Problem-Based Learning (PBL) – Anaemia and Polycythaemia

Number of Sessions: Four

Participants: First year MBBS Students

Methodology: PBL using DENT Protocol (DEFINE – EXPLORE – NARROW – TEST)

Overview

The Department of Physiology conducted a four-session Problem-Based Learning (PBL) module focusing on the clinical physiology of anaemia and polycythaemia. The sessions were designed to promote critical thinking, collaborative learning, and clinical reasoning skills among undergraduate medical students.

Session 1 (26.11.2024; 11.00 am to 12.00 pm)

The first session began with a brief introductory lecture on the concept of Problem-Based Learning and the DENT protocol as a problem-solving framework:

- DEFINE: Understanding and defining the problem
- EXPLORE: Gathering information and exploring possible explanations
- NARROW: Narrowing down to the most likely possibilities
- TEST: Testing the hypotheses with further data or investigations

With sufficient clinical example question the dent protocol was demonstrated.

Session 2 (26.11.2024 and 27.11.2024; 04.00 pm to 05.00 pm)

During the second session, students were divided into six batches, with each batch assigned a clinical case related to anaemia or polycythaemia. However, at this stage, the cases were deliberately provided with minimal information—no clinical findings or investigation results were included initially. This approach aimed to stimulate curiosity and promote a habit of structured clinical inquiry from the outset. Students were encouraged to discuss among themselves, identify what additional information they would need, and formulate relevant questions to guide their diagnostic process. Facilitators played a passive role initially, only responding when students requested further details. Upon such requests, selective and

limited pieces of information—such as brief clinical findings—were gradually shared, based on the direction of students' queries and hypotheses. This method helped simulate the uncertainty and step-by-step thinking process encountered in real clinical scenarios.

Session 3 (28.01.2025 and 29.01.2025; 04.00 pm to 05.00 pm)

In the third session, the cases continued to unfold. Students were now provided access to investigation results, again only upon request and in alignment with their clinical reasoning. For example, if a group considered a differential diagnosis that required specific lab confirmation, such as a complete blood count or iron profile, those reports were then shared. This approach deepened their analytical thinking and allowed them to test hypotheses through evidence-based reasoning. As students gathered more data and approached the final stages of the diagnostic process, they were encouraged to synthesise the clinical picture, justify their final diagnosis, and suggest potential management strategies. This progressive disclosure strategy across two sessions fostered an active learning environment, promoting teamwork, clinical reasoning, and decision-making skills that reflect real-life diagnostic workflows.

Session 4 (03.03.2025 and 04.03.2025; 03.00 pm to 04.00 pm)

In the Third session, each group was asked to present their case, detailing:

- Their discussion process
- The sequence in which they asked for information
- The differential diagnoses considered
- How they arrived at the final diagnosis using the DENT approach

The session served as a collaborative learning platform where all groups shared their reasoning, learned from each other, and reflected on the various patterns of anaemia and polycythaemia.

Cases Provided

1. Iron Deficiency Anemia
2. Sickle Cell Anemia
3. Megaloblastic Anemia
4. Thalassemia
5. Anemia of Chronic Disease
6. Polycythemia

Student Feedback and Outcomes

During the feedback session, students expressed several positive learning experiences:

- They appreciated the interactive format and team-based learning process
- Many highlighted that the systematic DENT protocol helped structure their thinking and problem-solving
- The gradual revelation of data mimicked real clinical scenarios, fostering better engagement
- Students noted a marked improvement in their group communication and collaborative decision-making skills
- They recognized the importance of a systematic and inquiry-based approach to clinical reasoning in physiology

Conclusion

The PBL sessions were successful in engaging students with real-life clinical problems and in nurturing essential skills such as teamwork, critical thinking, and structured clinical reasoning. By applying the DENT protocol to cases of anaemia and polycythaemia, students gained a deeper understanding of the physiological basis and clinical manifestations of these disorders. Future sessions will continue to build on this active learning model.

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