

## Mini Review

# Is clinical Reasoning Training a Valuable Experience?

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### Abbreviation

BMBS: Bachelor of Medicine, Bachelor of Surgery, BMedSci: Bachelor of Medical Sciences, CLS: Clinical Laboratory Science, CP: clinical phase, CP1: clinical phase 1, CP3: clinical phase 3, CR: Clinical reasoning, CRTs: Clinical reasoning test, GEM: graduate entry medicine, GMC: General Medical Council, UG: Undergraduate, UoN: University of Nottingham

### Background

Clinical reasoning (CR) is the term used to describe the analysis of a patient's clinical presentation by a healthcare professional, so as to better ascertain their likely diagnosis and appropriate management plan. CR skills are traditionally acquired through the experiential learning of undergraduate (UG) students as they progress through the curriculum. Recently there has been an acknowledgement of the need to explicitly teach CR. The University of Nottingham (UoN) aimed to introduce a vertically integrated CR theme. The opportunity provided by this development was used to develop, implement and evaluate this CR curriculum.

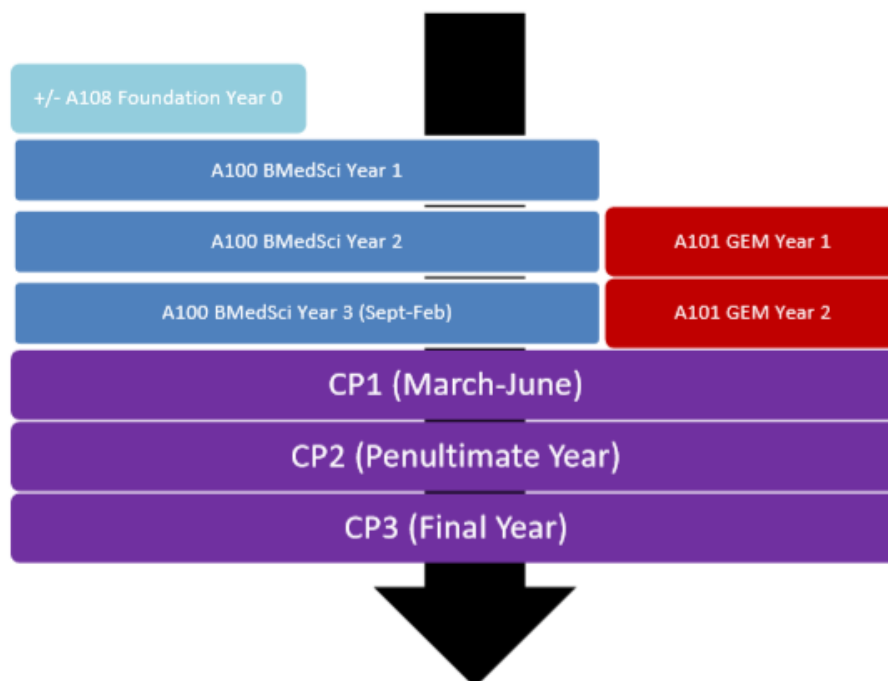
### The Course structure of the UoN medicine Degree

The course structure for medicine at UoN consists of a pre-clinical phase and a clinical phase, with three separate entry routes converging by the start of the clinical phase. There are

1. Five-year undergraduate course (A100)
2. Six-year undergraduate course including a foundation year (A108)
3. Four-year graduate entry course (A101)

For all three tracks, the educational objective is the same: to acquire the knowledge, skills, and behaviour to allow graduates to practice as new doctors on the foundation training programme with the Bachelor of Medicine/Bachelor of Surgery degree. Figure 1 summarises the course structure of the UoN medical degree, and how the different pathways interlink to conclude in qualification.

This study is aimed at evaluating the reaction of the learners (satisfaction with the programme, level 1 evaluation from Kirkpatrick). This is a measurement of the learner's feelings and opinions about the course just completed.



**Figure 1:** The course structure of the UoN medicine degree. BMedSci=bachelor of medical sciences, GEM=graduate entry medicine, CP=clinical phase.

