

Enhancing Patient Comprehension of Post-Operative Instructions and Education Using AI: A Quality Improvement Project

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Background & Objective

- Compliance with post-operative instructions is integral for recovery, preventing complications, and avoiding re-injury. However, lack of medical literacy may impede patient comprehension.
- The average U.S. resident and the average Medicare beneficiary read at an 8th-grade and 5th-grade reading level respectively, demonstrating patient literacy as an important consideration.
- This QI project examined the benefit of AI tools in enhancing patient comprehension by generating simplified revisions of existing post-operative instructions.

Methods

Study Design

- This was a **prospective single-center study** at a Pain and PM&R outpatient clinic.
- Patients were given two sets of post-operative instructions: the original version and an AI-revised version simplified to a 5th grade reading level.
- Instructions were randomized in the order they were provided to control for confounding variables.
- Patients were instructed to score the forms on a 5-point Likert scale for clarity and choose which version they preferred based on their confidence in following the instructions.
- Patients were assigned to Medicare group or Preferred Provider Organization (PPO) group based on insurance information.

Participants

- All patients (N=67) who had underwent an interventional procedure under fluoroscopy and local anesthesia during a **9 month study period** and provided consent were included.

Main Outcome Measures

- A mixed-design ANOVA was used to examine main effects of Form Version (within-subjects) and Insurance Type (between-subjects) and also interaction effect on clarity scores.

Results

ANOVA Summary Table: Effects of Form Type and Insurance Type on Clarity Ratings				
Source	Sum of Squares (sum_sq)	Degrees of Freedom (df)	F-value	p-value
Form Type	5.851	1.0	10.19	0.001772
Insurance Type	1.249	1.0	2.176	0.1426
Form Type x Insurance Type (Interaction)	0.3800	1.0	0.6619	0.4174
Random Effect	0.7100	1.0	1.237	0.2681
Residual	74.05	129.0	—	—

Fig 1: Mixed ANOVA Summary Table

1. Main Effect of Form Type - AI-Revised forms received higher clarity ratings than Original forms across both insurance groups, suggesting AI-revision may improve clarity overall.

2. Main Effect of Insurance Type - The blue line (PPO) is consistently above the red line (Medicare) indicating PPO patients rated forms slightly higher in clarity than Medicare patients — across both form types.

3. Interaction Effect - The lines are not parallel, suggesting a possible interaction. The Medicare group shows a larger difference between AI-Revised and Original forms. The PPO group shows a smaller improvement (or drop-off) between the two. This could imply that AI-Revised forms helped Medicare patients more (possibly due to increased readability, simplification, or accessibility).

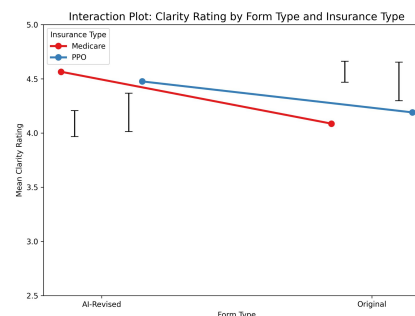


Fig 2: Interaction Plot for Clarity Rating by Form Type and Insurance Type

Conclusions & Implications

Key Findings

- Form Version (Original vs. AI-Revised) was statistically significant ($p=0.00177$). **74.6%** of patients ($n=50$) preferred the AI-revised version.
- Insurance Type (Medicare vs. PPO) and interaction effect (Form Version-Insurance Type) were not statistically significant ($p=0.1426$ and $p=0.4174$).
- However, when stratified by insurance types, **patient preference for the AI-revised version remained high** [16 out of 23 Medicare beneficiaries (69.6%), 34 out of 44 of PPO beneficiaries (77.3%)].

Conclusions/Implications

- AI-revisions of post-operative instructions **enhanced patient comprehension**, demonstrating the utility of AI in combating health literacy challenges.

Future Directions

- Broader integration of AI tools in adaptations of patient education materials should be considered to reduce health barriers related to poor literacy, improve patient understanding, and ultimately yield better health outcomes through increased compliance.

References

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