Clinical Trial Protocol
Iranian Registry of Clinical Trials

22 Nov 2026

Effectiveness of Chatbot-facilitated Case based learning in Oral Pathology, a pilot randomized cross-over trial.

Protocol summary

Study aim
To compare knowledge outcomes following chatbot-facilitated case-based learning and traditional facilitator-led case-based learning among undergraduate dental students.

Design
A single-center concealed, randomized, crossover trial conducted among third-year Bachelor of Dental Surgery (BDS) students between December 2025 and January 2026. Because of the nature of the educational intervention, participants and facilitators were not blinded. A total of 32 students participated in Session 1 and 27 students participated in Session 2.

Settings and conduct
Foundation University College of Dentistry, Foundation University Islamabad.

Participants/Inclusion and exclusion criteria
Participants 3rd Year Bachelor of Dental Surgery (BDS) students. Inclusion Criteria Third-year BDS students. Enrolled in the Oral Pathology course. Able to understand English. Provided written informed consent. Willing to participate in both study sessions. Exclusion Criteria Declined participation. Withdrew consent. Absent during either study session or the corresponding assessments.

Intervention groups
Intervention Students participated in chatbot-facilitated case-based learning using a customized GPT-based educational chatbot. Participants were stratified based on their most recent Oral Pathology examination scores and randomized in a 1:1 ratio into two sequences: Sequence 1: Traditional CBL → Chatbot-CBL Sequence 2: Chatbot-CBL → Traditional CBL. The study followed a crossover design in which students participated in two CBL sessions conducted two weeks apart to minimize potential carryover effects (Session 1: Soft Tissue Pathology; Session 2: Salivary Gland Pathology). Control Group In both sequences, the traditional CBL served as control group.

Main outcome variables
Knowledge outcomes of traditional vs chat-bot CBL.

General information

Reason for update
Acronym
Chat-CBL TRIAL
IRCT registration information
IRCT registration number: **IRCT20260720070263N1**
Registration date: **2026-07-28, 1405/05/06**
Registration timing: **retrospective**

Last update: **2026-07-28, 1405/05/06**
Update count: **0**
Registration date
2026-07-28, 1405/05/06

Registrant information
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Recruitment status
Recruitment complete
Funding source

Expected recruitment start date
2025-12-20, 1404/09/29
Expected recruitment end date
2026-01-10, 1404/10/20
Actual recruitment start date
2025-12-26, 1404/10/05

Actual recruitment end date
2026-01-16, 1404/10/26
Trial completion date
2026-01-16, 1404/10/26

Scientific title
Effectiveness of Chatbot-facilitated Case based learning in Oral Pathology, a pilot randomized cross-over trial.

Public title
Using an AI chatbot to facilitate case-based learning for undergraduate dental students.
Purpose
Education/Guidance
Inclusion/Exclusion criteria
Inclusion criteria:
Third-year BDS students. Enrolled in the Oral Pathology course. Able to understand English. Provided written informed consent and willing to participate in both study sessions.
Exclusion criteria:
Third year BDS students who declined participation, Or withdrew consent. Or absent during either study session or the corresponding assessments.
Age
From **20 years** old to **24 years** old
Gender
Both

Phase
N/A
Groups that have been masked
No information
Sample size
Target sample size: **32**
Actual sample size reached: **27**
Randomization (investigator's opinion)
Randomized
Randomization description
Randomization Participants were stratified according to previous Oral Pathology examination scores (high and low academic performance) and randomly allocated in a 1:1 ratio using computer-generated random numbers with permuted blocks of four. Allocation Concealment Group allocation was concealed using sequentially numbered opaque sealed envelopes prepared by an independent researcher. Blinding Because of the nature of the educational intervention, participants and facilitators were not blinded. Outcome assessment was performed using anonymized participant codes.
Blinding (investigator's opinion)
Not blinded
Blinding description
Placebo
Not used
Assignment
Crossover
Other design features
Retrospective trial registration.

