

Chapter 10

A Model Study Guide for Case-Based Clinical Reasoning

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Student Instructions and Background Materials for the CBCR Group Meetings

Authors: [name, role, affiliation, office, telephone for contact]

Year: [year of validity of the guide]

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Justification

[Names of case writers and developers of the course.]

Coordinating team

[Names and affiliations of course director and team members; contact information of the coordination team.]

Credit Points

Having successfully completed the CBCR course in Year [...] provides [...] credits.

Introduction

[Gives a short general introduction on the CBCR course.]

Case-based clinical reasoning, a series of meetings on clinical decision-making, constitutes an important part of the curriculum. This education not only serves as a training in the methods of clinical decision-making but also provides an opportunity to apply previously acquired knowledge to clinical problems.

Students will learn clinical reasoning by using written clinical situations. In CBCR the complaint of the patient is the key starting point for reasoning. From this complaint, a case is worked through toward a diagnosis and sometimes proceeds to a management plan in a structured way. CBCR basically asks you to think in a way that is used later in clinical practice. The systematic unraveling of a clinical problem is essential in the practice of the profession of a doctor. In addition, working in groups does not only encourage the learning process but also stimulates to argue the diagnostic process step by step.

Between the CBCR classes there is time reserved for independent study. Preparatory self-directed learning improves the efficiency of the group meetings significantly and also distributes your study load more evenly.

The Objectives of the CBCR Course

[Describes the learning goals/objectives of the course.]

CBCR focuses on learning to solve clinical problems. By doing this, knowledge from pathophysiology, epidemiology, and clinical decision-making is integrated.

The student who has successfully completed the CBCR course is able to reason clinically and systematically on patient problems as presented in situations similar to the CBCR cases discussed. This includes:

- Evaluation of collected data and making clear how they relate to a complaint/ medical problem

- Using of biomedical, epidemiological, and clinical knowledge in patient problems
- Making a focused differential diagnosis and evaluating all relevant hypotheses
- Giving a general direction which therapy and/or guidance is suitable

In addition, the student has acquired the skill to deal with new patient problems as presented at the doctor's office aligned with CBCR cases in the course.

Next, there is a focus on developing leadership skills. After successfully completing the CBCR course, the student is able to lead a meeting on clinical reasoning.

What Is Clinical Reasoning and Decision-Making?

[As students are mostly not really aware what clinical reasoning and clinical decision-making is, an explanation is necessary, illustrated by an example.]

Without giving a conclusive definition of clinical decision-making, it can be said that this form of education is about the rational considerations that underpin every step in the clinical encounter that starts at the moment when a patient presents at the doctor's office, until the moment that an end is reached in this contact.

The nature of this process is usually that of solving a medical question or problem. The considerations that guide that process are an essential part of the group discussions. The quality of the arguments, considerations, and decisions made is just as important as the solutions to be found. Many arguments include both pathophysiological and non-pathophysiological arguments. Pathophysiological arguments concern the construction and functioning of the body up to a molecular level and the disturbance of them. Non-pathophysiological arguments usually relate to epidemiological, but sometimes to ethical or social considerations. Eliminating a pathophysiological argued statement because a particular phenomenon in a certain group of people rarely occurs is an epidemiological founded argument. Also the decision not to carry out a specific diagnostic test because the costs and burden on the patient are in no proportion to the information that the doctor will receive is a non-pathophysiological argument. Clinical decision-making is schematically displayed below (Boxes [10.1](#) and [10.2](#)):

The CBCR Sessions

[This is a practical section and describes how the sessions take place and what is expected of the students].

During the CBCR sessions you will work through written clinical cases in a group of students. Every session, three students take the role of peer teacher and lead the session. A consultant is present to act as supervisor.

Box 10.1 A Roadmap to Clinical Decision-Making

1. Identify what the question(s) is/(are) of the patient. As long as the patient's request for help is not clarified, you will need to ask further questions, until it is completely clear what questions, wishes, and expectations the patient has.
2. After the request for help is clarified, formulate possible diagnoses before you start with history taking.
3. Estimate the order of likelihood of hypotheses within the differential diagnosis.
4. Argue every diagnosis with pathophysiological and non-pathophysiological arguments.
5. Schematically confirm or reject all possible diagnoses.
 - (a) What next history question should you ask? What does an answer tell you?
 - (b) What next part of the physical examination would you perform? Why?
 - (c) What diagnostic tests would you now like to order?

