

# Neurosurgical patient education

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Enhancing patient comprehension of their health is crucial in improving health outcomes. The integration of artificial intelligence (AI) in distilling medical information into a conversational, legible format can potentially enhance health literacy. This review aims to examine the accuracy, reliability, comprehensiveness and readability of medical patient education materials (PEMs) simplified by AI models. A systematic review was conducted searching for articles assessing outcomes of use of AI in simplifying PEMs. Inclusion criteria are as follows: publication between January 2019 and June 2023, various modalities of AI, English language, AI use in PEMs and including physicians and/or patients. An inductive thematic approach was utilised to code for unifying topics which were qualitatively analysed. Twenty studies were included, and seven themes were identified (reproducibility, accessibility and ease of use, emotional support and user satisfaction, readability, data security, accuracy and reliability and comprehensiveness). AI effectively simplified PEMs, with reproducibility rates up to 90.7% in specific domains. User satisfaction exceeded 85% in AI-generated materials. AI models showed promising readability improvements, with ChatGPT achieving 100% post-simplification readability scores. AI's performance in accuracy and reliability was mixed, with occasional lack of comprehensiveness and inaccuracies, particularly when addressing complex medical topics. AI models accurately simplified basic tasks but lacked soft skills and personalisation. These limitations can be addressed with higher-calibre models combined with prompt engineering. In conclusion, the literature reveals a scope for AI to enhance patient health literacy through medical PEMs. Further refinement is needed to improve AI's accuracy and reliability, especially when simplifying complex medical information <sup>1)</sup>

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## Quantitative experimental research studies

The escalating [complexity](#) of [medical literature](#) necessitates [tools](#) to enhance [readability](#) for patients. This study aimed to evaluate the efficacy of ChatGPT-4 in simplifying neurology and neurosurgical [abstracts](#) and [patient education materials](#) (PEMs) while assessing content [preservation](#) using Latent Semantic Analysis (LSA).

Picton et al. total of 100 abstracts (25 each from Neurosurgery, Journal of Neurosurgery, Lancet Neurology, and JAMA Neurology) and 340 PEMs (66 from the American Association of Neurological Surgeons, 274 from the American Academy of Neurology) were transformed by a GPT-4.0 prompt requesting a 5th grade reading level. Flesch-Kincaid Grade Level (FKGL) and Flesch Reading Ease (FKRE) scores were used before/after transformation. Content fidelity was validated via LSA (ranging 0-1, 1 meaning identical topics) and by expert assessment (0-1) for a subset (n = 40). Pearson correlation coefficient compared assessments.

FKGL decreased from 12th to 5th grade for abstracts and 13th to 5th for PEMs ( $p < 0.001$ ). FKRE scores showed similar improvement ( $p < 0.001$ ). LSA confirmed high content similarity for abstracts (mean cosine similarity 0.746) and PEMs (mean 0.953). Expert assessment indicated a mean topic similarity of 0.775 for abstracts and 0.715 for PEMs. The Pearson coefficient between LSA and expert assessment of textual similarity was 0.598 for abstracts and -0.167 for PEMs. Segmented analysis of similarity correlations revealed a correlation of 0.48 ( $p = 0.02$ ) below 450 words and a -0.20 ( $p = 0.43$ ) correlation above 450 words.

GPT-4.0 markedly improved the readability of medical texts, predominantly maintaining content integrity as substantiated by LSA and expert evaluations. LSA emerged as a reliable tool for assessing content fidelity within moderate-length texts, but its utility diminished for longer documents, overestimating similarity. These findings support the potential of AI in combating low health literacy, however, the similarity scores indicate expert validation is crucial. Future research must strive to improve transformation precision and develop validation methodologies <sup>2)</sup>

The study provides compelling evidence that GPT-4.0 can enhance the readability of medical literature while largely preserving content. However, it also highlights the limitations of automated tools in fully capturing content fidelity, particularly for longer texts. Future research should:

Explore methods to refine AI transformations for nuanced accuracy. Investigate the impact of simplified materials on patient comprehension and health outcomes. Develop hybrid workflows that integrate AI simplification with efficient expert review. This research sets a strong foundation for leveraging AI in patient education but underscores the need for continued development and expert oversight to ensure accuracy and trustworthiness.

## Best ChatGPT prompts for Neurosurgical Patient Education

### Best ChatGPT prompts for Neurosurgical Patient Education

1)

Nasra M, Jaffri R, Pavlin-Premrl D, Kok HK, Khabaza A, Barras C, Slater LA, Yazdabadi A, Moore J, Russell J, Smith P, Chandra RV, Brooks M, Jhamb A, Chong W, Maingard J, Asadi H. Can artificial intelligence improve patient educational material readability? A systematic review and narrative synthesis. Intern Med J. 2024 Dec 25. doi: 10.1111/imj.16607. Epub ahead of print. PMID: 39720869.

2)

Picton B, Andalib S, Spina A, Camp B, Solomon SS, Liang J, Chen PM, Chen JW, Hsu FP, Oh MY. Assessing AI Simplification of Medical Texts: Readability and Content Fidelity. Int J Med Inform. 2024 Dec 1;195:105743. doi: 10.1016/j.ijmedinf.2024.105743. Epub ahead of print. PMID: 39667051.

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