

# Can you learn from a dummy? Pharmacy students' views and perceptions of SimMan, a human patient simulator

CLEOPATRA BRANCH<sup>1\*</sup>, TARLOCHAN GILL<sup>1</sup>, BUGEWA APAMPA<sup>1</sup>

<sup>1</sup>Medway School of Pharmacy, Universities of Kent and Greenwich, Central Avenue, Chatham Maritime, Kent ME4 4TB, UK

## Abstract

**Background:** Simulation-based learning has been used extensively in medicine and nursing but its use in pharmacy education is now gaining momentum.

**Aim:** To explore the views of second year pharmacy students on the value of SimMan in the teaching of Pharmacology and Therapeutics at Medway School of Pharmacy.

**Method:** A 25-item pre-piloted satisfaction questionnaire was administered to 104 students immediately following a SimMan workshop.

**Results:** There was a 100% response rate. The majority (80%) of students enjoyed using the simulator, as it allowed them to have 'hands on' experience which led to a perceived enhancement of their knowledge, communication, problem solving and clinical skills. Only 19% of respondents found it stressful working in a technological environment. Students also felt that SimMan should be more widely utilised and made suggestions on how its use could be improved.

**Conclusion:** SimMan helped students to apply their knowledge. The invaluable feedback from students will help improve its future use.

**Keywords:** *communication skills, clinical skills, knowledge, problem solving skills, SimMan*

## Introduction

Over the past five decades, the focus of pharmacy practice in the UK has shifted from the traditional model of medicine supply and distribution to the provision of patient-centred care, with pharmacists now assuming a greater clinical role and having much more patient contact. As a result, the profession has been faced, especially in the past two to three decades with demands for radical reform in pharmacy education in order to keep pace with the changing role of the pharmacist. The onus is therefore on Schools of Pharmacy to adequately prepare students for future practice by equipping them with the necessary clinical skills and competencies underpinned by relevant and up-to-date science.

With the emphasis now on increasing the clinical context of pharmacy education (DoH 2008), many Schools are developing educational strategies that utilise a variety of methods for teaching and assessments in addition to the more traditional forms. These include Objective Structured Clinical Examinations (OSCEs), interprofessional learning, experiential learning and simulation.

Simulation-based learning which adopts an experiential learning approach may be described as "learning by doing". It provides a safe and controlled environment that closely resembles an actual clinical care setting; where students can have practice experiences that allow them to apply the knowledge and skills gained in the classroom.

Models of patient simulation include the use of patient actors; paper-based case study presentations and guided group discussions. In addition, anatomical models are used. These range from the simple low fidelity simulation tools such as full body Advance Life Support trainers, Resusci Anne intravenous training arms, intubation or airway management heads to computerised intermediate and high fidelity patient simulators. Intermediate and high fidelity patient simulators are two levels of advanced full body scale simulation. The intermediate fidelity models are partly interactive while the high fidelity type such as SimMan is a fully interactive human patient model that responds to treatment given (Alinier et al 2004; Seybert et al 2008).

SimMan is a universal computerised full body human simulator that has realistic anatomy and clinical functionality such as audible heart, lung and abdominal sounds, palpable pulses and visible hemodynamic monitoring such as continuous electrocardiogram (ECG) monitoring. It is also capable of speaking and can be programmed to display the symptoms of a wide range of illnesses. The use of such technology allows for easy standardisation of the patient in the disease state; with symptoms and disease progression remaining the same for each student encounter.

Simulation-based learning has been used extensively in medical and nursing education. Its use in UK pharmacy curriculum has not been extensive but it is gaining in popularity because of the changing nature of pharmacy education.

\*Correspondence: C. Branch, Medway School of Pharmacy, Universities of Kent and Greenwich, Central Avenue, Chatham Maritime, Kent ME4 4TB, UK. Email: c.branch@kent.ac.uk

Simulation-based learning using role play, paper-based patient case study presentations and guided group discussions was incorporated within the Medway School of Pharmacy innovative curriculum since its inception in 2004. In 2005, the School also invested in SimMan technology to teach clinical skills to undergraduate and postgraduate students.

What is not currently documented is the impact of using this modern technology on learning and teaching enhancement at the School. We believe that SimMan may provide a mechanism for pharmacy students to acquire and demonstrate clinical skills in a safe environment. Currently SimMan is not being used to its full extent as it is mainly used for showcasing simple cardiovascular and respiratory scenarios to students. We therefore developed a case scenario for a diabetic patient and tested it out on students.

