

INPLASY202570063
doi: 10.37766/inplasy2025.7.0063
Received: 16 July 2025
Published: 16 July 2025

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ADMINISTRATIVE INFORMATION

Support - None.
Review Stage at time of this submission - Data analysis.
Conflicts of interest - None declared.
INPLASY registration number: INPLASY202570063

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 16 July 2025 and was last updated on 16 July 2025.

INTRODUCTION

Review question / Objective To evaluate the effectiveness of game-based learning interventions in improving knowledge, self-efficacy, adherence, and clinical outcomes among dermatology patients.

Rationale Game-based learning (GBL) is an emerging and promising approach in patient education, particularly in dermatology, where visual recognition and treatment adherence are critical. While several studies have implemented GBL interventions for conditions such as melanoma and atopic dermatitis, the evidence remains scattered, methodologically varied, and often descriptive. Given the increasing use of digital health tools and the need for effective patient education strategies, a systematic review is warranted to rigorously assess the effectiveness of GBL in improving patient knowledge, engagement, adherence, and clinical outcomes in dermatologic care. This review aims to fill this evidence gap and guide future development and implementation of game-based patient education tools.

Condition being studied Dermatologic conditions targeted in patient education interventions, including melanoma, cutaneous malignancies, atopic dermatitis, and cutaneous leishmaniasis.

METHODS

Search strategy ("Game-Based Learning"[MeSH] OR "Serious Games"[MeSH] OR gamification OR "educational games") AND (dermatology OR "skin disease" OR "melanoma" OR "atopic dermatitis") AND ("patient education" OR "knowledge" OR "self-efficacy" OR "treatment adherence")
Filters: English, 2005–2025.

Participant or population Patients (children, adolescents, adults) receiving education related to dermatologic conditions.

Intervention Game-based learning interventions, including gamification, serious games, digital gameplay, and AR/VR platforms specifically designed for dermatology education.

Comparator Any comparator: pamphlet, verbal instruction, animation, standard education, or nointervention.

Study designs to be included RCTs, controlled trials, cohort studies, quasi-experimental studies, pre-post intervention studies.

Eligibility criteria This systematic review will include studies that meet predefined eligibility criteria based on the PICOS framework. Eligible studies must involve patients of any age—children, adolescents, or adults—who received educational interventions related to dermatological conditions. The intervention of interest is game-based learning (GBL), including but not limited to serious games, gamification strategies, augmented reality applications, and interactive digital games specifically designed to educate patients about skin diseases. Studies employing conventional patient education methods—such as brochures, verbal instructions, pamphlets, or standard care—will be considered as comparators, although comparator arms are not mandatory for inclusion. Eligible studies must report at least one relevant patient-centered outcome, such as knowledge acquisition or retention, treatment adherence, behavioral change, self-efficacy, clinical improvement, or satisfaction with the educational intervention. The review will include original quantitative research published in English between January 2005 and the present. Study designs eligible for inclusion are randomized controlled trials (RCTs), controlled clinical trials, quasi-experimental designs, cohort studies, and pre-post interventional studies that quantitatively evaluate the impact of GBL on patient education outcomes. Studies that employ a mixed-methods design will be included only if quantitative outcomes are reported separately. Only peer-reviewed, full-text articles will be included. Grey literature, conference abstracts, theses, and dissertations will be excluded due to the limited methodological and outcome detail typically available in such formats. Studies will be excluded if the target population consists solely of healthcare professionals, medical students, or dermatology residents rather than patients. Interventions that use social media platforms or telemedicine without incorporating a clearly defined game-based component will also be excluded. In addition, studies that lack outcome data related to educational effectiveness, behavioral changes, or dermatological management will not be eligible for inclusion. Editorials, opinion articles, narrative reviews, letters to the editor, qualitative-only studies, and papers not published in English will be excluded to maintain methodological

consistency and ensure the feasibility of accurate interpretation. These criteria are designed to capture the breadth of game-based learning strategies applied in dermatology patient education while ensuring the inclusion of studies with sufficient methodological rigor and relevance to patient outcomes.

Information sources

PubMed
Scopus
Cochrane Library
Directory of Open Access Journals (DOAJ).

Main outcome(s) Knowledge acquisition/retention, treatment adherence, self-efficacy, behavioral change, disease severity improvement, satisfaction.

Additional outcome(s) None.

Data management Screening: Two reviewers (independently) will screen titles/abstracts and full-texts.

Disagreements resolved via discussion or third reviewer arbitration.

Quality assessment / Risk of bias analysis A formal risk of bias assessment will be conducted for all included studies. For randomized controlled trials, the Cochrane Risk of Bias 2 (RoB 2) tool will be used to evaluate bias across key domains such as randomization process, deviations from intended interventions, missing outcome data, measurement of outcomes, and selection of the reported results. For non-randomized studies, including quasi-experimental and cohort designs, the ROBINS-I (Risk Of Bias In Non-randomized Studies - of Interventions) tool will be employed to assess bias due to confounding, selection of participants, classification of interventions, deviations from intended interventions, missing data, measurement of outcomes, and reporting. Two independent reviewers will assess the risk of bias for each study, with disagreements resolved through discussion or consultation with a third reviewer. The results of the quality assessment will be presented in both narrative form and tabular summary to inform the interpretation of findings.

Strategy of data synthesis Quantitative synthesis (if possible); otherwise, structured narrative synthesis guided by Popay et al. (2006).

Group studies by condition, outcome type, and game category.

Subgroup analysis None.

Sensitivity analysis If sufficient data are available, a sensitivity analysis will be conducted to assess the robustness of the review findings. This will involve reanalyzing the data by excluding studies with a high risk of bias as determined by the Cochrane RoB 2 and ROBINS-I tools. Additional sensitivity analyses may include restricting the synthesis to randomized controlled trials only, or to studies with larger sample sizes (e.g., $n > 100$) to evaluate the influence of study quality and size on the overall conclusions. Any changes in the direction or strength of outcomes will be documented and discussed to provide transparency regarding the stability of the review results.

Language restriction English.

Country(ies) involved Thailand.

Keywords dermatology; patient education; game-based learning; gamification; serious games; digital health; systematic review; knowledge retention; treatment adherence; augmented reality.

Contributions of each author

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