Original Articles/นิพนธ์ต้นฉบับ

Correlation between Medical Students' Grades and Computerized Multimedia Simulated Patient Cases generated by DxR Clinician Software.

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Abstract

Background: Medical education through computer software has been widely used among medical students throughout the world. DxR Clinician is available software in Thailand. It is useful for problem-based learning, which helps students to improve their diagnostic performances.

Objective: This study aimed to assess the correlation between formative family medicine scores of fifth year medical students and scores of diagnostic reasoning ability provided by DxR Clinician software. We studied on the correlation of both scores to determine the accuracy of the software analysis system.

Material & Methods: In year 2005-2006, 183 medical students from Mahidol University, Bangkok, Thailand, were assigned to complete cases in DxR Clinician software. 12 groups of students conducted 7 patients case-based. This research study on the correlation between the Clinical Reasoning Score (CRS), the Level of Diagnostic Performance (LDP), the Management Scores (MS) of DxR Clinician software, and compared with the scores of medical students when they passed family medicine rotation. Statistics were reported by using SPSS program.

Results: There were no significant correlations between overall performance scores and grading scores. Moreover, the students who had high family medicine grades had low Clinical Reasoning Score (CRS) and Level of Diagnostic Performance (LDP).

Conclusions: All of scores generated by computerized simulated patient software could not determine the knowledge level of the students. There was no correlation between the levels of diagnostic performance, clinical reasoning ability and students' grades. Teachers should justify the students' scores when using this educational tool.

Keyword: Multimedia Simulated Patient, DxR Clinician Software, Web-based critical thinking software, Diagnostic reasoning clinician, interactive computer platform

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Background

In order to encourage effective learning skills for students, and helps them to improve their diagnostic performance, we have to let them learn by themselves. Therefore, we need tools to help problem-solving process and providing a good feedback.

DxR clinician or Diagnostic Reasoning Clinician software is an interactive computer platform in which simulate real case situations. It provides the examples of patients who come to see the doctors at the hospital and set the situations as students are the first doctors to see them. This software offers 250 questions. Students can ask or add any other questions they need. It also provides students with relevant tools to complete physical examination. Students can interpret, gather information and give the differential diagnosis for the answers. After that, they can choose to order any types of investigation. This software offers price lists of investigations so that students can make an appropriate decision. In addition, it provides final scores for students.

Before getting start to use this program, medical teachers will orientate and give the instructions to all the students. After they finish this program, all the students' data will be recorded and evaluated by medical staffs. The conclusion of the scores will be clarified with reasons. Medical staff can analyze students' scores according to each part of students' ability such as diagnostic justification part, hypothesis refinement part, and laboratory interpretation part, etc.

For the formative family medicine scores of the fifth year medical students, the researcher collected the scores from MCQ and MEQ exam, which have resembled clinical questions with the questions in the software.

This study aimed to compare the scores of MCQ and MEQ exam of fifth year medical students when they passed family medicine rotation and students' score from practicing DxR Clinician software. We compared these 2 types of scores in order to test the accuracy of the software to detect the students' knowledge level.

Methods

We collected 183 medical students' grades and records when they pass Family Medicine rotation in year 2005 & 2006. The research was done in Mahidol University, Bangkok, Thailand. We randomly selected 7 patients case based and assigned 12 groups of students to conduct the cases. The simplicity and difficulty of the cases were compared by Anova test and Bonferroni test with SPSS program.

The example of the questions from the software was shown in Table 1. We cannot show MCQ and MEQ exam because of confidentiality.

Results

The overall performance scores from DXR software were shown in Table 2. 12 groups of students conducted 7 cases in DxR Clinician software. The mean of the students' score was 51.5 except the scores from a patient. No.3 and a patient No.7, students made very low scores with a statistical when compared to others. However, all the students, who had done the clinical problem No.3. and No.7 had the same MCQ and MEQ score with other people in the class (see Table 3). This indicated that all the students had the same level of medical knowledge, but the problems. No 3 & 7 were too hard for them. Patient No.3 is an 86-year-old female with "memory loss". Fifth year medical students had not learned how to approach dementia patients yet. Similarly, patient No.7 is a 47-year-old malepresents the walk-in clinic for evaluation of increasing visual loss. Fifth year medical students did not pass ophthalmology rotation. Therefore, it might be hard for them to differential diagnosis patients with visual loss. We excluded the scores of these two groups before analyzed and compared with MCQ & MEQ score.

A researcher plotted the graph between MCQ

Table 1 The questions from the software

DxR Clinician Software questions
Patient No. 1 Extremities pain
A 50-year-old man is seen in family practitioner's office for acute knee pain.
Differential diagnosis: Gouty arthritis, Hypertension, Hyperlipidemia and Left ventricular hypertrophy
Patient No. 2 Fatigue
A 28-year-old female seen for evaluation of fatigue.
Diagnosis: Depression, GERD, Migraine head-aches
Patient No. 3 Memory loss
An 86-year-old female seen for evaluation of "memory loss"
Differential diagnosis: Dementia of the alzhei-mer's disease type
Patient No. 4 Abdominal Pain
An 18-year-old male presenting to your office complaining of recent onset of abdominal pain.
Differential diagnosis: Acute appendicitis
Patient No. 5 Dyspnea
A 27-year-old woman is in the emergency department with wheezing and difficulty breathing. She is able to speak only in short sentences.
Diagnosis: Acute asthma attack
Patient No. 6 Syncope
A 45-year-old obese male sent to you by his employer after blacking out on the job.
Diagnosis: The patient has syncope of unknown origin. Factors that may have contributed to his problem include obesity, high blood pressure, smoking, alcohol, and hyperlipidemia.
Patient No. 7 Blurred Vision
A 47-year-old male present to the walk-in clinic for evaluation of increasing visual loss
Differential diagnosis: IDDM, diabetic retinopathy, behavioral issues.

