021, Stacy was forced to switch to Orencia due to the national shortage from the COVID-19 pandemic.



Future Research Opportunities



I'm not sure why a treatment stops working. I describe it as a prisoner of war. The prisoner is always looking for ways to get around whatever defenses have been put in place.

—Rick Phillips



As more decision-makers turn to economic evaluations such as health technology assessments for insights about value, it is imperative that data inputs reflect the demographics and experiences of diverse individuals living with diseases such as RA. AF and IVI see an opportunity to shift research practices in clinical, post-market, and comparative effectiveness contexts so that economic evaluation of treatment options accounts for factors important to patients and caregivers — including less-measured costs of living with RA. Doing so can improve our collective understanding of outcomes important to patients and families; identify data that can best measure those impacts; and aid in understanding economic value in a patient-centered context.

The incorporation of real-world data into healthcare research and economic evaluations is accelerating, which is promising. These efforts can improve understanding of patient preference factors and disease experience and help make treatment innovations more relevant and attainable. Our work with individuals living with RA highlights just a few perspectives that are under-represented in research, but they may significantly impact clinical and cost-effectiveness outcomes long-term. The challenge is pinpointing meaningful factors to guide future research and identifying reference points for measuring practice improvement.

While RA is a heavily studied disease area with a relatively large number of treatment options, patients' lived experience and priorities for treatment outcomes are often still an afterthought in clinical, effectiveness, and cost-effectiveness research. Our collaboration in this research reinforces the importance of changing the status quo and highlights several areas of opportunity (See Appendix B).

Five priorities emerge from this initiative that could achieve meaningful change in research practice, improve the data used to measure quality and outcomes, and stimulate discussions of authentic, patient-centered value in our healthcare system:

- Clinical and post-market research should include measures related to independence, fatigue, and impact of hormonal changes on efficacy.
- Research should better address co-occurring health conditions, including mental health impacts of disease.
- Real-world data studies should map actual clinical practice patterns against clinical guidelines to help improve treatment pathway design.
- Research should continue to work to identify biomarkers that would help improve treatment.^{xxxvi}
- Research should focus on defining and measuring cost impacts related to chronic diseases, including transportation, work-related costs (lost wages, career impact, disability), caregiver financial impacts, and non-health related costs.



I'd like to have a healthcare team — physicians, physical therapists, etc. — talking with each other and really listening to me to make a program action plan that makes me the healthiest that I can be. I can't imagine being completely pain free, but I would like to not be thinking about it all the time, not worrying all the time.

—Raquel Masco





Conclusion

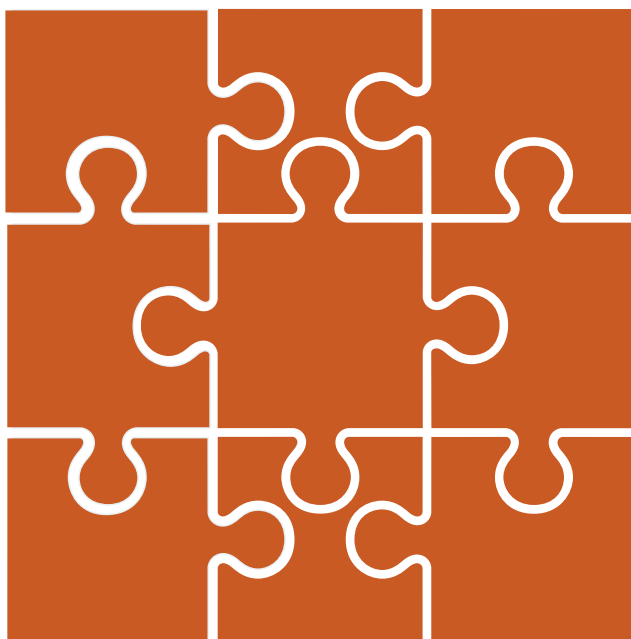
An estimated 1.6 million Americans suffer from rheumatoid arthritis, a disease area with well-documented levels of patient heterogeneity in all aspects — disease trajectory, outcomes, and preferences.^{xxxvii}

The societal and personal costs of RA are significant given direct and indirect medical costs, the prevalence of co-occurring health conditions, and impediments to the ability to work.^{xxxviii,xxxix,xi}

This project has emphasized aspects of patient experience and both clinical and quality-of-life outcomes that are underpowered or even absent from current research. As a result, treatment effectiveness and balance with an individual's health, quality of life, and family and work goals are too often a game of trial and error or based on metrics with little relevance to the patient's experience. Moreover, decision-makers at every level are unable to examine the full costs and clinical and life impacts on patients, nor fully determine the value of existing or future treatment innovations.

