

GlyphAI: Bridging the Communication Gap for Patients with Low English Proficiency

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Project Background

Healthcare providers often offer essential information about follow-up care, medication instructions, and diagnostic information through written and verbal instructions.¹ However, information is not always effectively communicated to non-English speaking patients and patients with low health literacy skills, resulting in poor health outcomes, increased healthcare costs, and increased readmission rates.²⁻³

Design Requirements

1. Accurately represents medication instructions
2. Reliably adapts to patient understanding
3. Easily integrates into clinical workflow

Need Statement

Healthcare providers need a method to **effectively** and **accurately communicate medication information** to non-English speaking patients upon hospital discharge in order to improve patient comprehension of their treatment course.

Our Solution

Our solution, GlyphAI, leverages large language models (LLMs) to generate pictographic representations of medication instructions in an adaptable and easily verifiable way.

Image Syntax

The initial image syntax developed for our pictographs used a sentence-like structure for arranging the images, arranging the images in the same order their corresponding words would be found in verbal instructions.



Figure 1: Initial Image Syntax

Figure 1 is our solution's output of the instruction: "Take 2 tablets of amoxicillin every morning for 14 days." When surveyed, participants had difficulty interpreting the meaning of the calendar image. Some participants correctly thought it represented the number of days, but others thought it represented months.

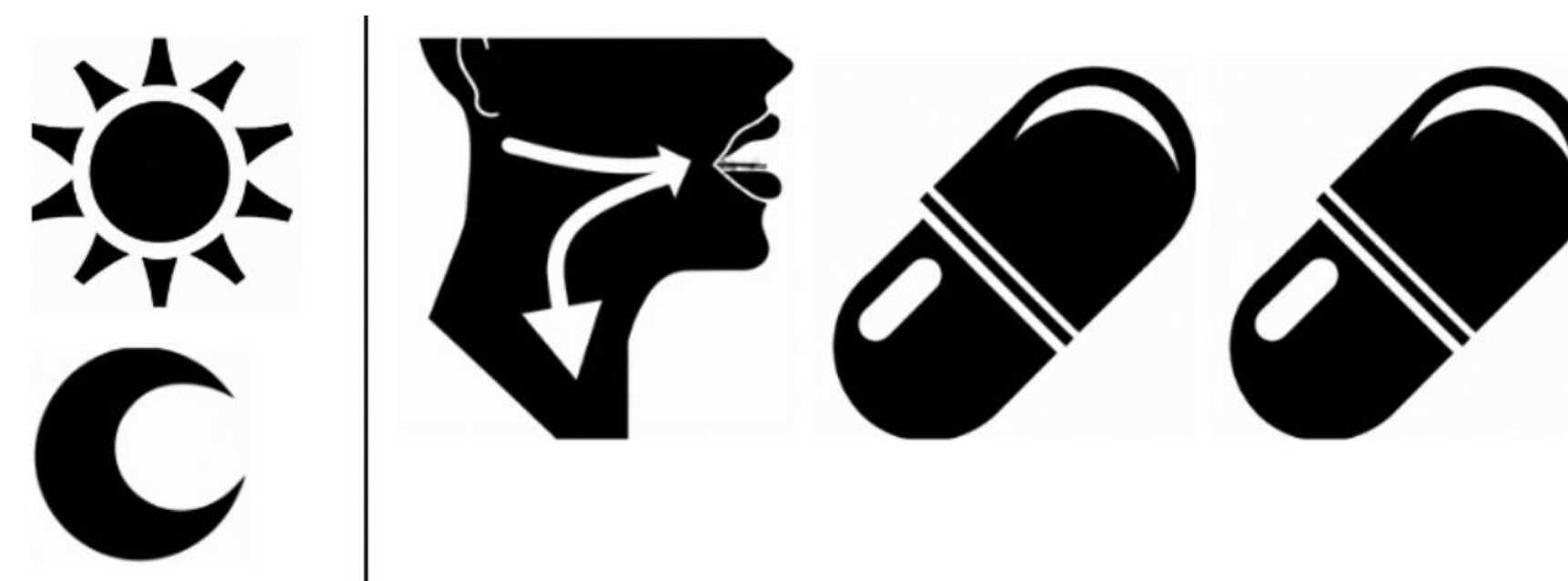


Figure 2: Final Image Syntax

The final image syntax, rather than using the calendar icon that survey participants found confusing, uses a different method to handle the number of days. Figure 2 shows the solution's output of the instruction: "Take 2 pills of amoxicillin for one morning and night." The solution encodes the number of days in the number of times the output is printed.