Argue every question and every diagnostic test. If you want to collect multiple data, make a priority list of what needs to be asked/done first.

6. Evaluate the data collected through history and additional research.
7. Repeat 3–6 until you have a most likely diagnosis and you cannot gain more certainty about the diagnosis. Then proceed to prognosis and therapy.

Introduction Session

In an introduction session, the students and their consultant get acquainted with each other. The consultant explains the purposes of CBCR course and gives the instructions for the sessions. Rules and regulations are set. The first three peer teachers are chosen, and they receive the peer teacher version of the first case.

Preparation and Self-Study

A distinction is made between the preparation of the students and the peer teachers. The peer teachers (three students rotating in the group) prepare the case thoroughly in advance so that they are able to lead the meeting. All other students prepare the meeting at home with the student version of the case. This preparation is necessary to ascertain a high-level discussion. All cases can be prepared using the prescribed literature given in the cases.

Box 10.2 Example Case Using the Roadmap for Clinical Decision-Making

A 35-year-old woman visits the family doctor because she is so tired lately during exercise. She also reports that she loses a lot of blood during her menstruation. You check her hemoglobin level; this is 6.2 mmol/L.

- ad 1 The request for help might be: “What is the cause of my fatigue?”
- ad 2 The first assumption in this case is obvious: Is the heavy menstruation the cause of the anemia and, therefore, the fatigue with exertion? What possible causes of anemia are there?
1. Disorder in the production
 2. Loss of blood
 3. Hemolytic anemia
- ad 3/4 An iron-deficiency anemia based on a heavy menstruation is most likely based on the following arguments:
1. Epidemiological argument: Iron-deficiency anemia is by far the most common.
 2. Pathophysiological argument: A heavy menstruation can indeed lead to anemia.
- ad 5a Deepening the history with special history questions is not very burdensome. Yet efficiency is desired. So it is wise to ask first for her menstruation cycle. Asking for blood with defecation (in case of suspicion on a bowel tumor) comes later in the hierarchy. Of course, you should also ask about other causes of fatigue with exertion, for example, complaints matching asthma – you know that anemia does not always give complaints of fatigue.
- ad 5b There is also a hierarchy in the physical examination. A gynecological examination gives us probably more information than a rectal examination (a fibroid in the uterus is sometimes felt better than a tumor in the rectum).
- ad 5c Many different diagnostic tests can be done to determine the cause of the anemia, such as MCV, hematocrit, and ferritin. However, it is important for each test to be aware of the (cost) effectiveness. MCV and hematocrit are cheap, not very stressful, and deliver a significant diagnostic result. However, a colonoscopy is expensive and stressful, and the chance that this patient has a carcinoma is small.

CBCR Sessions

Each session takes 2 h,¹ and during these sessions, patient cases will be discussed, increasing in difficulty over the course.

The aim of each session is to elaborate a clinical problem. At first a hypothesis or differential diagnosis is formulated after a patient problem has been introduced. This is elaborated by asking relevant questions on the problem and to test the first hypotheses. Too much or unfocused questioning means that the process is not well finished. The process of formulating and testing hypotheses is repeated one or more times after additional information is provided by means of “handouts” that include information of the history, the physical examination, imaging tests, and/or specified laboratory research. Before the sessions, only the peer teachers have handout information, which they will distribute during the class. Afterward, the handouts will be available for all students.

Tasks of Peer Teachers

Peer teacher roles for the first and subsequent sessions are assigned at the introduction session. By turn, at each session three students perform the role of peer teacher; every student fulfills this role at least twice² during the course. Peer teachers lead CBCR meetings. They have prepared the case using the peer teacher version of the case, which they have received from the consultant at the end of the previous session. This version of the case provides additional hints for the peer teachers. As a result, they are able to work through the complete case before the session, lead the discussion in the meeting, give comments on the arguments of other group members, and provide well-founded answers. During the session one of the peer teachers gives a mini-lecture to provide the students with additional information about a certain diagnosis, test, or therapy. The instructions for this are given in the peer teacher’s version.

The overall course of the meeting is as follows:

- *Introduction*: Introduction of the patient and formulation of the patient problem.
- *Answering*: Answering of the first questions by every student or in little groups (2–3 students).
- *Inventory of the answers*: Especially the arguments are important.

¹Duration of the sessions depends on local schedules. We advise a minimum duration of 1.45 and a maximum of 2.30 h.

