Lumanity

Improving Patient-Engagement Outcomes: A Pilot Study to Investigate the Role of Empathy in Scientific Writing

Authors: Martha Gauthier*, Heather Nyce, Susan Daniels, Laura Watts

Affiliation: Lumanity Inc, Boston, MA, USA.

*Presenting author

INTRODUCTION

- Guidance from regulatory bodies, such as the US Food and Drug Administration (FDA) and European Medicines Agency (EMA), emphasizes the importance of clarity and readability in patient-facing materials[1-3]
- While readability metrics such as the Flesch-Kincaid Readability Scale or New Dale-Chall Readability Formula can be used to assess grade-level readability in scientific writing, these tools do not capture empathy, tone, or patient-first language
- In healthcare professions, empathy (defined as the ability to understand the personal experience of a patient)[4] has been linked to better patient satisfaction, treatment adherence, clinical outcomes, and clinical competence[5]
- To our knowledge, no metric exists to evaluate empathy in scientific writing

OBJECTIVE

- To identify the features of scientific writing that patients perceive as empathetic, with an ultimate goal of informing the development of an empathy metric for use in scientific writing

METHODS

- Individuals who identified as patients or patient advocates completed an online survey to rate six scientific writing samples using a customized 5-point Likert scale that assessed 11 distinct features of scientific writing as well as overall empathy (**Figure 1**)
- Selected writing samples represented a range of readability levels and topics
- A definition of empathy was not provided to survey respondents
- The association between the 11 features and perceived empathy was compared using regression analysis
- Respondents reported their top three features for conveying empathy in scientific writing and were provided with open-text fields to report other features for conveying empathy

Figure 1. Study design
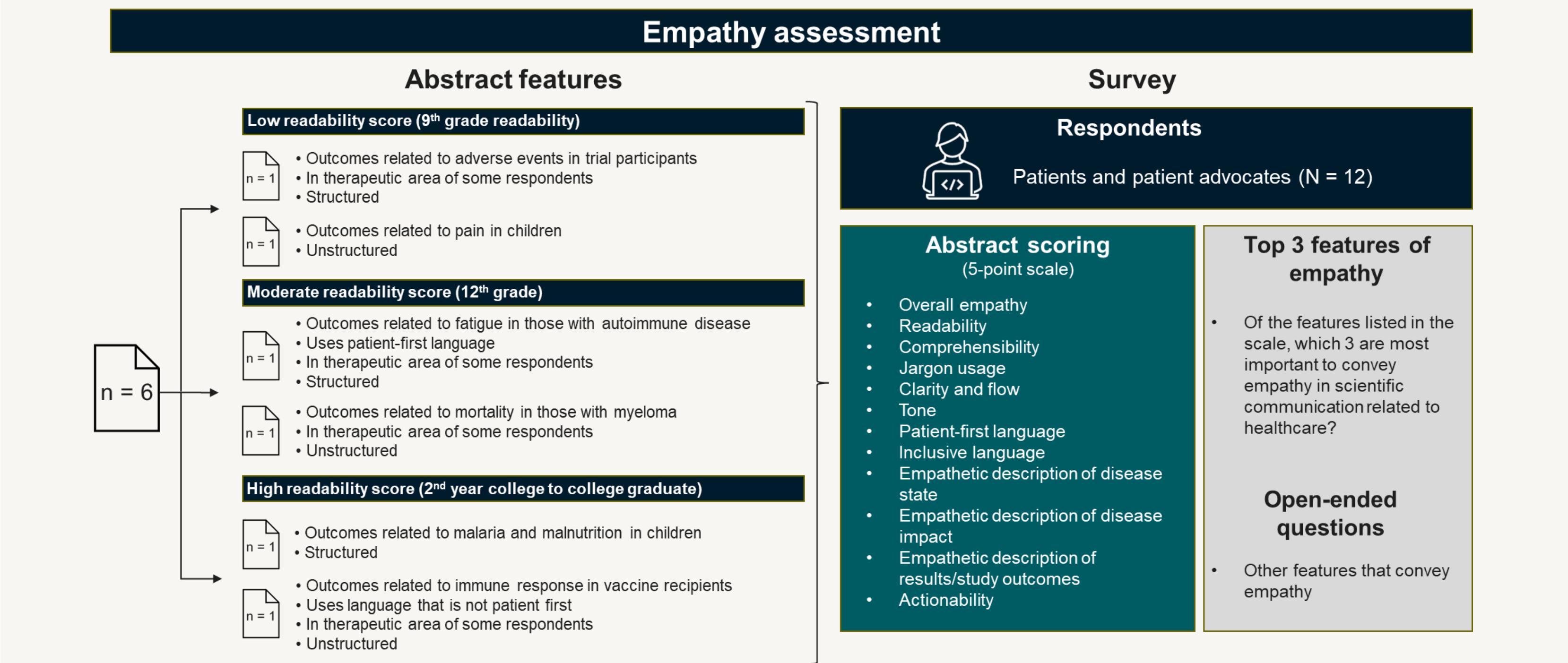
RESULTS

Survey respondents

- Twelve patients or patient advocates with experience in six therapeutic areas completed the survey (**Table 1**)