## **Aims and Objectives**

### *Aim*

To explore the value of simulation using SimMan technology, as a method of learning and teaching in the pharmacy curriculum

### *Objectives*

1. To determine the usefulness of SimMan as an effective instructional tool to facilitate the teaching of pharmacology to second year pharmacy undergraduate students
2. To investigate the benefits and limitations of SimMan

## **Methods**

### *Study Design*

PHAM 1008 Pharmacology and Therapeutics is a 30-credit core module offered in the second year of the MPharm programme at the Medway School of Pharmacy. Traditional didactic lectures are usually combined with interactive workshops where a variety of teaching methods are utilised. These include paper-based case studies discussion in small and large groups, role play (between students and their peers or staff) and simulation using SimMan technology. The purpose of the module is to introduce students to the pharmacological basis of drug action and application of this knowledge in clinical practice early in the pharmacy curriculum. The diabetes course in the pharmacology module includes lectures on the pathophysiology of type 1 and type II diabetes and the pharmacology of all classes of drugs used in its treatment as well as non-drug treatment.

All 130 second year students who enrolled on the module were eligible to participate in the study but were required to attend the SimMan workshop to be included in the study. Prior to the workshop, the students attended lectures on diabetes. They were divided into three groups, each comprising 43 - 44 students however for the actual SimMan session they were further divided into smaller groups of 10-20 students.

A case scenario for a diabetic patient who developed a hypoglycaemic episode while the pharmacist was conducting a medication history was designed and programmed into SimMan computer software. All relevant information including laboratory and clinical data representative of real-

life practice was made available to students. SimMan spoke to the students through a staff member using a microphone connected to the computer. To make it appear real, the operator sat in a booth adjacent to SimMan out of sight of students. Patient responses were scripted to allow for consistency at each of the three workshops. Students were given specific case scenario objectives designed to allow them to utilize a range of skills including communication, knowledge, problem solving and clinical skills to provide appropriate care to the patient. Immediately following the SimMan session, students were asked to give their views of the experience by completing an anonymous post-session questionnaire.

### *Questionnaire survey*

A 25-item questionnaire was designed to evaluate the impact of simulation using SimMan technology on students' learning experience. Both quantitative and qualitative methodologies were used to obtain the relevant data. The questionnaire consisted of five constructs - communication, knowledge, clinical and problem solving skills as well as satisfaction with the use of SimMan technology. Students were asked to rate the statements pertaining to each construct on a 5-point Likert-type scale - "strongly agree" to "strongly disagree".

In order to generate qualitative data, students were asked 3-open ended questions on what they liked most and least about their SimMan experience and to report any other information relevant to the entire experience. In addition to providing demographic data, study participants were asked to indicate their preferred learning style. The questionnaire was pre-piloted to test for reliability, content and face validity and the ease with which it could be completed, among a sample of six third year students with recent SimMan experience and six academics involved in either the writing of scenarios, scenarios programming or teaching on the module.

### *Ethical approval*

Ethical approval was sought and obtained from the Medway School of Pharmacy Research Ethics Committee prior to commencement of the study.

### *Participant recruitment*

A letter of invitation to participate in the study was sent via email with a participant information leaflet as an attachment, to all second year pharmacy undergraduate students.

### *Inclusion and exclusion criteria*

All students enrolled on the second year of programme who attended the SimMan workshop on diabetes were included into the study. Students from other years and those who attended the diabetes pharmacology lectures but not the SimMan workshop were excluded from the study.

### *Sampling*

The questionnaire was administered to students immediately following the SimMan workshop.

### *Governance*

Participants were informed that data would be anonymised to assure confidentiality and that personal details would not be used without their prior consent. Participants were also informed that completion of the questionnaire was entirely voluntary.

### Data analysis

Data was analysed using the software packages Microsoft Excel and SPSS (v 17.0) and reported using suitable descriptive statistics. Qualitative data generated from the open-ended questions in the questionnaire was analysed to identify emerging themes.

### Results

104 (80%) of the 130 students enrolled on the module met the inclusion criteria for the study and all completed the post-simulation questionnaire (100% response rate). Demographics of the students are shown in Table I. Of the 87 respondents who reported their gender, 58.7% were female and 41.3% were male. The majority of students (78.7%) were from the 18-24 age group while 6% were in the over 30 age group. An equal number of students indicated that they were visual (44%) or kinaesthetic ("learning by doing") learners (44%). About 12% were audio learners. 10 respondents gave two or three preferred learning styles while 20 did not indicate their preferred learning style.

