A Technology-Based Dyadic Intervention for Symptom Management Among Patients with Colorectal Cancer and Their Caregivers

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Background

- Patients with colorectal cancer (CRC) receiving chemotherapy often experience psychoneurological symptoms (PNS).
- PNS negatively impact both patients' and their caregivers' quality of life (QOL).
- A technology-based approach allows high flexibility and accessibility and creates opportunities to scale up the interventions for those residing at greater distances.
- Generative artificial intelligence (AI) can enable researchers to design tailored and personalized interventions and educational content.

Purposes

- To develop a technology-based dyadic intervention (CRCweb) leveraging large language models (LLMs).
- To test the feasibility and preliminary efficacy of an 8-week intervention among CRC patient-caregiver dyads.

Methods

- There were two phases. Phase 1 included key informant interviews, prototype development, and pilot testing. Phase 2 conducted a single-arm pre-post clinical trial.
- The intervention consisted of three core modules: family involvement, symptom management, and coping effectiveness.
- Dyads engaged with these modules weekly, supported by text message reminders, incorporating module-related activities into their routine.
- Feasibility outcomes (retention, adherence, and acceptability) and efficacy outcomes (PNS and QOL measured by PROMIS®) were evaluated among participants at pre- and post-intervention.

Results

- We engaged a panel of nine oncology experts to evaluate LLMs-generated content. LLMs showed excellent quality in tailoring content regarding our 7 criteria. Of the 360 annotations, 74.2% adhered to the word limit (<250 words) and 58.9% met the reading level (6th grade). We evaluated three GPT models (GPT-3.5, GPT-4, and GPT-4 Turbo) and selected the highest-quality content for inclusion in CRCweb.

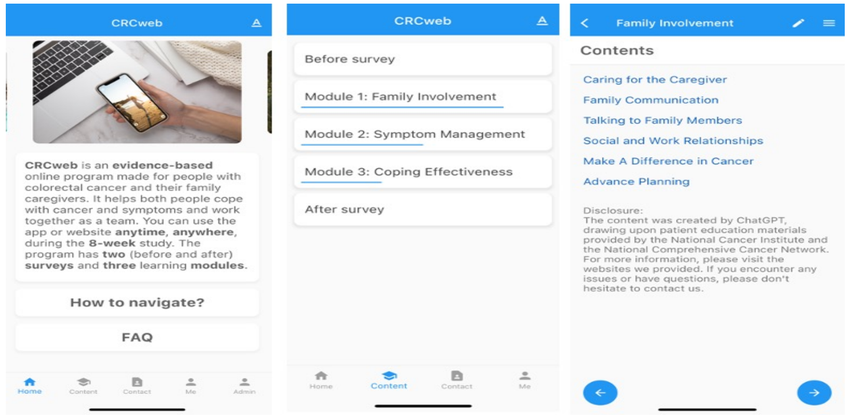

Figure 1. CRCweb Screenshots

- The enrollment rate was 54.2% and the retention rate was 80.8%.
- The most common reason for refusal was being overwhelmed with their cancer treatments.
- Thirteen dyads were enrolled in the intervention.
- Among the participants who used CRCweb (12 patients, 9 caregivers), 85.7% completed all three modules and logged into CRCweb at least three times, with login frequencies ranging from 2 to 12 times during the study; 85% of participants found the CRCweb useful and 95% of participants expressed satisfaction with it.
- Preliminary results show a promising trend of less severe PNS and improved QOL for patients and caregivers after the intervention.

Discussion

- Limitations: small sample size, single clinical site, a lack of diverse populations, and no statistical inferences.
- The technology-based dyadic intervention (CRCweb) demonstrated high levels of feasibility and acceptability, indicating its potential to alleviate the PNS burden and improve QOL for both CRC patients and their caregivers.
- Future studies using a randomized controlled trial design, larger sample size, and longer follow-up should be conducted to rigorously assess the intervention's efficacy.
- Next steps: design just-in-time adaptative intervention; collect real-time data; utilize machine learning algorithms.

Conclusions

- The findings from this study will advance intervention development and implementation of symptom management and supportive care for CRC patient-caregiver dyads.
- This study will expedite the integration of AI-driven solutions into clinical settings.

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