## Methodology

Educational strategies were piloted in each year and evaluated as students moved through the curriculum in order to determine the best methods for implementation of this curriculum. After the pilot phase, the curriculum resources were formally introduced into the UG curriculum.

### Methodology for curriculum implementation

This section highlights the curriculum journey and how this was implemented across the UoN curriculum. The implementation in the GEM curriculum as well as CP1 and CP3 are also highlighted in this section.

#### A. Overview of the Clinical Reasoning Curriculum Journey for Undergraduate Entry Course

It was agreed that the clinical case model should run through Year 1 and Year 2, in order to provide a much smoother progression and link between BMedSci and BMBS. Discussion took place regarding the best strategy to incorporate clinical cases in years one through three. Plans were made to incorporate the clinical cases used by GEM UoN students into the first two years and also to develop a special study component into Year 3 – it would be called Clinical Cases – in which students would be asked to interact with GEM-type cases (CR cases).

During the implementation of the CR curriculum, six CR cases were planned for Year 1 and Year 2, specifically: Medical school entry in September 2011 as an on-line self-directed process. The introduction of formative questions would aid students' use of the cases and help in their understanding. Course implementation began with the Year 1 students, had a session on the topic of 'Thinking like A Doctor' to introduce the concepts and the process of CR.

This was then evaluated through a short questionnaire to see what they thought about the CR cases. Based on feedback, the case releases were redesigned for the formal group of Year 1 cohort school entry of September 2012.

For Year 3 of the BMedSci group, the optional module was planned to be trialled as a pilot with 24 students in three groups, an approach that was perceived as being very resource intensive. The students were divided into 12 groups with the goal of helping students to consolidate and apply knowledge acquired in more didactic teaching. In addition, the use of clinical scenarios was an opportunity for the students to acquire skills in diagnosis and CR.

#### B. Overview of the Clinical Reasoning Curriculum Journey for Graduate Entry Course

In the pre-clinical curriculum, CR was explicitly taught through the following:

- CR workshops;
- clinical skills 'exploring symptoms' workshops; and
- evidence-based medicine lectures

## Year 1

### Workshop 1: Introduction to diagnostic tests

This workshop explores some key concepts such as the probability of a disease depends on the clinical (pre-test) probability, and the sensitivity and specificity of the test (Bayes' Theorem).

### Workshop 2: How doctors think

Human thinking and decision making are flawed. This workshop explores Type 1 and Type 2 thinking (dual process theory), cognitive biases and how our emotions and surroundings can affect our decision-making. 'To err is human'.

## Year 2

### Lecture: Human factors

This lecture recaps previous material and introduces 'human factors', 'affective biases' and some de-biasing strategies that can be useful in diagnostic decision-making [1].

#### C. Overview of the Clinical Reasoning Curriculum Journey for Clinical Years

In this section, the researcher describes why and how the CR curriculum on the CP1 and CP3 were established. Four online CR cases were delivered for CP1 and for CP3. The first author personally created the cases and model answers based on core clinical presentations for students. These scenarios were created based on the format developed by Da Silva [2] and formally validated as formative CR tests (CRTs).

These cases were selected on the basis of the GMC medical curriculum outcomes and the guidelines for UG medical curriculum to ensure that the difficulty level of the cases was aligned with the expected outcomes of UG medical education.

These CP1 materials were introduced to cohort 2013. The CRT was designed as an online test. The CRT was useful for preparing students for clinical practice and also was a useful tool for revising exams.

### Methodology for evaluation

To assess the pilot implementation of the CR curriculum, the researcher designed a short questionnaire provided on-line to seek the students' opinions on the CR cases that were made available. This evaluation was performed to address the students' perceptions of the value of the CR training experience. The questionnaires began with a series of closed questions that measured the students' ratings of the sessions and ended with open questions to seek the students' detailed opinions and insights.

