

A WHITEPAPER ON

A Reading Grade Level Analysis of Language within *Real World HCP- Patient Conversations*

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Introduction

Effective communication between healthcare providers (HCPs) and patients is crucial for fostering informed decision making and ensuring optimal care. While quantifying the effectiveness of communication is inherently challenging, the KISS principle of prioritizing simplicity in communications is widely accepted and well supported in a broad range of fields including [scientific communications](#) and [medical care](#).

Presenting health information at a level of complexity that exceeds the ability of the audience to interpret [inhibits comprehension and retention of medical information](#). Therefore, differences in language complexity between HCP speech and patient speech within the clinic can be used as a proxy for communication effectiveness. This is an intuitive concept which many of us have encountered within our own interactions with the medical system – if the complexity of HCP speech is much higher than the complexity of patient speech, it is more likely that the patient will struggle to understand important medical concepts and retain critical information.

ZoomRx maintains a large repository of deidentified conversations between HCPs and patients, recorded from real-world clinical appointments, which can act as a valuable dataset to explore communication effectiveness within the clinic. In this whitepaper, we analyze the speech complexity of these clinical discussions across different therapeutic areas and medical topics via reading grade level analysis.



Methodology

FLESCH-KINCAID READABILITY TEST

[The Flesch-Kincaid readability tests](#), developed by Rudolf Flesch and J. Peter Kincaid, are widely used measures of readability to assess how difficult a sample of English language is to understand. The Flesch-Kincaid Grade Level (FKRGL) is a metric approximating the equivalent American school grade level needed to comprehend that sample.

The Flesch-Kincaid Grade Level (FKRGL) is a function of the number of syllables per word and the number of words per sentence, as described below:

$$\text{FKRGL: } 0.39 \times (\text{words/sentences}) + 11.8 \times (\text{syllables/words}) - 15.59$$

We have applied this reading grade level to over 1,400 transcripts of the spoken language from recent real-world clinical appointments between patients and their HCPs to provide a simple and understandable numerical metric for comparing how clearly content is being communicated.

Below are some examples of higher and shorter reading grade language used by dermatologists to introduce JAK inhibitors.

High Reading Grade Level (12.9)

There's a couple of new therapies that use a different mechanism of action that controls eczema. They are called JAK Inhibitors, and basically what they do is they just control inflammation.

Low Reading Grade Level (4.8)

So there's a drug, there's actually two drugs we can talk about. One is called Rinvoq, one is called Cibinqo. They're JAK inhibitors. They work very good and they work very fast. They work great for the itch and they work really well for the rash.



Key Findings

Across a dataset of over 1,400 recent clinical conversations, HCPs spoke to their patients at an average reading grade of 5.8, just below a 6th grade level. This is nearly twice the reading grade level of the language spoken by their patients which measures at exactly a 3rd grade reading level.

Patients have a surprisingly low share of voice during clinical appointments. Patient speech accounts for only 17% of all words spoken within the clinic, while HCPs contribute 83% of the conversation.

Average sentence length is a direct input into reading grade calculation, and the discrepancy between HCP and patient speech is also reflected in this metric. Patient sentences include an average of 7 words, just over half the length of an average HCP sentences (13 words).

Overall, these findings point to a worrying communication gap between HCPs and their patients, which may contribute to a variety of negative clinical outcomes including low patient engagement, reduced compliance with medical advice, and erosion of trust in the healthcare system. However, the results also point to simple and actionable solutions for HCPs and medical practices – such as proactively simplifying HCP speech, asking frequent questions of patients, and matching HCP speech patterns to those of their patients.

Importantly, simplifying HCP speech patterns seems to activate a positive feedback loop in which patients feel more empowered to actively engage in treatment discussions. This active engagement facilitates better patient comprehension, as well as opportunities for HCPs to recognize gaps in comprehension and further adjust their speech patterns to better match those of their patients.



Patient Engagement

While the share of words spoken within the clinic does not directly influence the reading grade level, it is indicative of the conversational dynamic between HCP and patient and is strongly correlated to the complexity of HCP speech.

