Sentiment analysis applied to digital conversations among warm autoimmune hemolytic anemia (wAIHA) patients receiving rituximab and/or blood transfusion

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Key Takeaways

✓ This study leveraged a novel approach to explore the patient perspective in terms of sentiments and common topics of interest in self-identified patients with wAIHA treated with rituximab and/or blood transfusions

✓ Digital public-domain conversations revealed substantial concerns related to side effects and a lack of treatment efficacy, while also highlighting the importance of healthcare provider support and involvement in implementing a successful treatment strategy

✓ The AI-powered methodology uncovered patient sentiments and themes in an unprompted fashion, providing candid insights that could be leveraged in the implementation of more patient-centric approaches to care

Introduction

- Warm autoimmune hemolytic anemia (wAIHA) is a rare, life-threatening, and relapsing autoimmune disorder caused by autoantibodies that bind to and ultimately destroy red blood cells[1]
  – Inadequately compensated hemolysis leads to anemia[2]

- Immunosuppressive and anti-CD20 B-cell depleting therapies (e.g., rituximab) are often used to treat patients with symptomatic anemia; blood transfusion is available as a rescue therapy for those with severe anemia[2]
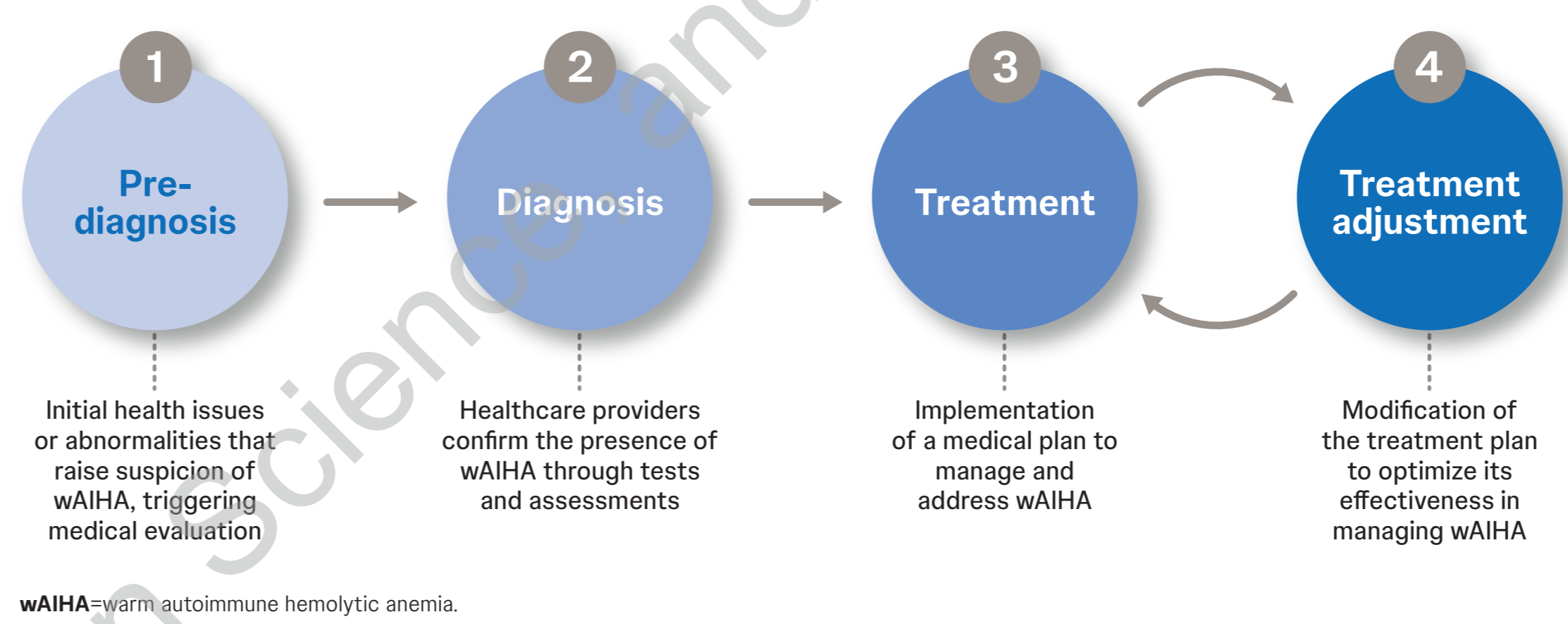
Objective