**Table I: Demographics of second year pharmacy students who participated in a SimMan workshop**

Demographics	N= 104
<b>Gender</b>	<b>No of students (%)</b>
Male	36 (41.4)
Female	51 (58.6)
No response	17 (16.3)
<b>Age Group (years)</b>	
18-24	74 (78.7)
25-30	14 (14.9)
>30	6 (6.4)
No response	10 (9.6)
<b>Preferred Learning Style</b>	
Visual	32 (44)
Audio	9 (12.3)
Kinaesthetic	32 (44)
Visual and audio	2
Visual and Kinaesthetic	3
Audio and Kinaesthetic	2
Visual, audio and kinaesthetic	3
No response	20

**Table II: Students' views on the impact of SimMan on their communication skills**

Survey item	Strongly Agree (%)	Agree (%)	Neither agree/disagree (%)	Disagree (%)	Strongly disagree (%)
I feel better able to communicate with a patient (n = 104)	15 (14.4)	62 (59.6)	13 (12.5)	9 (8.6)	5 (4.8)
I am better able to conduct a medication history in a diabetic (n = 104)	13 (12.5)	66 (63.4)	12 (11.5)	12 (11.5)	1 (0.9)
My ability to provide advice to patients with diabetes has improved (n = 104)	10 (9.6)	60 (57.6)	19 (18.2)	14 (13.5)	1 (0.9)
I am better able to communicate the signs and symptoms of hypoglycaemia (n = 104)	11 (10.5)	59 (56.7)	22 (21.1)	12 (11.5)	-
SimMan is an effective tool for teaching communication skills (n = 104)	28 (26.9)	49 (47.1)	16 (15.3)	11 (10.5)	-

### Communication skills

Responses relating to the effect of SimMan on students' communication skills are shown in Table II. The majority of students (74%) felt that SimMan was an effective tool to teach communication skills to students. A similar percentage felt that they were better able to communicate with a patient about the signs and symptoms of hypoglycaemia, or to conduct a medication history in a patient presenting with type 2 diabetes. Sixty-seven per cent of the students also agreed or strongly agreed that their ability to provide advice to a diabetic patient had improved following the SimMan workshop.

### Knowledge

As shown in Table III, students also responded positively to the impact of SimMan on their pharmacological knowledge. More than 50% of the respondents felt that SimMan helped them to improve their knowledge of diabetic complications and reinforce the diabetic material learned in class. Over 70% of students felt that they were able to reflect and learn from their SimMan experience. Sixty-seven per cent of the respondents strongly agreed or agreed that SimMan was an effective tool for facilitating the teaching of pharmacology while less than 20% of students remained undecided.

**Table III: Students' views on the impact of SimMan on their knowledge of diabetes**

Survey item	Strongly Agree (%)	Agree (%)	Neither agree/disagree (%)	Disagree (%)	Strongly disagree (%)
My knowledge of diabetic complications improved since using SimMan (n=104);	9 (8.7)	49 (47.5)	29 (28.1)	15 (14.5)	1 (0.97)
SimMan allowed me to reflect and learn from my experience (n = 104);	15 (14.5)	62 (60.2)	13 (12.6)	11 (10.7)	2 (1.9)
SimMan has helped me to understand the pathophysiology of diabetes (n = 104);	4 (3.9)	44 (43.1)	29 (28.4)	22 (21.6)	3 (2.9)
Compared to a standard workshop, SimMan helped to reinforce the diabetic material presented in class (n = 104)	13 (12.6)	55 (53.3)	20 (19.4)	12 (11.7)	3 (2.9)
SimMan is an effective instructional tool to facilitate the teaching of pharmacology (n = 104)	19(18.4)	50 (48.5)	18 (17.5)	15 (14.6)	1 (0.97)

*Problem solving skills*

Students attributed the improvement in their problem solving skills to SimMan. Results presented in Table IV shows that about 60% of students reported that their confidence in identifying drug therapy problems and dealing with a diabetic patient presenting with hypoglycaemia had improved. The majority of respondents were of the consensus that SimMan could be used to help students develop and apply problem solving skills.

