



Mini Review

Exploring the Understanding of the Term Clinical Reasoning and Its Importance by the Undergraduate Medical Students

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Abstract

The major problem in healthcare today is 'diagnosis errors in reasoning' and which results in significant 'morbidity & mortality'. This topic of "Clinical reasoning" (CR) has been received significant attention amongst leaders of health service organisation and improved education is vital. There is a short CR education programme. The question is: "is it enough?"

The extent of teaching CR in undergraduate medical education is not adequate. The current Nottingham Medical curriculum also does not offer specific education related to CR. We believe that leads to a situation where newly qualifying doctors are relatively unprepared for how best to manage the complexities of real-world problems with their patients. In order to introduce such theme into the curriculum, we have to explore the current understanding of medical students in Nottingham. The qualitative study of this involved an interview and the findings mainly served, as learning needs analysis for the students.

The study emphasizes the importance of education and the need for implementing CR in the medical curriculum. We believed the results from this could guide the development of an appropriate education programme which prepares them more effectively for qualification.

Abbreviations:

CR: Clinical Reasoning; UG: Undergraduate; UoN: University of Nottingham; PBL: Problem Based Learning; CP: Clinical Phase

Background

The Clinical Reasoning (CR) is defined as a recursive, multidimensional, and complex process which involves informal and formal strategies for the analysis of patients' information and evaluation of its information [1].

CR skills are commonly acquired through experiential learning of Undergraduate (UG) students within the course of undergoing the clinical curriculum. However, CR has not usually been formally taught in the past. It is only recently that there has been an acknowledgement of the need to explicitly teach CR in UG medical curricula. In this respect the University of Nottingham's (UoN) UG medical degree aims to introduce a vertically integrated CR theme starting from year 1 and working its way through the whole of the curriculum.

The term CR or one of its multiple synonyms always appear in the list of objectives stated by most medical schools, licensing organisations and speciality societies [2-5]. However, when it comes to understanding, describing and formulating an appropriate definition for CR it is a rather complex multifactorial process [6,7].

For medical students, CR has a wider scope [8,9]. Multiple definitions have been produced for CR in the literature with a spectrum of complexity associated with these definitions.

In order to introduce CR theme into the curriculum, exploring the current knowledge and understanding of medical students in Nottingham towards CR and sharing the key elements of CR are the starting point. Therefore, we decided to explore: The understanding of the term CR and its importance.

Methods

UoN has 2 curricular groups, Graduate Entry Medical students who have Problem based Learning (PBL) curriculum and BMedSci students who have integrated curriculum for the first few years but they all join together for clinical years from third year, Clinical Phase (CP) 1 to final year, CP3. The researcher met the CP1 and CP3 students face-to-face, explained the aim of the research, handed the volunteer's information sheet and an informed consent form. Those who agree with the contents of the consent form were invited to participate in interview. After identifying the point of data saturation, the total numbers of participants eventually included 28 students. There were eleven CP3 students from the integrated curriculum model. There were seven CP3 students from the PBL curriculum model. Ten third year students were from the integrated curriculum model.

In this study, the inductive thematic data analysis was conducted up to the level a manifest, semantic or explicit level.

In reporting the results each participating student was identified by code and a number. The code represented what phase they are, PBL group/Integrated group. The number referred to student's order in which he/she was interviewed. CP3 I 1 is the first interviewee from the integrated curriculum

from clinical phase 3 (final year) student and so on.

Results

This section will explain the results of thematic analysis with a focus on the emergent themes, then making comparisons between the four groups.

The understanding of the importance of CR

Students' answers to the question "What do you understand by CR?"

All the participants are familiar with the term CR but they are uncertain about the various components of CR. The findings are:

a. CR is a cognitive process in a way of taking a problem, gathering the information and then formulating a differential diagnosis.

For example:

"It's just working out a potential diagnosis from the information you've been given." (CP1 4).

b. Some expanded the outcome of CR from formulating a differential diagnosis to include the investigation and treatment plan to cover all aspects of the clinical cycle.

