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The use of simulation in the clinical education of radiation science students

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INTRODUCTION

Radiation science education students are considered to be adult learners. According to Fanning & Gaba, adults learn best through experiential learning.[1] Experiential learning actively engages the student by providing them with the ability to participate and play a role in the acquisition of knowledge.[1] Simulation in medical education is a practical approach which allows adults to learn experientially. The goal of simulation is not to substitute for actual clinical experience, but to replicate these clinical scenarios for the purpose of assessment of skill and feedback of the activity.[2]

Reform in education and medicine, along with the pressures associated with patient safety, have promoted the utilization of simulation in medical education. Team-based learning and inter-professional collaboration can also be fostered in a simulated setting.[3] There are many approaches to simulated clinical education; three current methods will be addressed in this exhibit. These three methods include:

1) Utilization of a clinical skills lab manikin
2) Virtual simulation
3) Use of Standardized Patients

Cognitive, psychomotor and affective learning domains can all be evaluating by using any of these three types of simulation methods.

Figure 1. Clinical Skills Laboratory with high fidelity manikin.[4]

CLINICAL SKILLS LAB MANIKINS

High Fidelity manikins have the capability to breathe, bleed, urinate and speak. The manikins are anatomically correct and can be programmed to react to a variety of treatments given by a student. Studies show that students who use simulators improve on skill performance.[5]

There are several ways in which radiation science students could benefit from the use of manikins. A simulated trauma scenario in which radiographers work as a team with students from clinical lab science, nursing, physician assistant or medicine is just one example. Other simulation equipment pertinent to radiation science students are task trainers including Foley catheter manikins, IV arms, and arterial puncture arm and wrist.

The clinical lab setting can be beneficial for psychomotor skills as well as critical thinking and cognition. Skills can be learned, practiced and perfected prior to applying them clinically in a stress-induced environment. Figure 1 illustrates an example of a high fidelity manikin being used in a simulation setting.

VIRTUAL SIMULATION

Virtual simulation or computer based simulation is another option for use in clinical education. The United States Medical Licensing Examination (USMLE) and the American Board of Family Practice use simulation for examinees.[2]

Psychomotor skills can be enhanced in a virtual setting where time and patient constraints are not an issue. Repetition of movements and manipulation of equipment will quicken clinical procedures.

Critical thinking is addressed by using virtual anatomy to understand how radiation affects surrounding tissues while practicing techniques to minimize radiation to normal tissue.

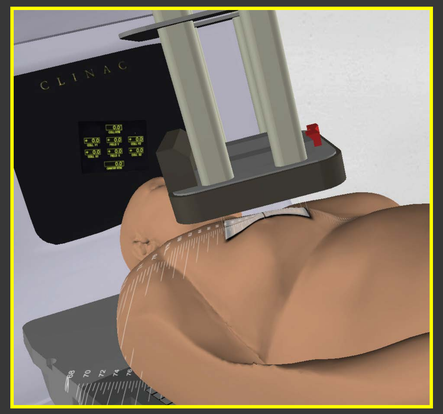


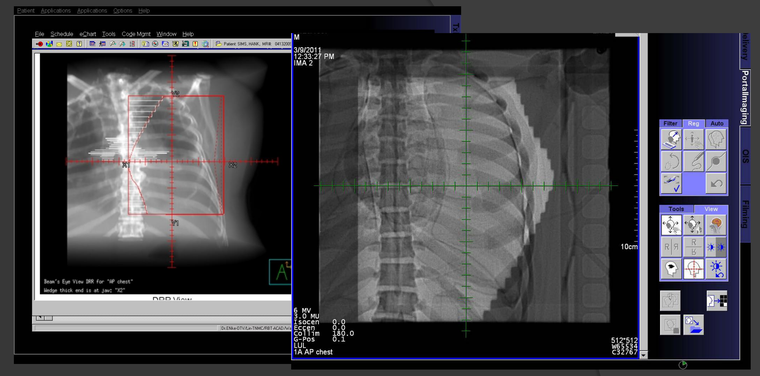
Figure 2. Virtual Simulation[6]

STANDARDIZED PATIENTS

Standardized Patients (SPs) are individuals trained to portray specific clinical cases in a manner that is consistent and measurable. SPs provide real time feedback on the quality of care provided. The use of SPs is an excellent tool for evaluating communication skills.

Figures 3 & 4 illustrate how critical thinking skills can be evaluated along with the use of SPs. Figure 3 demonstrates a mock treatment plan with the spinal cord blocked out of the treatment field. Figure 4 is a mock localization image with the collimator rotated 180° resulting in the cord being completely unprotected. When using an SP, students can identify this type of misadministration in a safe learning environment without risk of dangerously irradiating a patient.

Figure 5 demonstrates the student performing psychomotor skills by positioning the SP. Effective communication is crucial in this type of exercise with the SP having the opportunity to give feedback at the conclusion of the exercise.



Figures 3 & 4: Simulated lung localization images

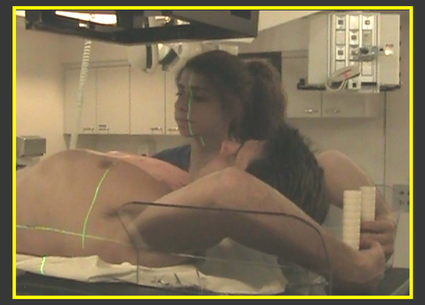


Figure 5. Student with Standardized Patient

DEBRIEFING

Issenberg et al (in Fanning & Gaba) note feedback (including debriefing) to be the most important aspect of simulation based medical education.[1] The debriefing process allows for facilitated and guided reflection as part of the experiential learning cycle.[1] The main objective of the debriefing session is to reflect on the simulation experience, discuss it with others in a non-stressful, supportive climate and then learn/modify behavior based on the experience.

CONCLUSION

It is evident that simulation can be a beneficial tool in the education of radiation science students. By providing students with a direct, interactive learning situation in a non-threatening environment, educators can better prepare them for real life clinical situations.

REFERENCES

1. Fanning, R & Gaba D. The Role of Debriefing in Simulation-Based Learning. *Simulation in Healthcare.* 2007; 2:115-125.
2. Yasuhara O, Bryson EO, DeMaria S, Jacobson L, Quinones j, Shen B et al. The Utility of Simulation in Medical Education: What is the Evidence. *Mt. Sinai J Med.* 2009; 76:330-343.
3. Bradley P. The History of Simulation in Medical Education and Possible Future Directions. *Medical Education.* 2006;40:254-262.
4. Accessed March 10, 2011 – www.unmc.edu
5. Laschinger S, Medves J, Pulling C, McGraw R, Waytuck B, Harrison M and Gambeta K. Effectiveness of simulation on health profession students' knowledge, skills, confidence & satisfaction. *Int J Evid Based Heathc.* 2008; 6: 278-302.
6. VERTUAL – www.vertual.eu, accessed March 10, 2011