Table 2 These are the overall performance scores from DxR Clinician software.

DxR Scores / 7 case-based	Number of students conducted each case	Mean (Maximum score = 100)	SD	95% CI for Mean	
				Lower Bound	Upper Bound
Patient No.1	39	65.7	16.3	60.4	70.9
Patient No.2	30	55.5	23.6	46.7	64.3
Patient No.3	28	30.1	24.0	20.8	39.4
Patient No.4	29	53.3	24.7	43.9	62.7
Patient No.5	39	56.4	22.7	49.0	63.7
Patient No.6	9	52.8	21.2	36.5	69.1
Patient No.7	9	15.6	6.5	10.5	20.6
Total	183	51.5	25.6	47.8	55.2

Table 3 MCQ & MCQ score of 5th year medical students

MCQ & MEQ Score	N	Mean	SD	95% CI for Mean		Min.	Max.
				Lower bound	Upper bound		
Patient No. 1	39	106.6	8.8	103.7	109.5	82.5	122.5
Patient No. 2	30	104.7	8.2	101.6	107.7	92.5	121.0
Patient No. 3	28	104.3	10.7	100.1	108.4	78.5	121.5
Patient No. 4	29	101.4	7.3	98.6	104.1	86.0	113.3
Patient No. 5	39	104.3	8.2	101.7	107.0	84.5	120.5
Patient No. 6	9	103.4	9.0	96.5	110.4	90.5	116.5
Patient No. 7	9	105.8	8.5	99.2	112.3	90.0	115.0
Total	183	104.4	8.7	103.1	105.7	78.5	122.5

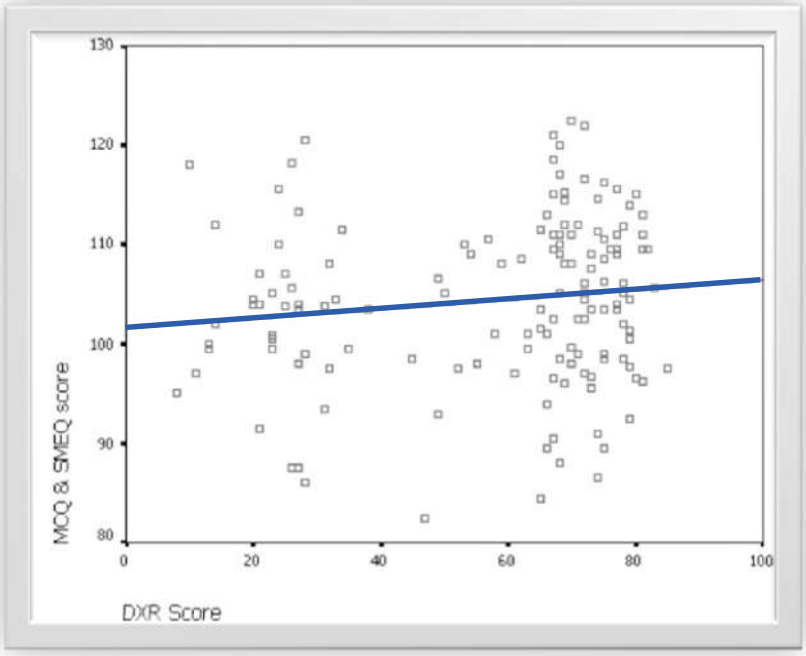

Fig.1 *Graph between MCQ & MEQ score and DXR overall performance scores.*

score and DxR score as shown in Figure 1. There was no significant correlation between grading scores and DxR scores. Moreover, the students who had high family medicine grades had low Level of diagnostic performance.

The diagnostic reasoning scores generated by computerized simulated patient software could not determine the knowledge level of the students. There was no correlation between the levels of diagnostic performance and students' scores.

Discussion

From the conclusion, teachers need to justify the answers to make them more accurate. We should change the answers for each problem. There is an "adjusted criteria" page to check the scoring system of the program. There are some pitfalls of the program such as some students get better scores even though they order unnecessary and too expensive test. Teachers should give personal feedback after practicing this program, so they will learn from their mistake.

Limitation

Before getting start to use this program, medical teachers will orientate and give the instructions to all the students. However, there are some feedbacks, the students said that asking questions, sending investigated tools from this program were hard to use. Consequently, they may get a lower score than usual.

Implication and Suggestion

The DxR program helps medical teachers identify strengths and weakness of students' ability to diagnose patients. It shows how to evaluate the students' performance in approaching patients. It can help students to gain confidence through the feedback process. However, teachers should justify the students' scores when using this educational tool.

Completing Interests

The authors declare that they have no competing interests.

Author's Contribution

Dr.Montarat Chinda participated in the design of the study, collected data, drafted the report, read and approved the final manuscript. Ms.Umaporn Udomsapayakul helped with statically analysis.

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