For example:

"A process of acquiring information logically ---either rule out or rule in clinical diagnosis --- investigations -- manage the patient---, is your treatment working?" (CP3 I 3)

c. Some added applying/combining the information with the knowledge and experience to do reasoning:

For example:

"It's the ability to assimilate information given --- history, examination, investigation, findings, and then to process and formulate a differential diagnosis and then create a management plan based on your knowledge and experience". (CP3 P 5)

d. Some broke down complex multifactorial process, that take place during reasoning

For example:

" It is about appropriate questioning of ruling in and ruling out pathologies--- is actually looking and thinking and using pattern recognition." (CP3 P 6)

e. Others emphasized that CR is context-dependent

For example:

"Use a logical process to understand the situation which will then help you with --- diagnosis and the management and what investigations to perform." (CP1 10)

Comparison between the different groups regarding their understanding of CR

CP1 students' view

CP1 students defined CR as 'linking together of all the information, knowledge and experience'.

"It's the ability to use past experience ---to be able to link together --- in one coherent bit" (CP1 5)

Some expanded the product of CR, from formulating the differential diagnosis, to include the management plan.

"The process behind working out what's wrong with a patient and what you need --- to manage them" (CP1 3)

But 30% of CP1 students (3/10) considered a context-dependent way of thinking and decision-making.

" How you're going to treat other aspects of the patient's care, whether that's providing a social packages for discharge ---So it considers aspects that are probably left out ---" (CP1 9)

CP3 Integrated curriculum students' view

Some CP3 students defined CR as taking all the information and coming up with differential diagnosis and expanded this to include the management plan that involved investigations, treatment and some steps of the clinical cycle and also added applying information derived from knowledge and looking at the big picture

"Using your Clinical judgement and the previous knowledge -- to make logical decisions" (CP3 I 6)

"The whole process of arriving at a diagnosis ---So you'd want to have a CXR (Chest X ray) --- but I never really thought about those results as CR" (CP3 I 7).

They also mention the sub process of CR

"---Pathway of your thought --- start with differentials and then you rule some out or include some ---(and) treat a patient safely" (CP3 8).

The other additional component of contextual interaction is not recorded in the CP3 Integrated group.

And this student thinks CR is to think about what are the most important things that the individual worried about and excluding or treating those things before getting the diagnosis.

"So sepsis might not be high up on the list of common things -- but it's something that I'd be worried about. --- excluding anything dangerous at the time." (CP3 I 7)

CP3 PBL curriculum students' view

This group of participants defined CR from formulating differential diagnosis to the management plan that involve in all the clinical cycle and also added applying/combining the information they gathered with their pre-existing knowledge

"Thinking about what you would do in terms of a history, examination, investigations and --- find a diagnosis and manage it accordingly." (CP3 P 2)

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They defined CR with many components including the sub process.

“Thought process that leads you to the diagnosis or --- informs your choice of --- tests to help rule in, rule out, likely conditions. ---It is constantly shifting with reference to the new information that you get.” (CP3 P 1)

A context-dependent way of thinking was also mentioned:

“---Both verbal and non-verbal sort of cues which can ---feed into your CR --- there’s a lot that’s not said ---but --- use what you’re seeing as well as what you’re hearing, that all feeds into --- reasoning for a case.” (CP3 P 3)

One student mentioned CR does not end with a diagnosis: patient centred Evidence Based Medicine and shared decision-making are also key elements:

“---Using best clinical practice by evidence-based medicine as well---NICE guidelines and Trust guidelines, and using that as part of your reasoning to direct --- care plans etc” (CP3 P 7).

