



RESEARCH ARTICLE

# Learning by doing: To explore the influence of Simulation on Clinical Decision-Making Approaches on Final Year Medical Students at the University of Duisburg-Essen, Germany

## [version 1]

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### Abstract

This article was migrated. The article was marked as recommended.

Background: Final year medical students at the University Duisburg-Essen, Germany, are unsatisfied with their clinical judgement skills in common elective and emergency clinical situations. A competency based medical curriculum determines that clinical judgement is an essential tool in effective patient care, patient safety and limiting clinical error. Approaches to clinical judgement include either analytical, intuitive or a combination of both approaches. Novices show specific factors, which are typical in inexperienced clinicians. Simulation provides opportunities in a competency-based medical education curriculum. There is limited evidence showing that simulation can provide an effective environment for teaching and learning clinical decision-making skills. This project explores how final year medical students at the University of Duisburg-Essen approach the clinical decision-making process as well as how simulation influences this process.

Methods: Ethics approval was obtained from the local ethics committee. After completing a 10-week simulation course, thirty-five students completed a clinical decision-making instrument to categorise their clinical decision-making approaches. The Novice Decision Making Model and the Cognitive Continuum Model were combined with learning theories in Simulation (Social Cognitive

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#### Invited Reviewers

**1** **2**

#### version 1

13 May 2021

report

report

1. **Leila Niemi-Murolo**, University of Helsinki

2. **Mildred López**, Tecnológico de Monterrey, School of Medicine and Health Sciences

Any reports and responses or comments on the article can be found at the end of the article.

Theory) and used to explore and interpret data collected through questionnaires, interviews and observation.

**Results:** The majority (60%) of students employed a predominantly analytic approach, some students showed intuitive tendencies in clinical situations. During interviews students displayed typical novice approaches to decision-making and expressed positive comments relating to simulation.

**Conclusions:** Simulation presents an opportunity for teaching and learning clinical decision-making. Results show the need for further inquiry into learning clinical decision-making through simulation. This research provides initial evidence that simulation can be incorporated into curricular teaching of clinical decision-making.

### Keywords

Clinical decision making, medical students, High-Fidelity Simulation, Learning Theories.

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## Supplementary Material 1

Table showing student 'quotations from Interviews

Themes	Sub-Themes
	<p><u>Difficulty Focusing:</u></p> <p>(S4) “I have never actually treated a nosebleed before, and I also noted that he was anticoagulated. I got completely focussed on reversing the anticoagulation even though there were simple measures to start management of a nosebleed. So, in the end, I did nothing about his presenting problem”.</p>
Personal Issues	<p><u>Anxiety:</u></p> <p>(S6) “I knew I had to do something, but my heart rate was like 180 and I was petrified that I could be wrong. Something could have gone wrong because I did it. I don't have enough experience. The consequences are known, and the patient usually won't die directly because of it, but one is still afraid that the patient may die”.</p> <p><u>Lack of Confidence:</u></p> <p>(S3) “I'm pretty sure he's bleeding from the liver but what if it's a lung embolus and I don't get him anticoagulated....”.</p> <p><u>Personal Reflection of Behaviour:</u></p> <p>(S7) “Well, when I have time, I often ask a colleague: I would do it this way, would you do it that way too?”</p>
Social factors	<p><u>Response from colleagues and seniors:</u></p> <p>(S5) “Then you can see the patient and you want to give him the feeling that you are prepared and knowledgeable. I mean</p>

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you don't want him to feel like you're incompetent especially when you see him before the resident”.

Lack of experience with autonomy and responsibility:

(S8) “I mean before it was always like read the notes then go clerk the patient. Sometimes you never had a chance to discuss anything. Now I’m getting sent off by myself to take a history and I know that the nurse expects me to make orders and so, but I’ve never had to do that without discussion and well it’s a big responsibility”.

Flexible approach to CDM:

(S7) “Well, if someone comes into the emergency room who had a head injury and they report that he is taking anticoagulants, then I'm not hesitating whether he gets a CT (computed tomography) or not. I do not need to rethink my decision in that situation. But if the situation is much more complicated, then I handle it differently”.