When HCPs dominate the conversation, they are much more likely to speak in language that is substantially more complex than language used by their patients. In conversations where HCPs contributed 85% or more of all words spoken in the clinic, the average grade level of HCP speech was typically double to quadruple the grade level of patient speech.

In contrast, when HCPs and patients contribute roughly equally to the conversation, the complexity of their speech is also equivalent.

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Patient Share of Wordcount	HCP Speech: Reading grade level	Patient Speech: Reading grade level
< 5%	7.1	1.9
5 - 9%	6.3	2.5
10 - 14%	6.3	3.1
15 - 19%	5.8	3.1
20 - 24%	5.7	3.5
25 - 29%	4.9	3.5
30 - 34%	4.6	3.5
35 - 39%	4.5	3.5
40%+	4.0	4.0

Conversations with high patient word count are characterized by longer patient sentences and more back-and-forth exchanges, which naturally breaks HCP speech into smaller, more digestible sentences. The results suggest that when HCPs speak at the same reading grade level as their patients, they encourage higher levels of patient engagement with treatment decisions – which may be a natural extension of higher patient comprehension of the treatment options.

The opportunity to speak freely in longer sentences also enables patients to accurately communicate their wants and needs with their HCPs. In turn, higher levels of patient speech create opportunities for HCPs to gauge a patient’s health literacy and tailor their presentation style to match that of their audience.

We interpret these findings to suggest that physicians who speak simply invite greater patient participation in treatment conversations, and that increased patient speech encourages HCPs to adjust and simplify their own speech patterns.

This compounding dynamic offers a compelling opportunity to increase the effectiveness of two-way communication within the clinic.



The Impact of Asking Questions

Underscoring the HCP's critical role in encouraging patient engagement, we also find that a higher volume of HCP questions is correlated to better alignment between HCP and patient speech complexity.

HCPs who asked fewer than 5 questions to their patients within a clinical conversation spoke at a 7th grade reading level, vastly exceeding the complexity of their patients' speech (reading grade level 3.2). HCPs who asked their patients 10 or more questions spoke at a reading grade level of only 4.8, leading to far better alignment with patient speech complexity. Intuitively, conversations with more HCP questions also led to greater patient engagement by share of wordcount and shorter, less complex sentences from both HCPs and patients.

HCP Questions	HCP Speech: Reading grade level	Patient Speech: Reading grade level	Patient Share of Wordcount
<5	7.0	3.2	12%
5-9	6.1	3.1	17%
10+	4.8	2.8	21%

Increasing the number of questions asked by HCPs is a practical, actionable approach to facilitating a more even dialogue between providers and patients and increasing patient comprehension. Interestingly, the number of questions asked by patients had no correlation with the language complexity of their HCPs.



Differences across Therapeutic Areas

There are large differences in complexity of HCP speech across therapeutic areas, with Cardiovascular specialists tending to speak at the highest reading grade level (6.9) compared to 4.7 for Respiratory and Immunology specialists.

Therapeutic Areas	HCP Speech: Reading grade level
Cardiovascular	6.9
Gastrointestinal	6.5
Dermatology	6.3
Metabolic Disorders	6.2
Oncology	6.2
Ophthalmology	6.2
Central Nervous System	5.6
Hematological Disorders	5.4
Infectious Disease	5.4
Respiratory	4.7
Immunology	4.7

While there is significant variability within each therapeutic area with regards to counseling style and conversational flow, diving deeper into the types of HCP within therapeutic areas is instructive. Within Cardiovascular clinic visits, HCPs often make use of complex technical language (shown in red) while speaking to their patients.

While some of these topics may be unavoidable due to the nature of the visit and the required conversation topics, there are Cardiologists who consistently present information in less complex terms (shown in blue).