Table 1. Respondent demographic characteristics

Characteristic, n (%)	Respondents (N = 12)
Age category, years	
18-29	0
30-39	2 (16.7)
40-49	5 (41.7)
50-59	4 (33.3)
60+	1 (8.3)
Gender identity	
Female	7 (58.3)
Male	4 (33.3)
Transgender	1 (8.3)
Education	
Some college, but no degree	2 (16.7)
Bachelor's degree	2 (16.7)
Master's degree	1 (8.3)
Professional or doctorate degree	7 (58.3)
Respondent identified as[a]	
Patient	7 (58.3)
Patient advocate	6 (50.0)
Medical writing professional	5 (41.7)
Caregiver	4 (33.3)
Other[b]	2 (16.7)
Therapeutic area	
Autoimmune disease	5 (41.7)
Infectious disease	3 (25.0)
Rare disease	3 (25.0)
Cardiovascular disease	1 (8.3)
Hematology/oncology	1 (8.3)
Metabolic disorders	1 (8.3)

[a]Respondents were able to select all that applied.
[b]One respondent specified "patient-engagement professional" and another specified "both." Due to the use of multiple options for respondent identification, the categories encompassing "both" are unknown for this response.

Features associated with empathy in scientific writing

- Nearly all features evaluated in the survey were strongly associated with empathy in the scientific writing samples (**Table 2**)
- An empathetic description of the disease state exhibited the strongest correlation with perceived empathy (R^2 = 0.9908 [P < 0.001])
- Actionability exhibited the lowest correlation among the assessed features (R^2 = 0.7804 [P = 0.0196])

Table 2. R^2 coefficient and P values comparing empathy scores and writing features in scientific writing

Writing feature	R^2	P value
Flesch-Kincaid Readability (Grade Level)	0.7323	0.0297
Respondent-rated features		
Readability	0.8913	0.0046
Comprehensibility	0.9441	0.0012
Jargon usage	0.9786	0.0002
Clarity and flow	0.8541	0.0084
Tone	0.9628	0.0005
Patient-first language	0.9614	0.0006
Inclusive language	0.9706	0.0003
Empathetic description of disease state	0.9926	< 0.0001
Empathetic description of disease impact	0.9830	0.0001
Empathetic description of results/study outcomes	0.9835	0.0001
Actionability	0.7804	0.0196

- When asked to rate which three of the assessed features were most important for conveying empathy in scientific writing, respondents most frequently selected patient-first language (50.0%; **Figure 2**)
- In addition to the features evaluated in the survey,[1] respondents highlighted the importance of framing the purpose of the research
- In open-ended feedback, respondents further emphasized the value of using appropriate language to refer to study participants (e.g. avoiding terms such as "subject") and the use of "plain English" in writing

