

## INNOVATIVE METHODS IN TEACHING CLINICAL PHARMACOLOGY AT A MEDICAL UNIVERSITY

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**Relevance.** The primary goal of professional education in a medical university is the training of qualified physicians who are capable of effective work in their specialty and competitive in the labor market. High-quality education is strongly associated with the goals of the Bologna Process: academic mobility, diploma recognition, the introduction of credit systems, and innovative technologies in teaching and knowledge management (4). Currently, the main methodological innovations are directly related to the use of interactive teaching methods.

**Aim and Objectives.** To improve teaching methods in clinical pharmacology through the implementation of interactive techniques.

**Materials and Methods.** Interactive teaching methods were studied in the instruction of clinical pharmacology for 5th-year students of the General Medicine Faculty and 6th-year students of the Pediatrics Faculty at TashPMI.

**Discussion.** The implementation of interactive learning formats is one of the key directions in enhancing student training at modern medical universities. The term "interactive" comes from the English word "interact" ("inter" meaning "mutual", and "act" meaning "to act"). One of the goals of interactive learning is to create a comfortable educational environment in which the student feels successful and intellectually competent, making the learning process itself more productive (1,4). The use of interactive teaching methods includes the simulation of real-life situations, role-playing games, and collaborative problem-solving.

It is well known that after performing a task independently, individuals retain up to 90% of the information. Optimal learning occurs when people are given the opportunity to be active and engage in interaction (1). A learning process based on the use of interactive teaching methods is organized in such a way that all students in the group are involved in the cognitive process without exception. Collaborative activity means that each participant contributes their unique, individual input; during the process, there is an exchange of knowledge, ideas, and methods of action.

Interactive methods are based on the principles of interaction, learner engagement, reliance on group experience, and mandatory feedback. In the classroom, an environment of communication is created, characterized by openness, participant

interaction, collective knowledge-building, and opportunities for mutual evaluation and control (4,5).

In teaching clinical pharmacology to 5th-year General Medicine students and 6th-year Pediatrics students, the following interactive methods are widely used:

- Situational tasks
- Case method (method of specific situations) – defense of a pharmacotherapy analysis protocol
- PRES method (Position – Reason – Example – Summary)
- Assessment method
- "Brainstorming"
- "Pen in the center of the table" method
- "Snowball" principle lesson method
- Development of graphic organizers (Cluster, T-chart, Venn diagram, "Why?" chart, Fishbone diagram, etc.)

**Presentation of Reports:** The use of situational tasks contributes to the development of students' clinical thinking, encourages a creative approach, significantly motivates students, and provides them with a sense of satisfaction from their work. The case study method (from the English "case" – an event or situation) is an active, problem-based situational analysis technique based on learning through solving specific cases. The case study method is classified as a non-game-based, simulation-based active learning method and is regarded as a tool for applying theoretical knowledge to solve practical problems (2). At our department, the case study method is used in evaluating the effectiveness and safety of pharmacotherapy based on real patient case histories. Patient case histories can serve as material for case studies (with all personal data removed for ethical reasons). The department archives are used to select cases with typical disease progressions and various types of complications. This task can be carried out by students as part of independent work. Photocopies of these case histories are added to the departmental case study database and are used as didactic handouts during class sessions.

Assignments or questions are developed for each case history. An introductory situation is presented before the clinical case discussion. For example: *"A health insurance company has received a complaint from a patient regarding substandard treatment, and you have been assigned to assess the adequacy of the therapy provided."* Acting as an expert and analyzing the documentation, the student is encouraged to approach the preparation of medical records more thoroughly and responsibly in the future.

**The PRES Method (MIIIO)** is useful when discussing controversial issues, doing exercises that require taking a certain position, as well as during practical lessons related to solving specific problems.

**Purpose of the Method:** This method provides students with a simple format during lessons in which they need to develop arguments or express opinions. It helps them clarify their thoughts, as well as formulate and present their opinion in a clear and concise manner.

**Procedure:**

1. Display or distribute materials that outline the four stages of the PRES (MIIIO) method:
  - **P (M):** State your **Position**
  - **R (P):** Give one **Reason** for your opinion
  - **E (P):** Provide an **Example** to support your reason
  - **S (O):** **Summarize** your opinion

**Task:**

Apply the PRES method and explain why **comprehensive treatment of stomach ulcers** is important.