Similarities and differences between the participants’ understanding of CR

There are not many differences between each group apart from:

CP1 students defined CR using simple language
“---An examination of the patient and looking at clinical tests and ---using that to narrow down your differential diagnosis and diagnose---“ (CP1 7)

Some CP 1 students have limited understanding and did not even mention the end product of the process
“---Using like knowledge and theories to --- transfer into--- clinical practice and working out what’s wrong with them. Sort of linking them all in“ (CP1 6)

Some CP1 students added CR as applying propositional and non-propositional knowledge to get the management plan of the patient. None of the CP1 students mentioned about details of the cognitive process
“It’s the thought process from obtaining ---signs ---moving it on to manage a patient. So it’s pulling together your knowledge and your decision-making really” (CP1 2)

Whereas CP3 students defined CR with many contents including looking at the big picture
“You’re not always going to have somebody who has every sign---it is looking at the big overall picture” (CP3 6)

They also mention the sub process of CR, complex factors of cognitive process like information analysis, synthesis and evaluation.

“---Using focused question --- that’s very sensitive or specific for that relevant illness --- to rule out and then judging---what

the relevant things you need to examine --- how you’re going to manage --- most effectively.” (CP3 10)

The results of this study inform the curriculum committee what CR means to students. Few similarities were identified across respondents but some important components of CR were missing amongst some students and educators.

The understanding of the importance of CR

Students’ answers to the question “Why is CR important?”

All participants acknowledged that CR is very important for them. The reasons are:

a. CR is the fundamental skill for the healthcare practitioner and needed to be used everyday

For example:

“It’s a skill more than anything to be able to do---as a clinician” (CP1 9)

b. To be an efficient clinician

For example:

“You’re going to be seeing a large number of patients. You need to be efficient you can do all the good histories -- just following the Calgary-Cambridge Framework, but if you’re not actually focusing in on questions that are relevant for each patient, ---(you don’t know) what is going on” (CP3 I 10)

c. To provide the best care of the patient

For example:

“It gives you a good foundation for why --- to follow good medical practice --- the guidelines and the best treatment options for that patient to give the best care and --- applying ethical principles etc--- reasoning helps to focus that to the most appropriate treatment for that specific patient (CP3 P 7).

Comparison between the different groups regarding their understanding of the importance of CR

CP1 students’ view

All the CP1 students admitted that CR is what they are going to do throughout their lives and most of their times.

“It’s real life ---what we are going to be doing when we’ve become doctors and – it makes you think like problem-solving kind of way “ (CP1 8)

Only one student mentioned to treat the patient properly.
“ The foundation for making proper clinical decisions and treating patients properly” (CP1 10)

CP3 Integrated curriculum students’ view

All CP3 integrated curriculum group said that CR is the basic of their future everyday job.

“In the medical profession it’s --- basis of your work for the rest of your life essentially” (CP3 I 8)

They believed that they could not work in real life without the CR skills.

“You’ve got all the knowledge in the world, --- but when you’re on the ward, that’s not what you need. You need to have --- CR skills but (if you) don’t have (it) well it’s completely pointless having the knowledge because you can’t use it.”(CP3 I 4)

They accepted that CR is the paramount to be an effective doctor and for the best care for patient

“Adaptability’s quite a big thing about it because each patient --- present differently, different symptoms, and it’s --- the functional use of that knowledge --- to kind of best care for people and help you be an effective doctor ---“ (CP3 I 8).

CP3 PBL curriculum students’ view

CP3 PBL students said that CR is vital for the following reasons.

“It’s ---what a doctor does really” (CP3 P 4)

“Otherwise,a computer could do your job” (CP3 P 6)

“You need good CR to save time and save resource”(CP3 P 1)

Addition to it, CR will help them to be a good doctor who could give the best care for the patients.

Similarities and differences between the participants’ reasons of the importance of CR

There is not much difference in the interpretation of the importance of CR By CP3 UoN students and GEM students.

Conclusion

The key things the students said were mainly served, as learning needs analysis for the students and guided the development of an appropriate education programme. Raising awareness of elements of CR should be addressed first in our UG curriculum.

CR is the process of gathering information by using all the senses, analysing them, synthesising them, evaluating them to make important decisions in the whole clinical cycle of a patient’s journey. The optimal patient outcomes depend on the CR model that the clinician uses to make decisions in a particular situation, his/her knowledge and experience, awareness of the biases and metacognition. CR is not happening solely ‘in the head’ of a decision-maker but is also a contextually- and environmentally-bound phenomenon.

