# Development of an AI-Enabled Social Robot System for Standardized Cataract Surgery Health Education: A Conceptual Framework

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## Objectives

Healthcare systems are facing increasing shortages of nursing and health education personnel, resulting in growing workloads and reduced efficiency in patient education. Cataract preoperative education is a standardized yet repetitive process that requires substantial clinical manpower. This study aims to develop an AI-enabled social robot system capable of delivering standardized cataract surgery health education. The proposed system seeks to reduce the workload of healthcare professionals while improving the accessibility, consistency, and quality of patient education.

## Methods

This interdisciplinary study proposes an intelligent health education system integrating social robotics, computer vision, automatic speech recognition, large language models, and multimodal interaction technologies. The system will employ Kebbi Air-S and Zenbo Junior II social robots connected to AI servers for real-time dialogue and multimedia health education. The proposed framework will support approximately 25-minute autonomous health education sessions, incorporating patient recognition, speech understanding, visual perception, and adaptive conversational interactions. The prototype is planned for implementation and feasibility evaluation in the Ophthalmology Department of Keelung Chang Gung Memorial Hospital.

## Results

The proposed system is expected to establish an autonomous AI-assisted health education platform capable of providing standardized cataract surgery education with minimal healthcare professional intervention. The development process will focus on improving speech recognition accuracy in Mandarin, adaptive dialogue generation based on patient responses, multilingual communication, and seamless integration across robotic platforms. Feasibility testing will evaluate system stability, interaction quality, and clinical applicability within routine healthcare settings.

## Conclusions

This study proposes an innovative AI-assisted social robot framework for standardized clinical health education. By automating repetitive educational tasks, the proposed system is expected to alleviate workforce shortages, reduce healthcare professionals' workload, and improve the consistency of patient education. The study will provide preliminary evidence regarding the feasibility of integrating social robots into routine clinical practice and establish a foundation for future clinical effectiveness studies.