- Given the lack of data on the humanistic burden of wAIHA, the purpose of this study was to conduct sentiment analysis to highlight areas of greatest concern to patients, specifically those treated with rituximab and/or blood transfusion

Methods

- Digital public-domain conversations among adults who engaged in online conversations about wAIHA over a 24-month period (October 2021 to October 2023) were analyzed using artificial intelligence (AI)-powered algorithms

- Sources of conversations included topical sites, message boards, social networks, comments, and blogs
  – The de-identified digital conversations were limited to those written in English and originating from United States IP addresses

- The AI-powered methodology extracted and sorted content from contributors who self-identified as having wAIHA into categories and themes

- Segments representing patients with wAIHA treated with rituximab or transfusions werefurther identified from the dataset of wAIHA-related conversations

- Each conversation was categorized as positive, negative, or neutral (e.g., information seeking/sharing) in tone toward wAIHA via sentiment analysis using natural language processing, followed by a breakdown of the most frequent themes within each sentiment category

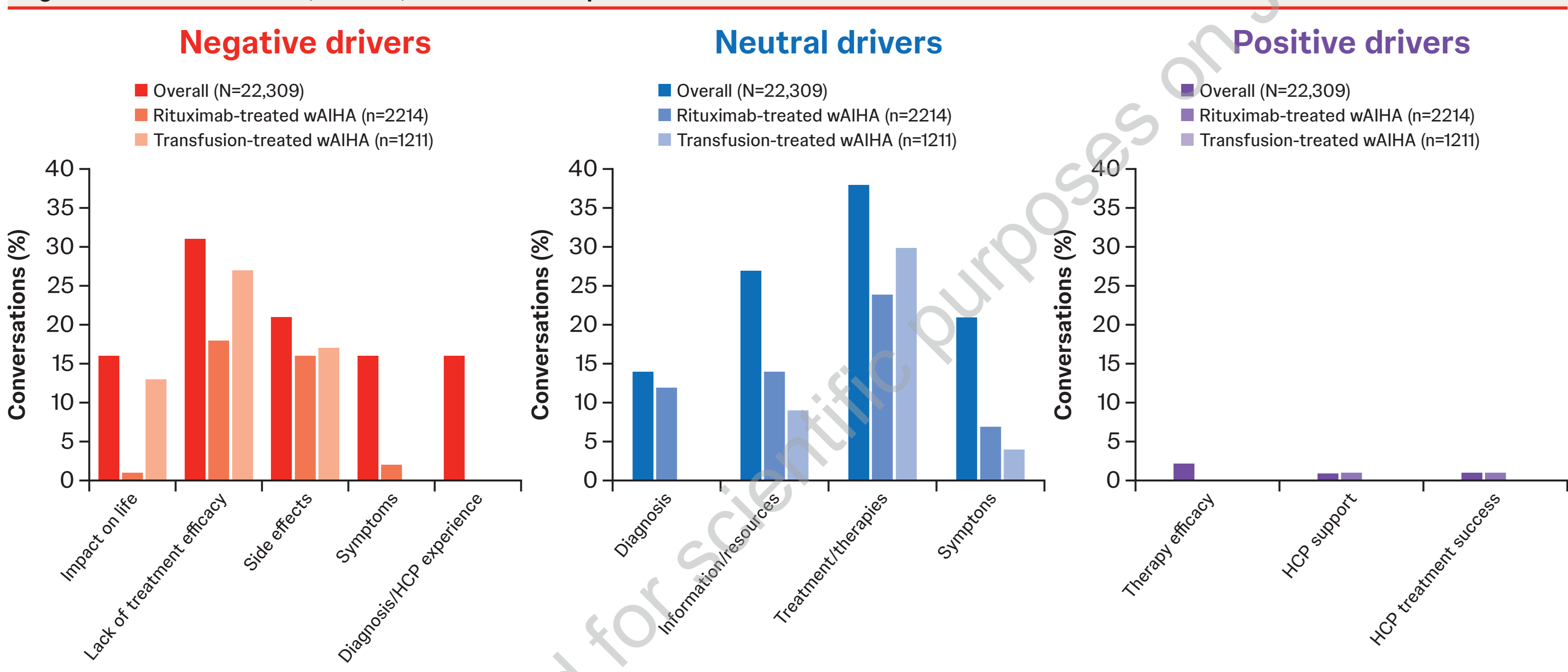- Sentiments were further categorized by different stages of the wAIHA journey (**Figure 1**)