The current emphasis on patient-centricity and value in health demands that we change this status quo. We must invest in the painstaking work of understanding priorities and impacts defined by lived experience. Leadership and investment in research that measures outcomes and impacts important to patients, families, and caregivers must be a national priority^{xli} and involve every sector.

Commitments from researchers to involve underrepresented patient communities and to co-create research with patient leaders and other community organizations must occur in word and deed, and research funders must ensure accountability. Finally, early and continuous learning must be shared with full transparency to sustain momentum and eliminate the redundancies endemic in our proprietary research culture.



Appendix A

Interview Questions for Case Examples

Name
Age
Location
Diagnosis or diagnoses
Year of diagnosis and age at time of diagnosis
Length of time between symptoms started and the correct diagnosis

Brief timeline of the disease as you experienced it. Are you willing to share your treatment sequences (or example)?

- How were your treatment choices dictated or changed by insurance coverage?
- What has been the biggest impact of your RA treatment on your life?
- What side effects of the treatment for RA are most difficult for you?
- When do you know that a treatment is no longer working for you?
- What, if any, specific triggers/events have you experienced that have led to a treatment no longer working?

What treatment goals are most important to you?

- What, if any, decision framework do you and your provider use to decide on a given treatment?
- What would you like treatment for RA to resolve?
- What is most important to you in considering a treatment effective?

Beyond co-pays and co-insurance, what are some of the other costs of treatment that you don't hear researchers/doctors ask about?

Research

- What research studies, clinical trials, or disease registries have you participated in?
- What type of research would be most helpful to you to improve the quality of your care?

Appendix B

Research Areas Based on Focus Group and Interview Insights

Domain	Research Needs
Experience of RA	Qualitative research on resistance and/or hormonal linkages to treatment response (e.g., through registries or PCORI-funded research).
	Impact of function and independence on ability to work, independence, caregiver.
	Research that looks at differences in treatment responses by race, gender, age.
Accessing Treatment	Exploration of biomarkers and diagnostic research to help pinpoint factors to define best treatment pathways.
	Ability to factor treatment history, step failures, or subgroup analyses-based benchmarks up-front into coverage policies, facilitating access to treatment.
	Disparities in access and quality of care across insurance coverage and/or by race or ethnicity or research that illuminates differences in time to diagnosis by race, gender, age, insurance coverage.
	Insurance design and its impact on access to treatment (e.g., to what extent does step-therapy or insurance appeals impact access to treatment?)
Less Measured Costs	Cost impacts for patient and caregiver (e.g., lost wages, transportation, career disruption, non-health costs).
	Time spent accessing treatment, including travel to appointments, time in appointments, recovery from treatments, filing insurance claims.
	Patient costs from other forms of therapy are often not covered by insurance (e.g., physical therapy, occupational therapy, acupuncture, nutrition).
Priorities	Quantifying long-term costs of disease.
	Understanding the impact of RA treatments on decisions to have children.
	Impact of patient preferences (e.g., mode of delivery) on adherence, outcomes, and quality of life.

