Clinical Trial Protocol
Iranian Registry of Clinical Trials

08 Nov 2026

Investigating the Effect of Gamification Based on Adaptive Microlearning on Knowledge, Skills, and Self-Efficacy in ECG Interpretation Among Undergraduate Nursing Students

Protocol summary

Study aim
Investigating the Effect of Gamification Based on Adaptive Microlearning on Knowledge, Skills, and Self-Efficacy in ECG Interpretation Among Undergraduate Nursing Students

Design
This three-group experimental study includes 51 undergraduate nursing students (17 per group): a control group receiving routine instruction, Intervention 1 receiving routine instruction plus adaptive microlearning, and Intervention 2 receiving Intervention 1 plus gamification. Students are randomly assigned to internship groups. To reduce information transfer between groups, the control group completes its course and post-test first.

Settings and conduct
“At Qom University of Medical Sciences, students are randomized into three study arms: control (standard CCU training) or adaptive microlearning (with or without gamification). This six-session intervention is evaluated at pre-test, post-test, and one-month follow-up.”

Participants/Inclusion and exclusion criteria
Currently pursuing a Bachelor's degree in Nursing Completed the Intensive Care course No prior experience participating in similar interventions No prior participation in ECG training courses or workshops

Intervention groups
Control Group: Receives routine CCU clinical training only.the training and takes the post-test first. Intervention Group 1: Receives routine training plus two phases of microlearning: pre-internship multimedia content over 10 days, followed by personalized, adaptive microlearning content delivered during the internship based on individual learning needs. Intervention Group 2 : Receives the full intervention of Group 1, with the addition of the “ECG Duel” card game in supervised sessions to increase motivation and reinforce ECG interpretation skills.

Main outcome variables
Adaptive Micro-learning-Gamification- Knowledge, Skills, and Self-Efficacy in ECG Interpretation

General information

Reason for update

Acronym

IRCT registration information
IRCT registration number: **IRCT20260921071142N1**
Registration date: **2026-10-08, 1405/07/16**
Registration timing: **registered_while_recruiting**

Last update: **2026-10-08, 1405/07/16**
Update count: **0**

Registration date
2026-10-08, 1405/07/16

Registrant information

Name
Hussein Rais_Mirzaie

Name of organization / entity

Country
Iran (Islamic Republic of)

Phone
+98 25 3665 1270

Email address
rm.hussein2002@gmail.com

Recruitment status
recruiting

Funding source

Expected recruitment start date
2026-09-19, 1405/06/28

Expected recruitment end date
2026-12-14, 1405/09/23

Actual recruitment start date

empty

Actual recruitment end date

empty

Trial completion date

empty

Scientific title

Investigating the Effect of Gamification Based on Adaptive Microlearning on Knowledge, Skills, and Self-Efficacy in ECG Interpretation Among Undergraduate Nursing Students

Public title

Investigating the Effect of Gamification Based on Adaptive Microlearning on Knowledge, Skills, and Self-Efficacy in ECG Interpretation

Purpose

Education/Guidance

Inclusion/Exclusion criteria

Inclusion criteria:

Currently pursuing a Bachelor's degree in Nursing
Completed the Intensive Care course/module

Exclusion criteria:

• No prior experience participating in similar interventions • Failure to participate in ECG training courses or workshops

Age

From **18 years** old

Gender

Both

Phase

N/A

Groups that have been masked

No information

Sample size

Target sample size: **50**

Randomization (investigator's opinion)

Not randomized

Randomization description

Blinding (investigator's opinion)

Not blinded

Blinding description

Placebo

Not used

Assignment

Factorial

Other design features

Secondary Ids

empty

Ethics committees

1

Ethics committee

Name of ethics committee

Ethics Committee of Qom University of Medical Sciences

Street address

No. 140, North Taghavi Street, Modarres Boulevard, Zein-ed-Din Square

City

QOM

Province

Ghoum

Postal code

3715134471

Approval date

2026-09-16, 1405/06/25

Ethics committee reference number

IR.MUQ.REC.1405.224

Health conditions studied

1

Description of health condition studied

Knowledge, Interpretation Skills, and Self-Efficacy in ECG

ICD-10 code

ICD-10 code description

Primary outcomes

1

Description

ECG Knowledge

Timepoint

Before the intervention – after the intervention – one month after the intervention