The researcher puts all the elements of CR together, as shown in the figure and delivered them in CR curriculum for both teachers and students.

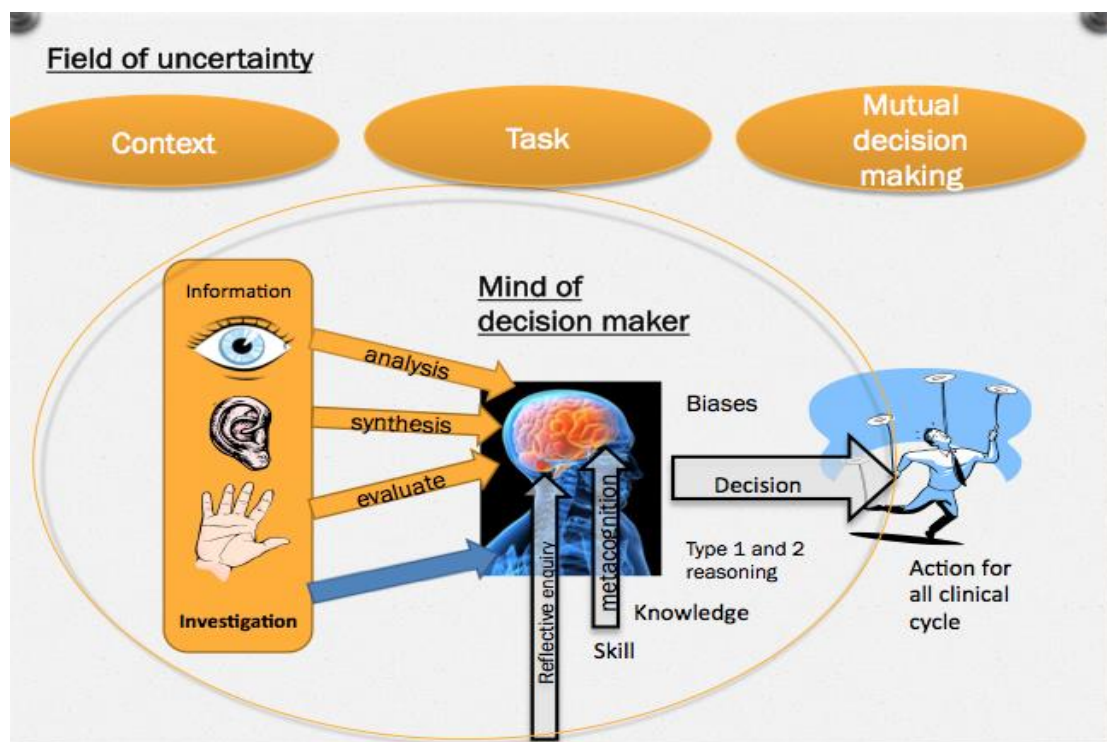


Figure 1: The elements of Clinical Reasoning.

Moreover, medical errors as an effect of faulty reasoning lead to mortality and morbidity of the patients and care users [10]. Therefore CR is strongly linked to the patient’s morbidity and mortality. Hence to promote patient safety, CR should be taught.

The researcher expanded the human factors and the ways to promote patient safety into each key element of CR and each process of CR process in the above figure in the CR curriculum. For example: the factors influencing the decision maker, the components of mutual decision making between patient and staff, the different impacts of task, raising

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awareness of cognitive forcing strategies, knowing one's favored biases, acknowledging emotions (due to external demands, internal stresses and stemming from patient interactions).

The results of the qualitative study, in particular, have contributed to the further development of the CR curriculum and have changed our educational practices.

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Received date: April 04, 2018; **Accepted date:** May 21, 2018; **Published date:** May 24, 2018

Citation: Khin-Htun S, Dennick R (2018) Exploring the Understanding of the Term Clinical Reasoning and Its Importance by the Undergraduate Medical Students. *J Health Sci Educ* 2(3): 138.

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