- ⁱ Ramaekers, B., Joore, M., and J. How Should We Deal with Patient Heterogeneity in Economic Evaluation: A Systematic Review of National Pharmacoeconomic Guidelines, *Value in Health*. 2013, Vol 16, Issue 5: 855-862. <https://doi.org/10.1016/j.jval.2013.02.013>.
- ⁱⁱ Food and Drug Administration definition of patient focused drug development. Available: <https://www.fda.gov/drugs/development-approval-process-drugs/cder-patient-focused-drug-development>
- ⁱⁱⁱ Arthritis Foundation. Arthritis by the Numbers: Book of Trusted Facts and Figures. 2019. Available: <https://www.arthritis.org/getmedia/e1256607-fa87-4593-aa8a-8db4f291072a/2019-abtn-final-march-2019.pdf>
- ^{iv} Arthritis by the Numbers (2019).
- ^v Lempp H, Hofmann D, Hatch SL, Scott DL. Patients' views about treatment with combination therapy for rheumatoid arthritis: a comparative qualitative study. *BMC Musculoskelet Disord*. 2012 Oct 18;13:200. doi: 10.1186/1471-2474-13-200. PMID: 23078166; PMCID: PMC3524760.
- ^{vi} Marsal S, Julià A. Rheumatoid arthritis pharmacogenomics. *Pharmacogenomics*. 2010 May;11(5):617-9. doi: 10.2217/pgs.10.53. PMID: 20415547.
- ^{vii} Arthritis Foundation Blog (April 7). Arthritis Foundation Leads the Way in Patient Engagement with the Institute for Clinical and Economic Review. Available: <http://blog.arthritis.org/advocacy/arthritis-patient-engagement-institute-clinical-economic-review/#more-488>.
- ^{viii} Bright, J. and M. Linthicum (Nov 2020). Open-Source Modeling for Value Assessment: Promises and Challenges. *Innovation and Value Initiative Value Blueprints Research Series*. Available: https://www.thevalueinitiative.org/wp-content/uploads/2021/04/Value-Blueprint_Open-Source_FINAL.pdf
- ^{ix} The Innovation and Value Initiative Open-Source Value Project: Rheumatoid Arthritis. Available: <https://www.thevalueinitiative.org/ivi-ra-value-model/>.
- ^x Kravitz RL, Duan N, Braslow J. Evidence-based medicine, heterogeneity of treatment effects, and the trouble with averages [published correction appears in *Milbank Q*. 2006;84(4):759-60]. *Milbank Q*. 2004;82(4):661-687. doi:10.1111/j.0887-378X.2004.00327.x
- ^{xi} Linthicum, M. and J. Bright (December 2019). Aligning Value Assessment with Treatment in Chronic Disease. *Innovation and Value Blueprint Research Brief Series*. Available: https://www.thevalueinitiative.org/wp-content/uploads/2019/12/Value-Blueprint_Aligning-Value-Assessment-with-Treatment_FINAL.pdf.
- ^{xii} How the Patient Voice Should Ripple Through the Healthcare System (May 2021). The Advisory Board. Available: <https://advisory-prod.azureedge.net/-/media/project/advisoryboard/advisory/topics/life-sciences/health-care-ecosystem/patient-voice-infographic.pdf?rev=b1528d905c054f6874bc4985ccd52ce&hash=2DB8478931672D25242D996A5AA7A284>
- ^{xiii} RA OSVP Model <https://www.thevalueinitiative.org/ivi-ra-value-model/> (Nov 2019).
- ^{xiv} Mian A, Ibrahim F, Scott DL. A systematic review of guidelines for managing rheumatoid arthritis. *BMC Rheumatol*. 2019 Oct 22;3:42. doi: 10.1186/s41927-019-0090-7. PMID: 31660534; PMCID: PMC6805606.
- ^{xv} Raemakers et al (2013).
- ^{xvi} Willke RJ, Neumann PJ, Garrison LP, Ramsey SD. Review of Recent US Value Frameworks-A Health Economics Approach: An ISPOR Special Task Force Report [6]. Published online 2018. doi:10.1016/j.jval.2017.12.011.
- ^{xvii} Kronzer VL, Crowson CS, Sparks JA, Myasoedova E, Davis JM 3rd. Comorbidities As Risk Factors for Rheumatoid Arthritis and Their Accrual After Diagnosis. *Mayo Clin Proc*. 2019 Dec;94(12):2488-2498. doi: 10.1016/j.mayocp.2019.08.010. Epub 2019 Nov 20. PMID: 31759675; PMCID: PMC6907158.
- ^{xviii} Rodriguez, T. (June 2019). Addressing Racial and Ethnic Disparities in RA. *Rheumatology Advisor*. Available: <https://www.rheumatologyadvisor.com/home/topics/rheumatoid-arthritis/addressing-racial-and-ethnic-disparities-in-ra/>