Method of measurement

Using the ECG-KAT tool

2

Description

ECG interpretation skills

Timepoint

Before the intervention – after the intervention – one month after the intervention

Method of measurement

Using the ECG-SAT tool

3

Description

Self-efficacy in ECG interpretation

Timepoint

Before the intervention – after the intervention – one month after the intervention

Method of measurement

Using the ECG-SES tool

Secondary outcomes

empty

Intervention groups

1

Description

Intervention Group 1 (Adaptive Micro-learning): In addition to standard clinical training in the CCU, students in this group receive an educational intervention delivered in two phases: 1. Pre-internship phase: For 10 days prior to starting their rotation, students are provided with 3–4 pieces of multimedia micro-learning content daily via an online platform (covering key points and concise summaries on ECG interpretation, cardiac arrhythmias, conduction disorders, and common pharmacological/interventional treatments) to establish the necessary foundational knowledge. 2. During-internship phase: Educational content is delivered adaptively from a database. At this stage, content is selected and presented based on the identification of each student's specific weaknesses and learning gaps, thereby enabling targeted improvement of their ECG interpretation skills.

Category

Other

2

Description

Intervention Group 2 (Adaptive Micro-learning + Gamification): Phase 1: Pre-internship (Micro-learning)—For 10 days prior to the internship, students receive 3–4 pieces of multimedia micro-content daily via digital platforms (covering key points and "capsule" summaries on ECG interpretation, cardiac arrhythmias, conduction disorders, and common pharmacological/interventional treatments) to establish the necessary foundational knowledge. Phase 2: During Internship (Adaptive Content + Card-based Gamification)—Implementation of the "ECG Duel" card game: Gamification sessions are conducted in person under the researcher's supervision during ward-based internship sessions. The game creates a competitive, engaging, and interactive environment where students can test their knowledge against clinical scenarios and actual ECG tracings. Personalization and adaptive content based on game performance: During and after the game, each student's diagnostic and therapeutic errors are identified. Based on these individual weaknesses, remedial and supplementary content is retrieved from an "educational content bank" and delivered to the specific student in a targeted, personalized manner.

Category

Other

Recruitment centers

1

Recruitment center

Name of recruitment center

School of Nursing and Midwifery, University of Medical Sciences

Full name of responsible person

Moghadam abbas

Street address

Nursing Faculty, No. 2 East Alley, Moallem Blvd

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Qom

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3715835155

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+98 25 3783 1370

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rm.hussein2002@gmail.com

Sponsors / Funding sources

1

Sponsor

Name of organization / entity

Ghoum University of Medical Sciences

Full name of responsible person

Ebraze Ali

Street address

Shahid Lavasani St. (Saheli St.),Qom University of Medical Sciences

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Qom

Province

Ghoum

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3713649373

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Grant name

Grant code / Reference number

Is the source of funding the same sponsor organization/entity?

Yes

Title of funding source

Ghoum University of Medical Sciences

Proportion provided by this source

100

Public or private sector

Public

Domestic or foreign origin

Domestic

Category of foreign source of funding

empty

Country of origin

Type of organization providing the funding

Academic

Person responsible for general inquiries

Contact

Name of organization / entity

Ghoum University of Medical Sciences

Full name of responsible person

Hussein Rais_Mirzaie

Position

Master's student in Nursing

Latest degree

Bachelor

Other areas of specialty/work
Nursery

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No. 140, North Taghavi St., Modarres Blvd., Zeyneddin Sq.

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Person responsible for scientific inquiries

Contact

Name of organization / entity
Ghoum University of Medical Sciences

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Person responsible for updating data

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Sharing plan

Deidentified Individual Participant Data Set (IPD)
No - There is not a plan to make this available

Justification/reason for indecision/not sharing IPD
“No decision has yet been made regarding data release; a final decision will be made after the completion of the study, taking the relevant circumstances into consideration.”

Study Protocol
Undecided - It is not yet known if there will be a plan to make this available

Statistical Analysis Plan
Undecided - It is not yet known if there will be a plan to make this available

Informed Consent Form
Undecided - It is not yet known if there will be a plan to make this available

Clinical Study Report
Undecided - It is not yet known if there will be a plan to make this available

Analytic Code
Undecided - It is not yet known if there will be a plan to make this available

Data Dictionary
Undecided - It is not yet known if there will be a plan to make this available