Figure 1. The stages patients experience across the wAIHA journey

1. **Pre-diagnosis** — Initial health issues or abnormalities that raise suspicion of wAIHA, triggering medical evaluation
2. **Diagnosis** — Healthcare providers confirm the presence of wAIHA through tests and assessments
3. **Treatment** — Implementation of a medical plan to manage and address wAIHA
4. **Treatment adjustment** — Modification of the treatment plan to optimize its effectiveness in managing wAIHA

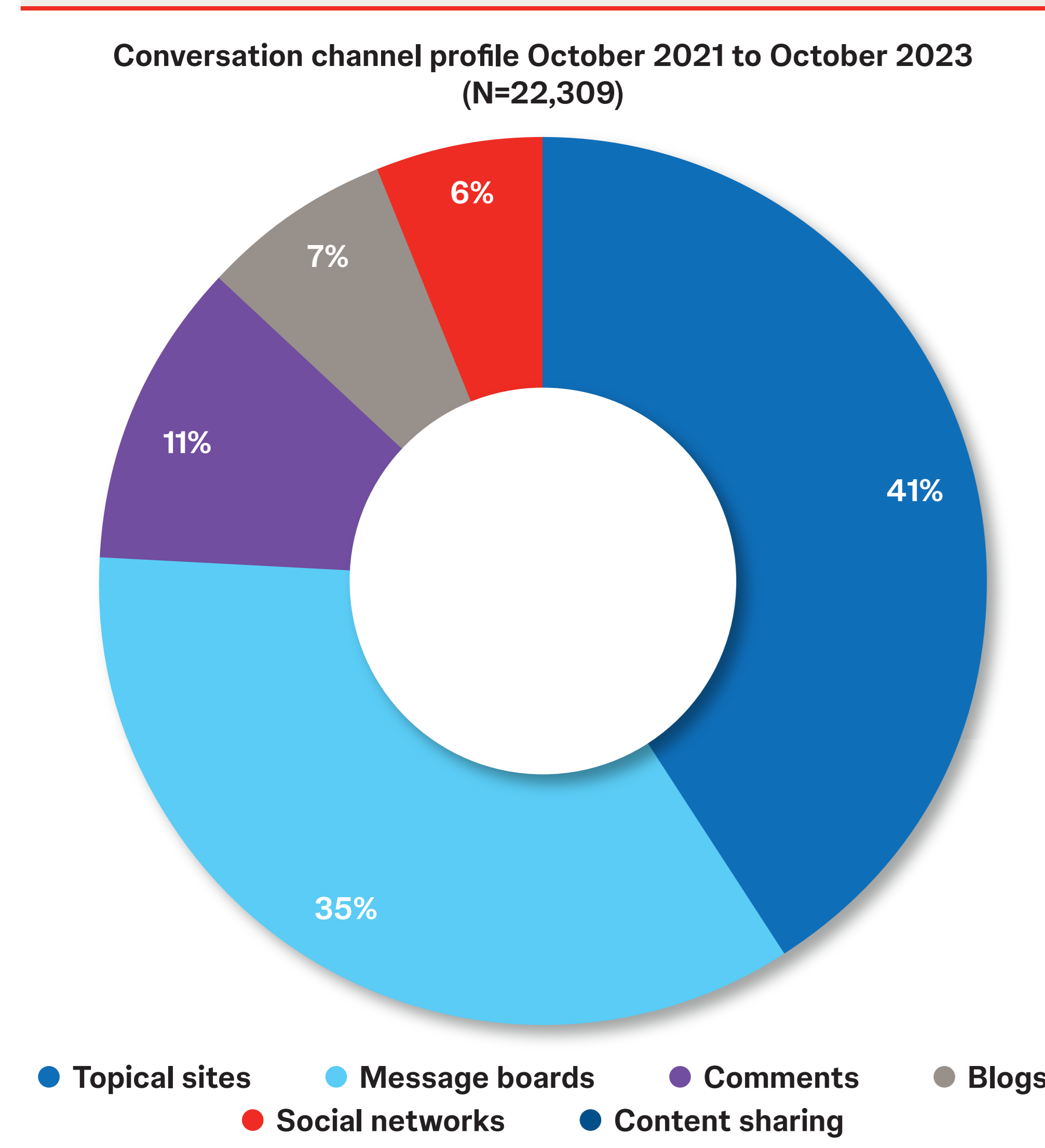wAIHA=warm autoimmune hemolytic anemia.