Figure 2. Features identified as most important for conveying empathy in scientific writing
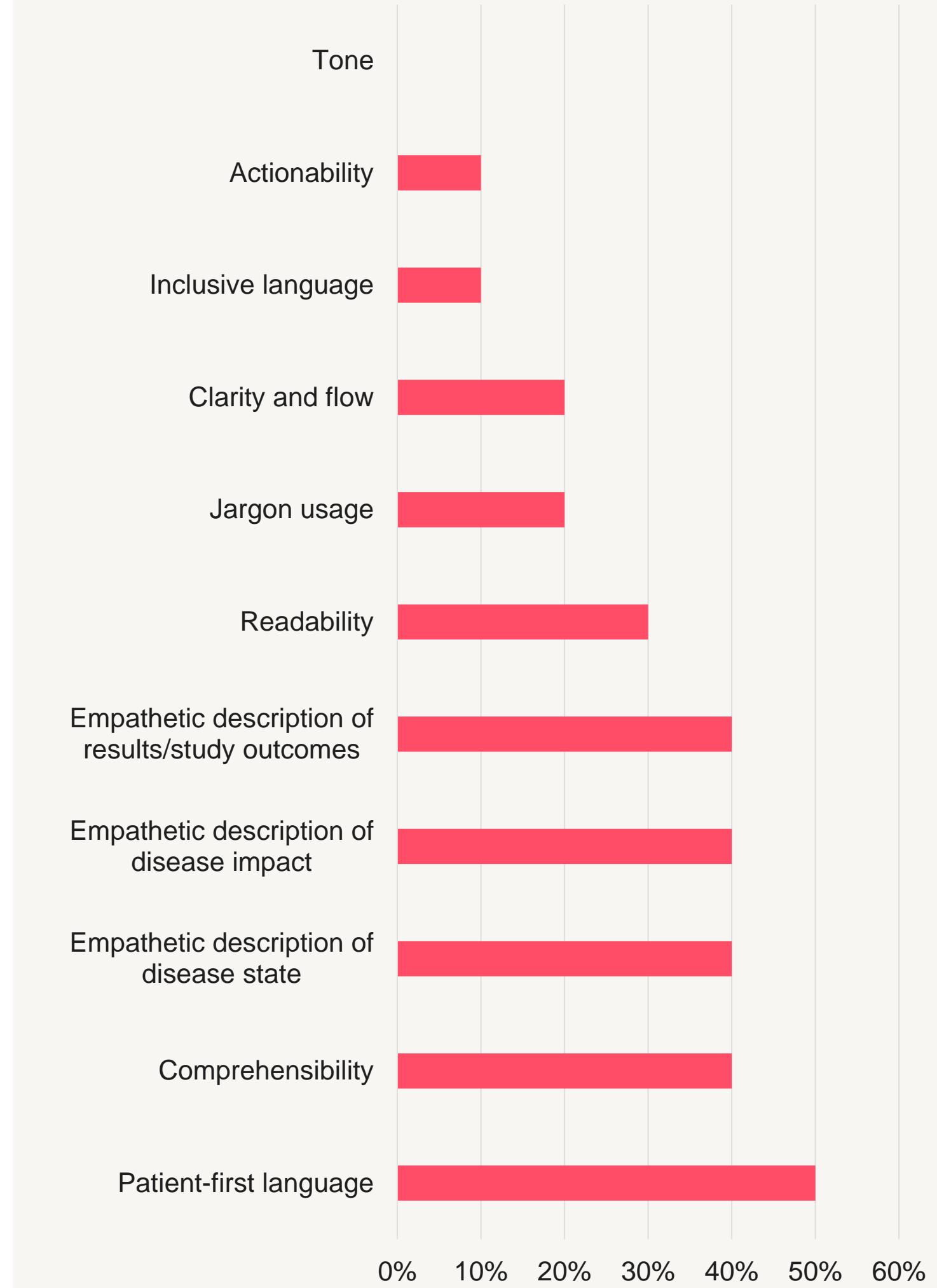
The association between readability metrics and empathy in writing samples

- Of the eight standardized readability metrics, the Simple Measure of Gobbledygook (SMOG) Index showed the strongest and most significant correlation with empathy (R^2 = 0.8231 [P = 0.0125]; **Table 3**)

Table 3. R^2 coefficient and P values comparing standardized readability metric scores with empathy scores in scientific writing samples

Readability metric	R^2	P value
Flesch-Kincaid Readability (Grade Level)	0.7323	0.0297
Automated Readability Index	0.6840	0.0423
Flesch Reading Ease	0.6145	0.0650
Gunning Fog Index	0.6485	0.0532
The SMOG Index	0.8231	0.0125
Original Linsear Write Formula	0.2646	0.2964
Linsear Write Grade Level Formula	0.6110	0.0663
New Dale-Chall Readability Formula	0.6996	0.0380

Key: SMOG, Simple Measure of Gobbledygook.

REFERENCES

1. Freyr™. 2025. www.freyrsolutions.com/blog/us-fda-guidelines-series-plain-language-summary-in-focus. Accessed: March 31, 2025. 2. Publications Office of the European Union. 2014. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:02014R0536-20140527. Accessed: March 26, 2025. 3. US Food and Drug Administration. 2009. https://www.fda.gov/media/77832/download. Accessed: March 26, 2025. 4. Moudatsou et al. *Healthcare*. 2020; 8:26. 5. Vieten et al. *PLoS One*. 2024; 19:e0297099.

KEY TAKEAWAYS

- Patients and patient advocates evaluated several features of scientific writing that conveyed empathy, and identified the strongest drivers to be the use of an empathetic description of the disease state, an empathetic description of study results/outcomes, and an empathetic description of the disease impact
- While still significantly correlated, clarity, readability, and actionability were among the lowest drivers of empathy-perception in scientific writing
- The features identified through this research may be used to inform a framework for evaluating empathy in scientific writing; extending the research beyond scientific writing has the potential to improve the empathy conveyed through a wide range of patient-engagement materials

CONCLUSIONS

- Incorporating empathetic language, specifically patient-first language and use of an empathetic description of the disease state, can enhance the perceived empathy of scientific writing, potentially improving its accessibility and impact
- Findings show that while readability and clarity are part of conveying empathy in writing, other factors were identified as more impactful to patients, suggesting that readable and clear content may not inherently be perceived as empathetic
- These findings may inform other modes of patient engagement (e.g. outreach materials and data collection tools, such as surveys or interview guides) to refine language and improve the empathy conveyed. Additional research is needed to establish the extent to which the findings from scientific writing samples align with other forms of written patient-engagement materials
- In the absence of an empathy metric, the SMOG Index may provide insights of the extent to which writing may be perceived as empathetic

An electronic version of the poster can be viewed by scanning the QR code.