Secondary Ids

empty

Ethics committees

1

Ethics committee
Name of ethics committee
Foundation University School of Health Sciences Ethical Review Board.
Street address
DHA 1, Islamabad.
City
Islamabad.
Postal code
45000
Approval date
2025-12-19, 1404/09/28
Ethics committee reference number
FF/FUMC/215-723 Phy/25

Health conditions studied

1

Description of health condition studied
Not applicable as outcomes are educational.
ICD-10 code
ICD-10 code description

Primary outcomes

1

Description
The primary outcome was the knowledge scores between both groups of students i.e. traditional case-based learning group and chat-bot facilitated case-based learning group. It was assessed using a 10-item multiple-choice question (MCQ) test administered before and after each case-based learning (CBL) session for both traditional and chatbot group. The MCQ assessment was developed specifically for this study based on the undergraduate Oral Pathology curriculum and reviewed for content validity by two subject experts.
Timepoint
Knowledge was assessed using pre-test multiple-choice questions (MCQs) i.e. before the intervention; traditional & chat-bot facilitated case-based learning (CBL) and after each intervention. Two weeks after the cross-over of groups in session 2 again pre and post-session knowledge assessed using MCQ as an instrument.
Method of measurement
For both sessions MCQ based assessment was used which measured the knowledge scores obtained by students.

Secondary outcomes

empty

Intervention groups

1

Description
Intervention group 1: Participants were stratified based on their most recent Oral Pathology examination scores and randomized in a 1:1 ratio into two sequences: Sequence 1: Traditional CBL → Chatbot-CBL Description of Intervention :Phase 1 (Session 1 - Soft Tissue Pathology): Participants receive Traditional Case-Based Learning (CBL) guided by trained faculty facilitators using specific case materials, structures, and prompts. Washout Period: A two-week interval to minimize carryover effects. Phase 2 (Session 2 - Salivary Gland Pathology): Participants switch to Chatbot-CBL. Each group interacts with the chatbot using a shared device. The chatbot delivers case content stepwise (history, clinical findings, imaging, histopathology) and provides immediate feedback. Traditional CBL serves as control in sequence 1.

Category
Behavior

2

Description
Intervention group 2: Sequence 2 (Chatbot-CBL → Traditional CBL) Description of Intervention: Phase 1 (Session 1 - Soft Tissue Pathology): Participants receive Chatbot-CBL. Each group interacts with the chatbot using a shared device. The chatbot delivers case content stepwise (history, clinical findings, imaging, histopathology) and provides immediate feedback. Washout Period: A two-week interval to minimize carryover effects .Phase 2 (Session 2 - Salivary Gland Pathology): Participants switch to Traditional CBL guided by trained faculty facilitators using identical case materials, structures, and prompts. Traditional CBL serves as control in this sequence 2.

Category
Behavior

Recruitment centers

1

Recruitment center

Name of recruitment center
Foundation University Islamabad.

Full name of responsible person
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Sponsors / Funding sources

1

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Email
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Grant name
Not applicable

Grant code / Reference number

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

Title of funding source
Foundation University Islamabad.

Proportion provided by this source
1

Public or private sector
Private

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
Foundation University Islamabad.

Full name of responsible person
Amna Waheed

Position
Demonstrator

Latest degree
Medical doctor

Other areas of specialty/work
Medical Education

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Sharing plan

Deidentified Individual Participant Data Set (IPD)
Yes - There is a plan to make this available
Study Protocol
Yes - There is 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
Yes - There is a plan to make this available
Clinical Study Report
Not applicable
Analytic Code
Not applicable
Data Dictionary
Not applicable
Title and more details about the data/document
Data sharing statement mentioned at the end of manuscript i.e. available only on request.
When the data will become available and for how long
After publication of manuscript till 6 months.
To whom data/document is available
anyone working in academic institution.
Under which criteria data/document could be used
Corresponding author can be contacted after article is published.
From where data/document is obtainable
Contacting corresponding author.
What processes are involved for a request to access data/document
Anyone needing to replicate this study will contact the corresponding author via email.
Comments