## Results of the Study

The results of the pilot evaluation through the short questionnaires provided to the NLE in regard to the CR cases during the pilot implementation showed that for year 1, 87 of 248 students (35%) completed the online questionnaire and 42 students completed the free-text portions of the questionnaire. The findings showed that 13 of 248 students (5%) acknowledged the relevance of Clinical cases to their modules and career. In addition, no other issues were raised during the feedback meeting as none of the issues presented in the questionnaire were encountered by above 5% of the sample, which was the threshold assigned by the committee.

Curriculum effectiveness was also measured through the student feedback questionnaires in year 2. Out of 252 students, 125 (50%) completed the online questionnaire and 154 students completed the free-text portions. The results showed that 44 of 116 students (38%) agreed or strongly agreed to the usefulness of the clinical reasoning module in supporting the CLS module. Moreover, 70% of the students agreed or strongly agreed that the clinical contents of the cases were realistic and related to what is expected in practice, 49% agreed or strongly agreed that the CR tests helped developing their CR skills and data interpretation skills, and 48% of the respondents expressed their desire for more CR tests and emphasized this in their free-text responses as well.

- “I think these types of learning aids are very useful, therefore more cases and increasing variety would be extremely beneficial.”

- “I think it has a lot of practical value as well as a sort of academic value: helping you prepare for potential cases in the knowledge papers and for my future career as a doctor to be able to think in a structured way”.

Some students would also like to have individual and more detailed feedback, written resources, more cases linking to the modules that they are covering and send more reminders about these cases using text messages.

- “You don’t get very many and then so a lot of people forget to do it. Rather than they don’t want to do it but you’d do one a week or something so it was just always in your head that, ‘I’ve got to do that before Friday’.”

- “I do find them very useful. I think sometimes it’s very difficult because if you’re presented with a case that you haven’t yet done a reading about. You don’t quite get the full benefit from it”

- Year 1 students stated, “Unlike first term I really felt that I was being reminded of why I was at Medical School. It really boosted my confidence and interest for the course and encouraged me that there was light at the end of the dark tunnel of first term!!”

- In year 2 feedback, more than 50% of year 1 students stated, “the Clinical cases stimulated my interest in clinical medicine”.

- Year 3 students said, “Great module. Very interesting and relevant to medicine! It helped me build my teamwork skills and I learnt a lot about problem solving and the process of diagnosing and treating a patient.”

- CP1 students mentioned, “Well I’ve really enjoyed them because that’s exactly what you come across when you meet someone on the ward, and as you work through ---those CR

assessments --- at a very smooth way where you can sit down and work through as if they were a real patient. So, I find that quite useful.”

- CP3 students added, “They’re good because they go through the steps and help you to --- go through the process yourself and see what is happening and make some decisions based on the information that you’ve got. So that reflects what happens in real life.”

- The GEM students’ view on new assessments was very positive too. For example, ‘I like the reasoning exams. I think they are a good idea conceptually. I believe that most modern-day exams may be prepared for in the majority by pure memorisation and I do not like this fact. As doctors we will need knowledge, which will have to be memorised, but the use of the knowledge, through reason will be as important as the knowledge itself.’

## Discussion

The participants found the CR curriculum engaging and favourable.

The first author designed evaluations of CR, acquired evaluation data for them, reviewed the educational interventions, and helped to redesign the course as dynamic process.

Because of this new intervention, UoN BMedSci is changed into more of an integrated course with more clinically relevant experience, case studies and a patient centred approach along with an increased focus on dissection studies. The science component of the BMedSci was not dropped, but was reinforced by an increase in the CR activity. Based on the popularity of the student preference and the introduction of new structure of the medical school, year 3 optional module became mandatory for the students allocated to School of Life Sciences home bases. Hence, the student intake has increased to 140-150 students every year.

CR teaching for clinical years and clinical teachers training were also formally implemented.

## Conclusion

The use of CR teaching curriculum is a way to enhance the CR of students. Even though the literature on the effectiveness of curriculum in developing CR has not been established, this study extends the support for their effectiveness. The clinical training of students should have an explicit and implicit CR component that would aid in the enhancement of their CR.

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