Results

- In total, 22,309 conversations related to wAIHA were identified (**Figure 2**)
  – All n totals reported represent the number of wAIHA-related conversations identified, and not necessarily individual patients with wAIHA

- The most common negative sentiment themes identified in conversations for both rituximab (n=2214) and transfusion-treated (n=1211) were lack of treatment efficacy (16% rituximab; 27% transfusion) and side effects (16% rituximab; 17% transfusion) (**Figure 3**)

- Most neutral conversations for all groups focused on treatment/therapies

- For all groups, positive drivers were rarely noted (all <5%)

Figure 2. Overview of all mined conversations about wAIHA

Conversation channel profile October 2021 to October 2023 (N=22,309)

- Topical sites 41%
- Message boards 35%
- Comments 11%
- Blogs 7%
- Social networks 6%
- Content sharing

Figure 3. Sentiment drivers, themes, and associated quotes

Negative drivers
(Conversations (%))
- Overall (N=22,309)
- Rituximab-treated wAIHA (n=2214)
- Transfusion-treated wAIHA (n=1211)

Categories: Impact on life, Lack of treatment efficacy, Side effects, Symptoms, Diagnosis/HCP experience

Neutral drivers
(Conversations (%))
- Overall (N=22,309)
- Rituximab-treated wAIHA (n=2214)
- Transfusion-treated wAIHA (n=1211)

Categories: Diagnosis, Information/resources, Treatment/therapies, Symptoms

Positive drivers
(Conversations (%))
- Overall (N=22,309)
- Rituximab-treated wAIHA (n=2214)
- Transfusion-treated wAIHA (n=1211)