**Assessment Method on the Topic "Pharmacotherapy of Peptic Ulcer Disease"**

Assessment method Test	Clinical Case
<input type="checkbox"/> Antacids should not be prescribed simultaneously with the following drugs: A) Iron preparations, tetracyclines B) Gastrozepin C) Platyphyllin D) De-Nol E) Cimetidine <input type="checkbox"/> Enzyme preparation of the pancreas: A) Pancreatin B) Abomin C) Pepsin D) Gastrozepin E) Contrikal	A 14-year-old girl complains of pain in the epigastric and periumbilical areas, which is more intense at night or on an empty stomach. She appears lethargic and asthenic. There is no vomiting, nausea, or heartburn. Appetite is good. The tongue is coated, and tenderness is noted in the pyloroduodenal region. Mendel's "hammer" sign is positive. The stool test for occult blood is positive. Increased secretion of gastric juice, bile, and pepsin is observed. <ol style="list-style-type: none"> <li>1. Establish the diagnosis.</li> <li>2. Recommend a diet.</li> <li>3. Prescribe treatment.</li> </ol>
<b>Prescription:</b>	<b>Definitions:</b>
<b>Omeprazole, Acid peptidium</b>	<b>Side effects</b>

The assessment method can be used to evaluate students' knowledge. "Snowball" is a figurative name for a method of conducting a learning session, which begins by giving students individual time to reflect. Then, discussion begins in groups of two,

then four, then eight people, and so on, until the entire group is involved in the discussion. The goal of this method is to give each group member the opportunity to express their opinion, using the knowledge and experience that the entire group possesses.

An advantage of using the snowball method in a learning session is the ability to minimize differences in abilities among group members with less effort. The goal of conducting a "Brainstorming" session is to obtain a large number of response options from the group in a short amount of time. Brainstorming can demonstrate what students know. The "Pen in the Center of the Table" method aims to engage all students in the group, promotes concentration, and activates student participation. The group is offered a collaborative task (questions on etiology, clinical presentation, laboratory diagnostics, and treatment of a particular disease). Each student writes down one version of the answer on a sheet of paper and passes the sheet to a classmate, while placing their pen in the center of the table. If a student does not have an answer, they keep their pen. All answers are discussed collectively, with correct and incorrect responses being analyzed. Reviewing and repeating correct answers increases the level of understanding and retention of the material. Graphic organizers (Cluster, Venn Diagram, Fishbone Diagram, "Why?" Diagram, T-chart) are widely used in teaching clinical pharmacology. They serve as a visual tool to represent students' thought processes.

**A Cluster** – meaning a bundle or bunch – is a way to create an information map by gathering ideas around a central factor. In the center of the board or a large sheet of paper, a key word or the name of a topic (1–2 words) is written. Based on associations with the key word, related "satellite" words or phrases are written around it in smaller circles, connected by lines to the "main" word. These "satellites" can have their own "mini-satellites," and so on.

The recording continues until the ideas are exhausted. Students exchange their clusters for discussion. Clusters such as "Anti-inflammatory Drugs," "Sulfonamides," "Quinolones," "Fluoroquinolones," etc., can be created this way. The cluster method helps to systematize students' knowledge.

The Venn Diagram helps deepen students' understanding of penicillins by comparing two groups: natural and semi-synthetic. The tasks given to students are:

1. Identify the distinctive features of natural penicillins.
2. Identify the distinctive features of semi-synthetic penicillins.
3. Find common characteristics between the natural and semi-synthetic penicillin groups.

To solve these tasks, students fill out a Venn Diagram titled "Distinctive Features of Natural and Semi-synthetic Penicillins." The instructor assigns the task of filling the left circle with features specific to natural penicillins, the right circle with features of

semi-synthetic penicillins, and the overlapping middle section with the common features of both groups.

The Fishbone Diagram helps students study the cephalosporin group. The instructor asks them to complete the Fishbone Diagram by answering the questions placed on the upper "bones" and writing the answers on the corresponding lower "bones."

The "Why?" Diagram promotes deeper exploration of a topic. The instructor suggests filling in the diagram by answering the questions placed between the cells. This method helps students grasp clinical-pharmacological approaches to treating acute and chronic cardiovascular insufficiency in children and teaches them to evaluate the effectiveness and safety of treatments.

The T-chart helps deepen students' knowledge of gastroprotective drugs by identifying the advantages and disadvantages of a drug. Students are tasked with:

1. Determining the positive and negative qualities of the drug De-Nol.
2. Filling out a T-chart titled "Advantages and Disadvantages of De-Nol."

The instructor assigns the table to be filled with advantages in the left column and disadvantages in the right column. The duration of the T-chart activity is 10 to 20 minutes. Evaluation and analysis follow a short break.

While studying clinical pharmacology, students prepare presentations on assigned topics. Reports and presentations are delivered using a computer and projector. After the presentation, students are asked questions on the topic, with correct answers sometimes rewarded with small prizes. Presenting reports helps develop public speaking skills, improves speech, and makes students more confident and active.

### **Conclusions:**

- Interactive methods such as situational tasks; Case Method (analysis of pharmacotherapy protocols); PRES Method (MPPO); Assessment Method; Brainstorming; "Pen in the Center of the Table" method; Snowball principle method; and creating graphic organizers (Cluster, T-chart, Venn Diagram, "Why?" Diagram, Fishbone Diagram, etc.) are successfully used in teaching clinical pharmacology to students.
- Students enjoy learning through active participation, which develops their clinical thinking and analytical skills, enhances their public speaking abilities and professional speech, and makes them more confident and active.
- The success of interactive teaching methods depends on the appropriate choice of method according to the lesson topic and the students' knowledge level.

### **Literature:**

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