*Clinical skills*

67% of students felt that SimMan allowed them to have “hands-on” experience and 75% agreed or strongly agreed that they could apply the clinical experience gained in a real life clinical setting. An overwhelming 80% agreed that SimMan was an effective tool for teaching clinical skills to students (Table V).

**Table IV: Students’ views on the impact of SimMan on their problem solving skills**

Survey item	Strongly Agree (%)	Agree (%)	Neither agree/disagree (%)	Disagree (%)	Strongly disagree (%)	No response (%)
I feel confident in identifying and resolving drug therapy problems;	11 (10.7)	51 (49.5)	28 (27.2)	13 (12.5)	-	1 (0.97)
I feel better able to apply solving skills in a patient with diabetes;	6 (5.9)	55 (54.5)	22 (21.8)	18 (17.8)	-	3 (2.9)
I feel more confident dealing a hypoglycaemic patient;	12 (11.6)	57 (55.3)	19 (18.4)	15 (14.5)	-	1 (0.97)
I feel better able to recommend modifications to a diabetic patient;	15 (14.5)	54 (52.4)	24 (23.3)	10 (9.7)	-	1 (0.97)
SimMan has helped me to my problem solving skills.	10 (9.7)	49 (47.5)	24 (23.3)	19 (18.4)	1 (0.97)	1 (0.97)

**Table V: Students’ views on the impact of SimMan on their clinical skills**

Survey item	Strongly Agree (%)	Agree (%)	Neither agree/disagree (%)	Disagree (%)	Strongly disagree (%)	No response (%)
SimMan has allowed me to gain “hands on” experience	12 (11.5)	58 (55.7)	22 (21.2)	12 (11.5)	-	-
I am better able to manage a patient with hypoglycaemia	7 (6.7)	61 (59.2)	20 (19.2)	20 (19.2)	1 (0.96)	-
I can better recognise a patient presenting with symptoms of hypoglycaemia	13 (12.6)	61 (59.2)	10 (9.7)	10 (9.7)	-	1 (0.96)
I can use the clinical experience gained in a real-life practice setting	17 (16.3)	64 (61.5)	5 (4.8)	5 (4.8)	-	-
SimMan is an effective tool for teaching clinical skills	24 (23.1)	59 (56.7)	8 (7.6)	8 (7.6)	1 (0.96)	-

*Satisfaction with SimMan technology*

A majority of students (80%) enjoyed their SimMan experience. Students felt that the experience was good because it paralleled real-life clinical practice and asserted that interaction with the human patient simulator was better than they had expected. With regard to the simulation encounter being stressful, 19% of students found the experience stressful. Most of the students were of the opinion that SimMan was currently underutilised at the School and that its use in teaching pharmacology should be increased. The results of the students’ responses are summarised in Table VI.

Several themes emerged from the students’ free-text comments. Students liked the realism of the simulation exercise and commented that it “mirrors real life” and gave “a taste of what a real life diabetic situation may be like”. One student also said that it gave them “an insight into a real life situation which you may experience as a pharmacist”

The fact that the simulation provided “hands on” experience that “helps you put what you learnt into practice” was a popular comment among students. They referred to it as being

“practical” and added that they “learn better from practical hands on sessions”. One student wrote that it gave a “hands on” approach to a clinical problem and an insight as to what questions need to be asked of patients”

Students felt that the session was interactive. One student wrote that interacting with SimMan made “me feel like a real pharmacist” while another said that they were able “to get confident in their communication skills”. Verbal responses from SimMan to questions posed by students led to an interesting comment from one student, that the “interaction back from SimMan made it seem like a real patient-pharmacist interaction”

Students recognised and appreciated that SimMan provided “good communication practice” and that it could “help in the preparation for OSCE”. One student wrote that “I was able to demonstrate my communication skills” while another said that it “improved my communication skills”. The students felt that SimMan could be used as a learning tool to practise “communication” techniques for conducting “medicine use reviews (MURs) and medication history taking”.