Testing for Accuracy

Accuracy of GlyphAI Image Comprehension

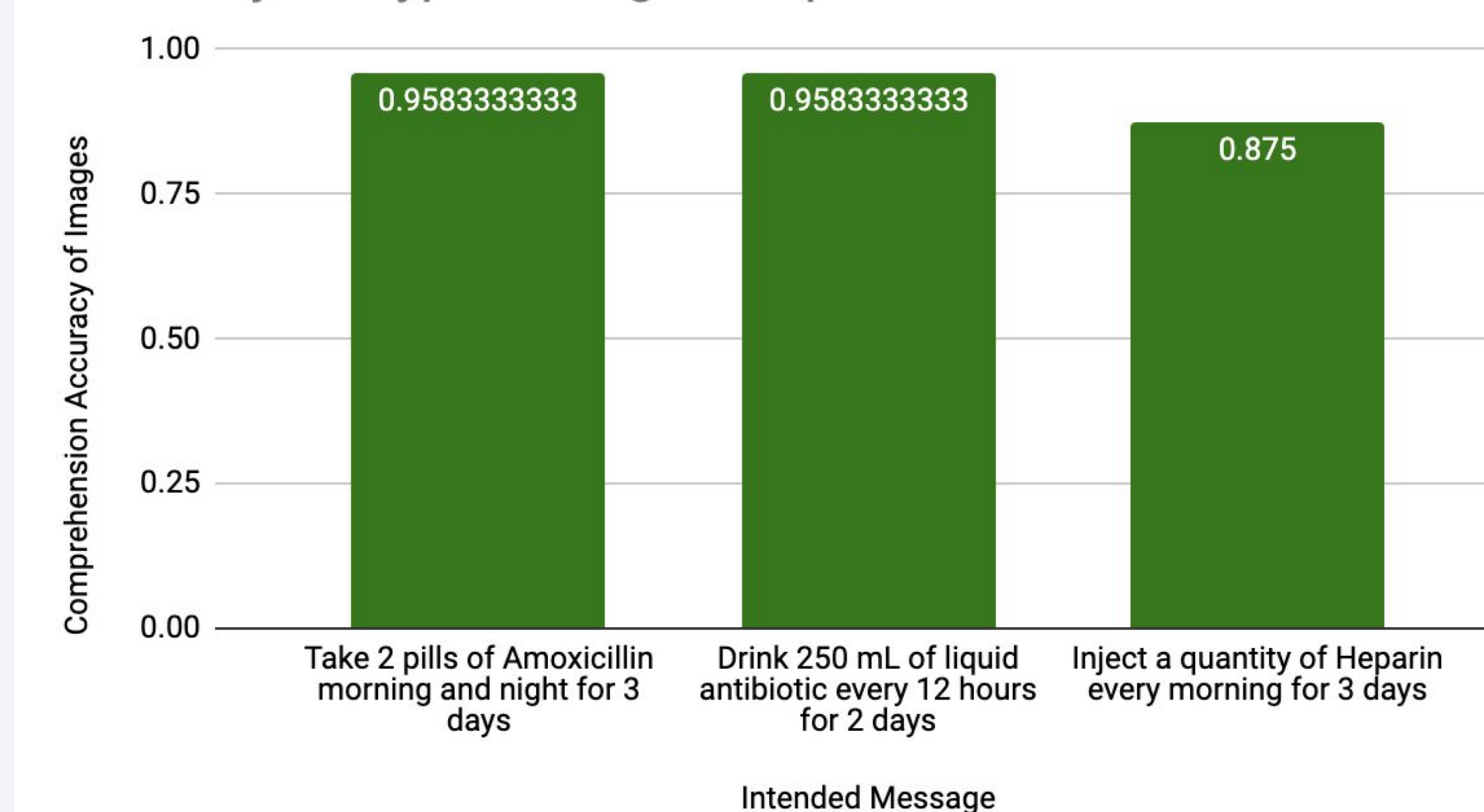


Figure 3: Accuracy of Comprehension of Generated Images

We sent out surveys with images generated with our image syntax (Figure 2). The surveys asked the participant to write what medication instruction they thought the image depicted. Then, following the protocol of prior studies involving pictographs,⁴ our team scored survey responses as either accurate to the intended message (1) or inaccurate (0). Figure 3 shows the average of the scores.

Future Directions

Through surveys conducted, the final image syntax appears to provide a **promising solution** to our need statement. However, further studies will need to be conducted with this image syntax to **verify its universal understandability** and thus ensure that GlyphAI will be able to increase health equity.

References

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