(S3) “For example, when I get called or notified by the ward, that a patient has dyspnoea, then I go to the ward and I’m already trying to figure out why the patient has dyspnoea and what are the most likely differential diagnoses. I start collecting my information from all sources, I try to be systematic.”

(S3) “ I think, that with the experience you just do things automatically at some point you know, like which investigations you need to order, but right now I still ask myself, especially when doing something a bit more invasive or new, if I really have to do it because I need to consider all possible consequences”.

Task Features:

(S4) “It also depends on the time you have. When there is a patient, who is pale and tired all the time, then I think of anaemia

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and I have the time to examine that further and consider possible causes.”

Pre-encounter:

(S3) “Yes, while I'm on my way there, I'm thinking about what the problem could be, without knowing the patient yet and then I start collecting my information. I look at the lab results, which medication she takes etc., I try to be systematic.”

Observer and participant exposure:

(S2) “As a spectator, one sits there and thinks: "I would have done this now and that now or maybe something different to the doctor. But as the participant, one cannot think so clearly. So, it is more stressful to consider your actions.”

(S4) “I would say in both cases you learn different things. You take different things out of each situation. Personally, I still remember the things I did wrong when I played the doctor and I think it will stay in my memory but as the observer, I thought more what would I do differently or wow I would never have thought of doing that.”

Learning Strategies

Reflection on Behaviour:

(S1) “Well, now that I've done the simulation, I often ask myself: would I do it this way, would I do it that way too?”

Reflection on Behaviour:

(S1) “The best thing about the simulation is the feedback. I have the opportunity to assess my own decision, why I did that and got positive criticism on it. It helps to see things from different perspectives and then maybe next time I can do some things differently.”

Simulation Issues

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Lack of experience with autonomy and responsibility:

(S4) “We get all this CPR training as students, but I have never actually seen a real arrest, and I have definitely never been responsible for the management. I was so scared that I wouldn’t know what to do. But in the SIM, I have experienced CPR from start to finish, and I’ve had to make the decisions. It was scary, but now I feel like I can handle it myself”.

Exposure to new situations:

Feedback from experts/colleagues:

(S4) “A lot of time on the wards there is just no time to sit down and discuss things. I mean I know I have to take blood and order a chest Xray, but no one explains why. That was the best thing about the simulation. Now I know I have back up knowledge for my decision. Plus, it is just great being in a positive environment where you are not criticised for the wrong answer”.

Ability to observe peers: See Observer and participant exposure.

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### Mildred López

Tecnologico de Monterrey, School of Medicine and Health Sciences

This review has been migrated. The reviewer awarded 5 stars out of 5

I think the article is an interesting manuscript worth reading by other medical educators. I see the value of the authors explaining the theory and the framework that supports the study; I think not many papers do that. I also found it interesting that the authors included the structure of the sessions and the topics, so other schools can replicate them. I would love to read more, as the other reviewer mentioned, about the qualitative analysis. I noticed that it was part of a thesis project, so I am sure it was a matter of summarizing all the work in here.

**Competing Interests:** No conflicts of interest were disclosed.

Reviewer Report 23 May 2021

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### Leila Niemi-Murola

University of Helsinki

This review has been migrated. The reviewer awarded 3 stars out of 5

This is an interesting article focusing on the influence of simulation on clinical decision-making. This is a hot topic, and many medical students have difficulties in learning this essential skill. The authors give a

thorough presentation of the theoretical background of their study, which the reader truly appreciates. Forty out of 120 students participated the study. The course was mandatory, but 40/120 students participated. Perhaps the course is organized three times per year? The authors used a validated tool designed to assess decision-making and they had semi-structured interviews for eight participants. The authors don't report if they were individual or focus group interviews. The questionnaire revealed that most students had an analytical approach on decision-making and five themes emerged from the interviews. The results were very interesting, but the connection and the summary of the results received using the questionnaire and the interviews remains vague. These interesting results inspired many thoughts and hopefully the authors elaborate these themes in their further studies.

***Competing Interests:*** No conflicts of interest were disclosed.

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