**Table VI: Students' views on the degree of satisfaction with learning technology**

Survey item	Strongly Agree (%)	Agree (%)	Neither agree/disagree (%)	Disagree (%)	Strongly disagree (%)	No response (%)
I found it stressful working in a technological environment	4 (3.8)	16 (15.4)	20 (19.2)	51 (49)	13 (12.5)	-
I have enjoyed using SimMan	15 (14.4)	68 (65.4)	9 (8.6)	9 (8.6)	3 (2.8)	-
The experience was good because it mirrored real life	14 (13.5)	63 (61.2)	10 (9.7)	10 (9.7)	6 (5.8)	1 (0.96)
Interaction with the patient simulator was better than I expected	15 (14.4)	45 (43.2)	29 (27.9)	11 (10.5)	4 (3.8)	-
I think that SimMan should be used more often in the teaching of pharmacology	29 (27.9)	48 (46.2)	18 (17.3)	6 (5.8)	3 (2.8)	-

SimMan also helped students to identify gaps in their knowledge. "It made me aware of what I didn't know ....when communicating with a hypoglycaemic patient" and with their "problem solving issues"

With regards to the things students liked least about the SimMan experience, some of the respondents raised concerns about the poor sound quality in the SimMan suite. They commented that "the sound of SimMan wasn't very clear" and that "it echoes".

Students were concerned about the size of the group during the simulation session and commented that "too many people were crowded around SimMan" hence "it was not possible to see everything".

Some students would have liked to be prepared beforehand. "I wish I was better prepared for it" and "you are not able to do it unless you have read the notes beforehand" were among comments echoed by students.

A few students felt uncomfortable and did not enjoy talking to SimMan and commented that they "felt stupid talking to a dummy" and that they "prefer role play with a teacher/students as it's more real". Students also noted that SimMan was not able to provide "a full experience of a real life situation. An interesting comment made by students was the fact that some were able to see the staff member who was providing the voice of SimMan and that this further detracted from the realism of the experience.

Additional comments about the experience include the assertion that SimMan was a good teaching tool that "should be used more often" in pharmacology to help students to apply and consolidate what they have been taught in lectures. "I liked the idea that you have been given the opportunity to put theoretical information from lectures into practice" One suggestion that SimMan should be made to look more realistic such as having appropriate eye and mouth movement may indeed be possible with the advent of new technology.

## Discussion

This study sought to evaluate the views and perceptions of second year pharmacy students of the usefulness of a patient simulator to teach Pharmacology. The authors are unaware of similar research in the UK that has assessed the impact of a patient simulator among this study population. The post-simulation survey showed that a vast majority of students enjoyed using the simulator and less than a quarter of the

respondents found it stressful working in a technological environment. It allowed them to have "hands on" experience which led to an enhancement of their communication, knowledge, problem solving and clinical skills.

These findings are consistent with previous studies reported in the literature. Seybert et al (2006) in a study which explored pharmacy students' response to patient-simulation mannequins to teach Pharmacotherapeutics reported that the simulation session allowed students to utilize their knowledge gained in the course and boosted their confidence. The authors were led to hypothesize that the simulation session was more enjoyable and preferred over traditional didactic lectures.

Furthermore, human patient simulation was found to provide pharmacy students with the unique opportunity to hone their problem solving skills, grow in self confidence and knowledge (Seybert et al 2008).

A review of the free-text comments in the Medway study showed concerns by a majority of students about the large group size at each simulation session. This prevented many students from having a more direct interaction with the patient simulator. Some students also noted that each interactive simulation session was too short and that they would have liked the relevant material beforehand to better prepare for the session.

In a study by Seybert et al (2006) to assess pharmacy students' satisfaction with simulation to teach Pharmacotherapeutics, the respondents were divided into groups of 6-7 students for each simulation session and given the case scenario one week beforehand. Each simulation exercise lasted for 30 minutes. Being given the material one week in advance allowed adequate time for students to prepare themselves. The group size and session duration appeared to be appropriate as there were no reports of comments from the study participants. This point will be addressed in future SimMan workshops.

The students also felt that the staff member who supplied the voice for the simulator should be hidden from students' view in order to make the setting and the situation appear more realistic. This was our intention as the facilitator was in a booth (due to financial constraint) and meant to be out of sight of the students as recommended by a Laerdal trainer. In the Seybert et al study (2006), students were left alone in the room with the patient simulator while the session facilitator was behind a one-way glass mirror in the control room. The facilitator was able to speak to the students through the

simulator and could hear them in the patient's room. The students were deliberately left alone in the patient's room to augment their sense of independence and responsibility.

### Conclusion

The use of the human patient simulator to facilitate the teaching of pharmacology was found to be beneficial in helping students to apply what they were taught in lectures. This led to an enhancement of their learning experience. While students enjoyed the session and felt that the patient simulator could be more widely utilised, they suggested improvements that may further enhance the effectiveness of simulation-based learning and teaching in the pharmacy curriculum.

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