Categories: Therapy efficacy, HCP support, HCP treatment success

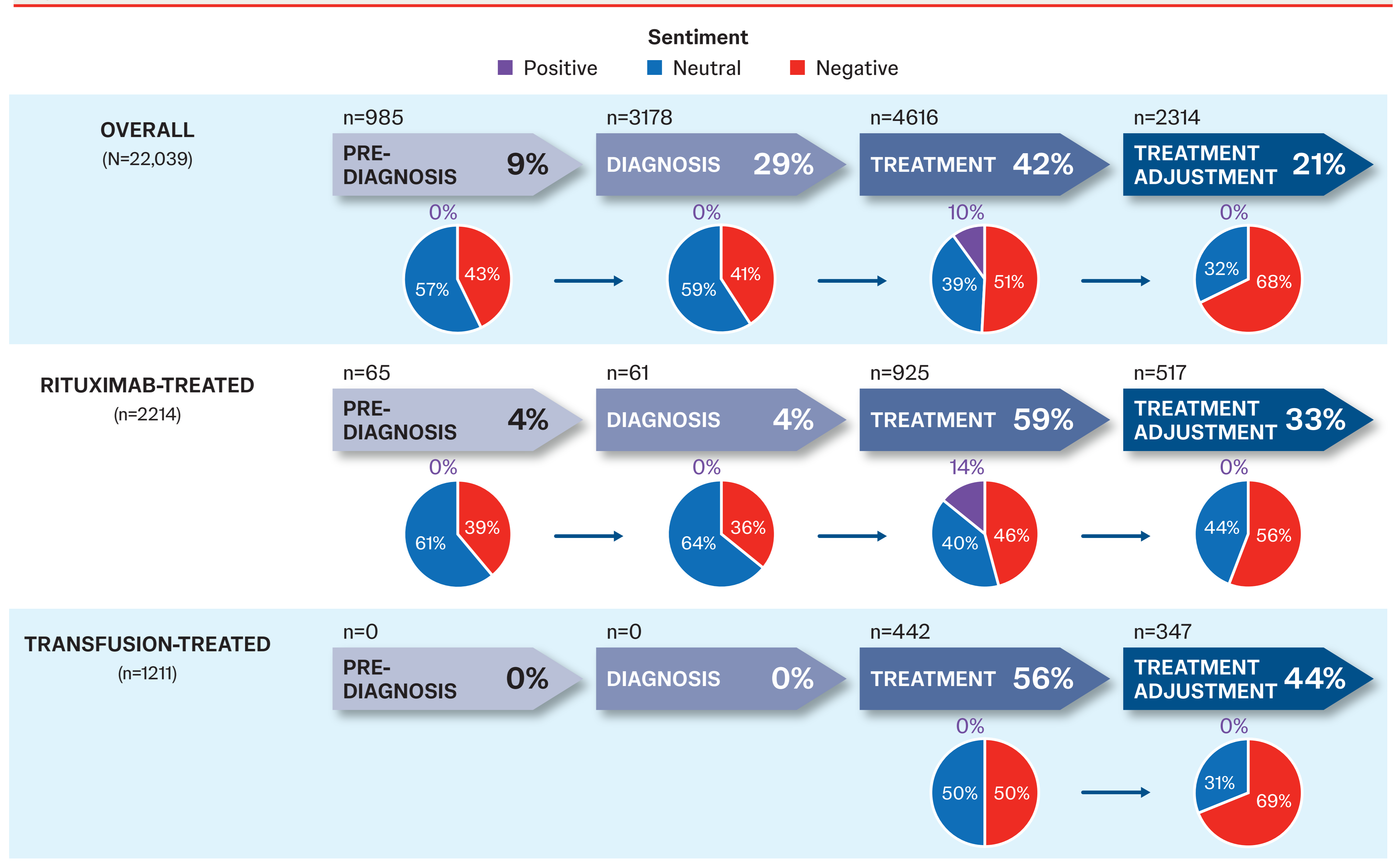**NEGATIVE DRIVERS**

"I'm exhausted all the time, but every other day is really bad. It's like I use all my energy one day, and it takes time to rebuild more."

"Entering the 7th hour of the process during my 1st infusion; I experienced annoying itching deep within my ears, back of the throat, head, and face. Shortly after the 'push.'"

NEUTRAL DRIVERS

"Rituximab or splenectomy: which second-line therapy for wAIHA?"

"So my hematologist wants to start me on Imuran (azathioprine) since this is like my 2nd relapse after my splenectomy. Have any of you been on it before? Is there anything I need to be aware of?"

POSITIVE DRIVERS

"Splenectomy 7-17. No relapses. I feel not exactly 100%, more like 85%. Can't work physically like I used to, but very happy with how things are going."

"I think I've been very lucky to have a GP who never gave up on me and did a lot of research and work to make the diagnosis, plus a hospitalist who did even more research about the more recent developments in treatment."

wAIHA=warm autoimmune hemolytic anemia.

- Across the patient journey (**Figure 4**), most of the conversations among both rituximab and transfusion-treated patients were highly negative in sentiment and were associated with being in the treatment or treatment-adjustment stages (46% and 56% for rituximab; 50% and 69% transfusion)
  – The rituximab-treated patients expressed all positive sentiment during the treatment phase, becoming increasingly negative at treatment adjustment
  – The transfusion-treated patients also became increasingly negative from the treatment to treatment-adjustment phase

Figure 4. Map of the wAIHA journey from the patient perspective

Sentiment: Positive, Neutral, Negative

OVERALL (N=22,039)
- PRE-DIAGNOSIS 9% — n=985 — 0% / 57% / 43%
- DIAGNOSIS 29% — n=3178 — 0% / 59% / 41%
- TREATMENT 42% — n=4616 — 10% / 39% / 51%
- TREATMENT ADJUSTMENT 21% — n=2314 — 0% / 32% / 68%

RITUXIMAB-TREATED (n=2214)
- PRE-DIAGNOSIS 4% — n=65 — 0% / 61% / 39%
- DIAGNOSIS 4% — n=61 — 0% / 64% / 36%
- TREATMENT 59% — n=925 — 14% / 40% / 46%
- TREATMENT ADJUSTMENT 33% — n=517 — 0% / 44% / 56%

TRANSFUSION-TREATED (n=1211)
- PRE-DIAGNOSIS 0% — n=0 — 0%
- DIAGNOSIS 0% — n=0 — 0%
- TREATMENT 56% — n=442 — 0% / 50% / 50%
- TREATMENT ADJUSTMENT 44% — n=347 — 0% / 31% / 69%

N values representing the number of conversations within the journey stages may not always add up to the overall N for each segment, as some conversations may not include the self-identification of specific journey stages.
wAIHA=warm autoimmune hemolytic anemia.