²Depending on the number of sessions and number of students per group. This is an example of the situation at the University Medical Center Utrecht.

- *Reflection on the responses*: Reflection on the responses by the peer teachers and explanation of what they think that the proper responses are (a mini-lecture can be useful).
- *Brief summary*: At the end of the case, one of the students gives a brief summary of the patient and his/her complaint.
- *Evaluation*: The student participation is evaluated and assessed by the consultant, material for the next meeting is distributed, and the case or the meeting is discussed and evaluated.

The value of CBCR consists of the ability of students to formulate new hypotheses based on new information received. Therefore, it is very important that the students do not know in advance how the case will proceed and do not know answers on the history or diagnostics. As peer teachers you are kindly but firmly requested not to give any information concerning the case to students who haven't had this meeting yet.

Tips

Peer teachers are expected to be able to argue through all steps in the clinical decision-making of this particular case. The following tips are provided to make the peer teacher role feasible:

- Make sure that the students have answered the questions the best they can. Only then provide them with comments and additions.
- Avoid the group to become passive. Involve every student in the discussion. Even the students who haven't prepared properly can try to answer questions.
- Bring literature to the sessions. Any unforeseen questions can be answered, and a solution can be found during the session. The consultant should not be the primary source of information, but can be asked for feedback in case the group cannot continue.
- The peer teachers determine the course of the meeting. The role of the consultant can be limited if the peer teachers are well prepared.
- The peer teachers can use a whiteboard, flip over, or PowerPoint to make tables or to use it for their mini-lecture.
- Peer teachers play an important role in the evaluation of the cases. Any comments they have should be handed to the consultant.
- CBCR trains peer teachers in leadership skills. Three roles can be distinguished.
 - (a) The *chairperson*
 - (i) Takes the lead
 - (ii) Divides turns to get everyone involved (in addition actively involve silent students, e.g., let the neighbor of an answering student argue the answer given)
 - (iii) Ensures time management

(b) The *summarizer*

- (i) Identifies key issues after the discussion
- (ii) Provides a conclusion at the end of a question
- (iii) Writes down keywords on the board and fills in the table

(c) The *content expert*

- (i) Is critical; is not easily satisfied with the answers given by the students
- (ii) Asks thoroughly: what does a student mean with an answer?
- (iii) Seeks answers to questions that remain unresolved on the spot, to be able to answer them before the end of the meeting.

It is important that the tasks are alternated during the meeting, since the consultant will assess peer teachers on their overall performance.

The Mini-Lecture

Mini-lectures are meant to provide students with background information to proceed with the case. The provided information must be directly applicable (i.e., explanation about diagnostic tests) or create a better understanding of a topic (i.e., explanation about pathophysiology). Tips for a good mini-lecture:

- Keep it simple in form and content
 - Form:
 - Use as little text as possible on the slides
 - Use images
 - Use a clear structure
 - Content:
 - Make sure you have an evident message and conclusion
 - Be cautious with details
- Maintain contact with the group
 - Check if your message comes through
 - Ask questions
 - Mind your voice and presentation
 - Be aware of the level of preparation of the students

N.B. The mini-lecture is not meant as a recitation for the peer teachers or merely an exposure of their content knowledge, but is meant to teach the students. Mini-lectures should not take more than about 5 min.

PowerPoint and Whiteboard

Experience has shown that the use of PowerPoint during the CBCR session can undermine the clinical thinking process. Therefore, its use should be limited to showing handout texts and to support a mini-lecture. It is advised to use the blackboard or whiteboard as much as possible in the interactive discussions on hypotheses and disease symptoms. Building a clear table (with diagnostic hypotheses and diagnostic findings on the two axes) helps with structuring a reflective thinking process.

Tasks of Regular Students

All students are expected to be prepared and show active participation in the meetings.

Tasks of the Consultant

The main task of the consultant is to encourage the students to have a meaningful discussion about the clinical problem. He or she acts as a supervisor. As for the provision of content knowledge, the teacher is a true consultant, reacting to student requests for information if needed. In addition, the consultant's task is to assess the active participation of all students. The consultant gives feedback, especially to the peer teachers.

At the end of the session, as an administrative task, the consultant hands out the peer teacher versions to the peer teachers for the next session.