HIGH READING GRADE LEVEL EXAMPLES :

You had a positive vasoreactive study
It works through very different way than vasodilation
Right cardiac catheterization
It does have known teratogenic effects
Pericardial infusion and pericardial involvement on gadolinium
Different receptors within the pathology of the disease
Put you at risk for cardiac tamponade

LOW READING GRADE LEVEL EXAMPLES :

The goal is to get you back to not being on any medicine
Have you ever tried like anything else? Ibuprofen? Or aspirin?
Do you notice that you have chest pain in certain positions?
Like ibuprofen colchicine is kind of a gold standard medicine that we use a lot
Starting at high dose today and we'll taper it down over the next 10 days
Little bit of fluid around your heart

Similarly analyzing conversations between patients and Respiratory specialists, HCPs tend to use more understandable language (shown in blue) with fewer technical terms than their counterparts in Cardiology. Respiratory specialists also tend to use shorter sentences and ask more questions of their patients. However, there are ample examples of respiratory specialists using overly complex language (shown in red)

These examples present an illustrative target for those in the healthcare industry to review their own communication patterns for overly complex technical jargon and to strive for simple language that encourages patient participation and engagement.

HIGH READING GRADE LEVEL EXAMPLES :

**Less reactivity all the way down the cascade
Your fractional excretion of nitrogen oxide or NIOX was 96**

These are precision medicines that are specifically targeting what's going on and causing some of those asthma symptoms

The way that it works is it blocks a molecule called TSLP that's right, generally at the mucosal membrane
It doesn't work on IgE or eosinophils, it works on inflammation that really starts at the beginning of the inflammatory cascade

**You still have some obstructive dysfunction noticed on your pulmonary function testing
Self-administration of injections particularly, subcu in the back of the arm**

LOW READING GRADE LEVEL EXAMPLES :

**The Tezspire is a fixed dose and that would be every four weeks
So it's two puffs in the morning, two puffs at night**

I'm sure I've told you many times before that taking too many steroids is not good

All these medications are injectable like an allergy shot

How often are you have you been using your rescue inhaler?

Trelegy is a type of inhaler that has three medications instead of two because Symbicort only has two

You were on Advair for a while, Wixela ,which is like this newer version of Advair

It seems to have a pretty good safety profile



Topics of Discussion

The ZoomRx HCP-Patient Conversation dataset is tagged by clinical topic and themes to facilitate deeper insights, as well as faster navigation between points of interest in transcripts and audio recordings. Analyzing a selection of clinical topics, we can see that the more complex topics, such as discussions about mechanisms of action and drug efficacy, are discussed using more complex language than topics such as dosing and administration.

Importantly, regions of conversations where patients were exceptionally engaged or frequently voiced questions resulted in HCP responses that used substantially less

complex language – up to 3.5 reading grade levels lower – than the average HCP speech complexity for these topics.

Themes	HCP Speech - Reading grade level
Mechanisms of Action	8.8
Treatment, Disease Education	8.1
Efficacy	7.5
Side Effects	7.3
Access	7.3
Labs / Testing	7.1
Diagnosis	7.0
Dosing / Administration	5.8
Patient Engagement	5.3
Patient Questions / Concerns	5.1



Conclusions

Analyzing actual in-office conversations between HCPs and patients, such as those in ZoomRx’s HCP-Pt Conversation research, enables real-world insights which are otherwise unobtainable. Our results suggest that the complexity of language and speech between HCPs and patients is often dramatically misaligned. This mismatch is an indicator of less effective communication in the healthcare setting, which is correlated to a host of negative outcomes including low patient engagement, reduced compliance with medical advice, and erosion of trust in the healthcare system. However, this research also points to a range of simple solutions which are relatively easily implemented by HCPs and practices willing to critically examine their communication styles.

- Use plain language whenever possible, including common terms and short sentences
- Ask more questions, providing patients the opportunity to express confusion or concerns and to speak at length about their wants and needs
- Recognize the health literacy and language complexity of patients, and adjust HCP speech patterns accordingly

Not only will these actions increase patient comprehension, but they will also encourage patient engagement, activating a positive feedback loop of back-and-forth conversation that naturally results in less complex and more comprehensible speech patterns.

