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Specific teaching methods to enhance the diabetes knowledge of undergraduate nursing students

Submission date 11/12/2025	**Recruitment status** No longer recruiting	[_] Prospectively registered [_] Protocol [_] Statistical analysis plan [_] Results [_] Individual participant data [X] Record updated in last year
Registration date 17/12/2025	**Overall study status** Completed	
Last Edited 15/12/2025	**Condition category** Other	

Plain English summary of protocol

Background and study aims
This study looks at two different ways of teaching nursing students about diabetes care. One is the traditional lecture method, and the other is based on Skinner's programmed instruction, which uses short videos, instant feedback, and progress tracking. The aim is to see which method helps students learn better, feel more confident, and provide better care for patients.

Who can participate?
The study involves undergraduate nursing students doing their internship in the endocrinology department of the First Hospital Affiliated to Hebei North College in China.

What does the study involve?
Participants are randomly placed into one of two groups. One group learns through traditional lectures, while the other uses the Skinner method, which includes QR code videos, interactive quizzes with instant feedback, and progress dashboards. Both groups cover the same diabetes-related topics and skills.

What are the possible benefits and risks of participating?
Benefits include gaining diabetes knowledge and practical skills, which can improve confidence and patient care. Risks are mainly for the researchers, as creating the teaching materials takes time and effort. For students, there are no major risks, but the new method may need adjustments over time.

Where is the study run from?
The study is run at the First Hospital Affiliated to Hebei North College in Zhangjiakou City, Hebei Province, China.

When is the study starting and how long is it expected to run for?
The study started in June 2021 and is expected to finish in March 2025.

Who is funding the study?
The study is funded by the Zhangjiakou Municipal Science and Technology Plan Self-raised Fund Project.

Who is the main contact?
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Contact information

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Study information

Scientific Title
Skinner program teaching improves diabetes knowledge and skills of undergraduate nursing students: a randomized controlled trial

Study objectives

Ethics approval required
Ethics approval required

Ethics approval(s)
approved 20/03/2021, The Ethics Committee of the First Affiliated Hospital of Hebei North University (No. 12 Changqing Road, Zhangjiakou City, Hebei Province, Zhangjiakou City, 075031, China; +86 0313-8059228; gcpll2019@126.com), ref: K2021415

Primary study design
Interventional

Allocation
Randomized controlled trial

Masking
Blinded (masking used)

Control
Active

Assignment
Parallel

Purpose
Health services research

Study type(s)

Health condition(s) or problem(s) studied
To evaluate whether Skinner’s programmed instruction is more effective than traditional lecture-based teaching in improving diabetes-related knowledge, technical skills, self-efficacy, and patient satisfaction among undergraduate nursing students.

Interventions
The principle of small steps:
According to the principle of "from simple to difficult", the teaching content, educational methods and skills that nursing staff need to master were broken down into a number of small and logical modules. According to the order of learning difficulty from low to high, the teaching content is arranged in an orderly manner to help nursing students gradually understand the knowledge points and build up learning confidence. For example, the traditional teaching method will divide the teaching content into five major parts: etiology, laboratory tests, diagnosis, treatment, and nursing care. The principle of small steps is to divide the above five aspects into smaller teaching content, such as the treatment content is divided into "oral medication, insulin and GLP-1 agonists" different treatment content, in the "oral medication" part is subdivided into eight subsections of the content.

The principle of self-pacing:
Nursing students were allowed to regulate their own pace of learning according to their own learning situation. As students have already mastered diabetes-related knowledge in the theoretical teaching stage, they have a certain knowledge base, but the degree of knowledge mastery of each student is different, and their practical ability is different in the internship stage. Therefore, focusing on weak knowledge and strengthening practice of weak skill points according to students' needs can make the learning arrangement more flexible and efficient, so as to meet the needs of personalized learning.

Immediate feedback principle:
If problems are found in the teaching process, immediate feedback was given to nursing students so that they can quickly understand the correct knowledge or technical operation methods and so on. For example, if a student contaminates the test strip while doing the operation of blood glucose test, he/she should be interrupted immediately and told the correct method. This kind of immediate feedback helps to enhance the nursing students' confidence in learning and ensures the learning effect.

Positive response principle:
In the process of program teaching, we ensured that the nursing student always maintained a

positive learning state. When the nursing student gives the correct answer, give positive reinforcement or reward to consolidate the correct response and motivate further learning, usually positive reinforcement or reward will have a variety of forms of expression, such as students answered correctly, give a smile, nodding, encouraging looks, prizes, etc, so that students can experience positive emotions, students will be more willing to learn and look forward to being rewarded.

The principle of low error rate:
In the teaching process should tried to avoid too many errors in the nursing students' response, because frequent errors will affect the nursing students' learning mood and progress. On the contrary, a lower error rate can enhance their learning motivation and efficiency. Therefore, the teaching content should be designed to be simple to complex and easy to difficult, so that students will be more receptive and less frustrated when learning. Teachers were correct, rigorous and uniform in their instruction. For example, when demonstrating a technical operation for the first time, it is important to ensure that it is correct and that no steps are missed, otherwise an incorrect demonstration will leave a very deep impression on the students and affect their memory of the correct knowledge. In addition, the questions or competence requirements put forward to the students should be back and forth, step by step, the difficulty across should not be too large, not only to play a role in improving students' ability, but also to protect the students' self-confidence.

The intervention lasted for 4 weeks, with a total of 60 class hours from 08:00 to 11:00 every Monday to Friday. Each class hour lasts 45 minutes and is divided into 10 teaching units, with 5-minute real-time feedback and operational exercises embedded between units.

Intervention Type
Behavioural

Primary outcome(s)
1. Basic knowledge of diabetes measured using the diabetes knowledge questionnaire (25 items) developed by the research team based on the 2020 Chinese Guidelines for the Prevention and Treatment of Type 2 Diabetes, at baseline and post-intervention (4 weeks)

2. Diabetes-specific procedural skills measured using performance-based assessment via direct observation at 4 weeks

3. Self-efficacy measured using the 10-item General Self-Efficacy Scale (GSES) at baseline and post-intervention (4 weeks)

4. Patient satisfaction measured using an 11-item Patient Satisfaction with Nursing Student Care questionnaire adapted from the Chinese version of the Risser Patient Satisfaction Scale at post-intervention (4 weeks)

Key secondary outcome(s))

Completion date
10/04/2025

Eligibility

Key inclusion criteria

Nursing interns:
1. Full-time undergraduate nursing interns at our hospital
2. Normal communication abilities
3. No prior experience in long-term insulin injection or blood glucose monitoring techniques

Patients:
1. Patients diagnosed with type 2 diabetes according to the Guidelines for the Prevention and Treatment of Type 2 Diabetes in China (2020 Edition)
2. Aged between 35 and 77 years

Healthy volunteers allowed
No

Age group
Mixed

Lower age limit
35 years

Upper age limit
77 years

Sex
All

Total final enrolment
80

Key exclusion criteria
Nursing interns:
Those who had received prior training in diabetes nursing

Patients:
Those with severe hepatic or renal disease, psychiatric disorders, malignant tumors, or poor treatment compliance

Date of first enrolment
01/06/2021

Date of final enrolment
01/03/2025

Locations

Countries of recruitment
China

Sponsor information

Organisation
First Affiliated Hospital of Hebei North University

Funder(s)

Funder type

Funder Name
Zhangjiakou Municipal Science and Technology Plan Self-Raised Fund Project (No.: 1821144I)

Results and Publications

Individual participant data (IPD) sharing plan

IPD sharing plan summary
Not expected to be made available