- ^{xix} Izadi Z, Li J, Evans M, et al. Socioeconomic Disparities in Functional Status in a National Sample of Patients With Rheumatoid Arthritis. *JAMA Network Open*. 2021;4(8):e2119400. doi:10.1001/jamanetworkopen.2021.19400
- ^{xx} Pope JE. Management of Fatigue in Rheumatoid Arthritis. *RMD Open*. 2020 May;6(1):e001084. doi: 10.1136/rmdopen-2019-001084. PMID: 32385141; PMCID: PMC7299512.
- ^{xxi} Strait A, Castillo F, Choden S, Li J, Whitaker E, Falasinnu T, Schmajuk G, Yazdany J. Demographic Characteristics of Participants in Rheumatoid Arthritis Randomized Clinical Trials: A Systematic Review. *JAMA Netw Open*. 2019 Nov 1;2(11):e1914745. doi: 10.1001/jamanetworkopen.2019.14745. PMID: 31722023; PMCID: PMC6902779.
- ^{xxii} Rodriguez (2019).
- ^{xxiii} Izadi et al (2021).
- ^{xxiv} Singh JA, Saag KG, Bridges SL Jr, Akl EA, Bannuru RR, Sullivan MC, Vaysbrot E, McNaughton C, Osani M, Shmerling RH, Curtis JR, Furst DE, Parks D, Kavanaugh A, O'Dell J, King C, Leong A, Matteson EL, Schousboe JT, Drevlow B, Ginsberg S, Grober J, St Clair EW, Tindall E, Miller AS, McAlindon T. 2015 American College of Rheumatology Guideline for the Treatment of Rheumatoid Arthritis. *Arthritis Rheumatol*. 2016 Jan;68(1):1-26. doi: 10.1002/art.39480. Epub 2015 Nov 6. PMID: 26545940.
- ^{xxv} Chambers JD, Wilkinson CL, Anderson JE, Chenoweth MD. Variation in Private Payer Coverage of Rheumatoid Arthritis Drugs. *J Manag Care Spec Pharm*. 2016 Oct;22(10):1176-81. doi: 10.18553/jmcp.2016.22.10.1176. PMID: 27668566.
- ^{xxvi} Hresko A, Lin TC, Solomon DH. Medical Care Costs Associated With Rheumatoid Arthritis in the US: A Systematic Literature Review and Meta-Analysis. *Arthritis Care Res (Hoboken)*. 2018 Oct;70(10):1431-1438. doi: 10.1002/acr.23512. PMID: 29316377; PMCID: PMC6033682.
- ^{xxvii} Hsieh PH, Wu O, Geue C, McIntosh E, McInnes IB, Siebert S. Economic burden of rheumatoid arthritis: a systematic review of literature in biologic era. *Ann Rheum Dis*. 2020 Jun;79(6):771-777. doi: 10.1136/annrheumdis-2019-216243. Epub 2020 Apr 3. PMID: 32245893.
- ^{xxviii} Chambers et al (2016).
- ^{xxix} Fairley JL, Seneviwickrama M, Yeh S, Anthony S, Chou L, Cicuttini FM, Sullivan K, Briggs AM, Wluka AE. Person-centred care in osteoarthritis and inflammatory arthritis: a scoping review of people's needs outside of healthcare. *BMC Musculoskelet Disord*. 2021 Apr 9;22(1):341. doi: 10.1186/s12891-021-04190-z. PMID: 33836697; PMCID: PMC8035722.
- ^{xxx} Galloway J, Capron JP, De Leonardi F, Fakhouri W, Rose A, Kouris I, Burke T. The impact of disease severity and duration on cost, early retirement and ability to work in rheumatoid arthritis in Europe: an economic modelling study. *Rheumatol Adv Pract*. 2020 Sep 16;4(2):rkaa041. doi: 10.1093/rap/rkaa041. PMID: 32964180; PMCID: PMC7494042.
- ^{xxxi} Witters, Dan (July 2021). 1 in 6 U.S. Workers Stay in Unwanted Job for Health Benefits. *West Health and Gallup*. Available: https://news.gallup.com/poll/349094/workers-stay-unwanted-job-health-benefits.aspx?utm_source=newsletter&utm_medium=email&utm_campaign=newsletter_axiosvitals&stream=top
- ^{xxxii} Coskun Benlidayi I, Gokcen N, Sariyildiz A, Sarpel T. They have got the blues: patient's mood- and disease activity-related psychological burden of rheumatoid arthritis on caregivers. *Int J Psychiatry Clin Pract*. 2019 Jun;23(2):84-89. doi: 10.1080/13651501.2018.1492728. Epub 2018 Jul 24. PMID: 30039721.
- ^{xxxiii} Rodriguez (2019).
- ^{xxxiv} Strait et al (2019).
- ^{xxxv} Izadi et al (2021).
- ^{xxxvi} Marsal S, Julià A. Rheumatoid arthritis pharmacogenomics. *Pharmacogenomics*. 2010 May;11(5):617-9. doi: 10.2217/pgs.10.53. PMID: 20415547.
- ^{xxxvii} Arthritis by the Numbers (2019).
- ^{xxxviii} Fairley et al (2021).
- ^{xxxix} Hresko et al (2018).
- ^{xl} Galloway et al (2020).
- ^{xli} PCORI Draft National Priorities (June 2021). <https://www.pcori.org/about-us/pcoris-new-strategic-plan/pcoris-national-priorities-health>