Assessment

[Gives information on assessment of group meeting and final assessment of the course and general rules on missing sessions]

The course requirements include both active participation at sessions as students and as peer teachers and passing the CBCR test. Participation makes up 12 % and the test score 88 % of the final mark.³

³This is an example of the University Medical Center Utrecht, where participation during sessions makes 12 % and the test score 88 % of the final mark. In nine sessions, with a peer teacher assignment twice, 11 points can be earned (7*1 point plus 2*2 points). Access to the final written test requires at least 5 points for active participation. Points from 6 on (until 11) are counted toward the overall final score, while each of those points counts twice, yielding 12 points (6*2). This is 12 % of the overall final score.

Active participation at all meetings is expected. Missed sessions may be replaced in another group. Attending at another group is advisable if this other group and the consultant agree, but this is not rewarded with points. In case of three or more sessions missed, students need to contact the coordinator and may gain an exception through the study counselor if they have a sound reason.⁴

CBCR Session Participation Points

[Gives information on how students are assessed during group meetings, see for more explanation Chap. 7. Make a distinction between points for students and points for peer teacher. Describe the criteria for receiving points/scores clearly.]

Active Participation During the Group Meetings: Students

The assessment of the participation occurs at the end of each meeting. The consultant indicates which students have actively participated, considering the following criteria⁵:

Students gain *1 point per meeting* for satisfactory participation. A student can receive 0 points for two reasons:

- Unsatisfactory participation in the discussion. Each student should participate in the discussion. A student who remains silent out of embarrassment or modesty is stimulated by the peer teachers or consultant, but must participate. *Silent presence is not enough.*
- Unsatisfactory preparation. From the active participation should show that there is a thorough preparation. Only with background knowledge a student can make a meaningful contribution. *It is not enough if the student wants to participate but doesn't give substantive contribution.* The latter doesn't mean to create an exam atmosphere, but it is important to properly prepare for each meeting.

Peer Teachers Roles

Peer teachers are expected to show a more extensive preparation than the students. The peer teachers must have a substantive performance at the meeting, which is especially reflected in the quality of justifying reports of the thinking steps in the

⁴Rules mentioned in this paragraph are used at the University Medical Center Utrecht, however, can be adapted to align with the local situation.

⁵Criteria and scores mentioned in this paragraph are used at the University Medical Center Utrecht, however, can be adapted to align with the local situation.

clinical process. They must demonstrate pathophysiological background knowledge and understanding of the clinical process.

Peer teachers can gain *up to 2 points per meeting*. The consultant will pay close attention to the way discussions are guided, to the peer teachers' additional background knowledge, and to the way they take leadership over the group. Scores are given as follows:

- 0 for poor preparation, no good leadership of the session
- 1 for moderate preparation, moderate leadership of the session
- 2 for good preparation, good leadership of the session

Each student must fulfill the peer teacher role twice. It is possible to earn a maximum of 1 bonus point by fulfilling the role of peer teacher for a third time to compensate for illness or absence at another meeting. There are never more than three peer teachers per meeting. The group as a whole is responsible for ensuring that there are at least two students functioning as a peer teacher at every meeting.

Disputes

We aim to provide good quality education by the consultants for the lessons. It is however possible that guidance or marking by the consultants leads to a dispute with a student. For any comments or disputes, we ask you kindly to contact the coordinator of the course [email address].

The CBCR Test

[In this paragraph students should be explained when the test will take place and what they can expect for the test. Examples of possible questions can be given here.]

The CBCR test is composed of questions that begin with a brief case description in which the age, sex, and the complaint with which the patients presents himself at the doctor are made clear. After this some additional information may be given and several questions follow.

The students are asked to choose the correct answer out of a table. The possible answers are displayed in a table, broken down by category: “diagnosis,” “history features,” “physical examination,” “diagnostic test options,” and “management.” Sometimes there is asked for only one answer, sometimes for more.

A mock exam will be distributed a month before the test.

[Here example of test questions can be included. See for an example of the Utrecht CBCR test Chap. 7, Table 7.1].

Rules for Test Participation and Passing

[In this section the terms and conditions to participate in the test should be described. If students must have fulfilled certain conditions as minimal points for participation or minimal presence, this should be clarified here. Any regulations about possible compensation for missed classes can be described. Rules for passing the CBCR course need to be described.]

Rules for the Exam Retake

[Any rules and regulations for the exam retake should be clarified here.]

Rules for Repeaters

[Any rules and regulations for the repeaters should be clarified here.]

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