Incorporating Clinical Laboratory Science Students into Interprofessional Simulation

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LEARNING OBJECTIVES

1. Identify the barriers associated with incorporating students from multiple professional programs in interprofessional simulation.
2. Describe techniques used to allow CLS students to analyze specimens and communicate results within the timeframe of the simulation.
3. Describe debriefing a large, diverse group of students.

ABBREVIATIONS: ACLS – advanced cardiac life support, CBC – complete blood count, CLS – clinical laboratory science, CMP – comprehensive metabolic panel, COPD – chronic obstructive pulmonary disease, CT – computerized tomography , ICU – intensive care unit, PT – prothrombin time, PTT – partial thromboplastin time

INDEX TERMS: Interprofessional simulation, Prebriefing, Debriefing, Scenario development

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INTRODUCTION

The laboratory is a vital and dynamic participant on the clinical team in healthcare. However, the laboratory often exists behind the scenes, quietly providing answers to many diagnostic questions while providing a critical role in patient care. It is unfortunate that this hidden nature of the laboratory begins during professional education. In many educational institutions, interprofessional simulations are gaining ground as an excellent way for different professions to work together in a safe environment, preparing them for their future real life experiences.[1,2] In order for these simulations to be effective and authentic, it is crucial for the laboratory to be included.

This manuscript serves as an example of how the University of Alabama at Birmingham's Clinical Laboratory Science Program was able to partner with the Office of Interprofessional Simulation for Advanced Clinical Practice and create an interprofessional simulation that highlighted patient safety, teamwork, and communication.

The Value of the Laboratory in Simulation

Including the laboratory in interprofessional simulation is imperative. For starters, it is not realistic for lab values to be pulled out of one's pocket at the exact moment the clinician in the simulation orders a test. This provides unrealistic expectations of turnaround time for lab results. Waiting on results affords the opportunity for providers to determine appropriate measures to take while lab analysis is being performed. Bedside healthcare providers need experience in multi-tasking with patient care during a simulation. They may receive a call that a specimen is being rejected for one patient, all the while dealing with another patient. It is absolutely critical for clinical laboratory science students to gain the valuable experience of being a part of the simulation as well. They also need the experience of dealing with

multiple patients, phone calls, and interprofessional communication difficulties. As described in the article, Strengthening the Clinical Laboratory with Simulation-Enhanced Interprofessional Education, participating in simulation allows students to showcase the value of the laboratory as part of the healthcare team. This article also highlights the barriers programs face when incorporating interprofessional simulation into their curricula.

Overcoming Barriers

There are several barriers that must be overcome to include the laboratory in interprofessional simulation. As with any activity involving multiple programs and professions, there are curricular issues to deal with. Sometimes the nursing students are in their second semester, laboratory science students in their first, and physician assistant students in their third. This creates a discrepancy in their level of expertise, but it is manageable through proper design of the simulation. For example, laboratory science students can perform testing they are familiar with and perhaps simply call critical values for the tests they have not learned to perform.

Ensuring that laboratory results are reported in a timely manner during the timeframe of the simulation is a challenge. This issue can be circumvented by "adding on" a test to a specimen already in the lab (a crossmatch or order for plasma) or by having the "laboratory supervisor" hand off testing that "came off the analyzer" and request that the student communicate a critical result to the bedside team. Also, the simulation can be expanded to be an extended time simulation to allow time for pertinent laboratory analysis.

Simulation Objectives

It is essential to determine the expected outcomes of the simulation and to be able to assess if they have been achieved. At the University of Alabama at Birmingham (UAB), in interprofessional simulation, we construct the objectives to have a focus on teamwork and communication. For the students to balance using these strategies in a life-like healthcare setting, we often include a skills-based objective as well. Objectives for this large-scale intensive care unit (ICU) simulation are described in Table 1.

Overview of the Simulation

This immersive simulation experience occurred in two locations simultaneously. The ICU in the simulation center had a main laboratory off site and a satellite lab where rapid testing was performed and blood components were issued (Figure 1). The satellite lab, located in the simulation center could not have any blood or body fluids present, thus limiting the testing performed by the laboratory (Figure 2). Therefore, we chose to also use the Clinical Laboratory Science (CLS) student laboratory, a biosafety level 2 area, to be able to allow the students to analyze real specimens. The CLS student laboratory is three blocks away from the simulation center. This was, at first, viewed as barrier. In reality, it increased the authenticity of the simulation. In a healthcare setting, the clinical laboratory is not in a central location and the majority of conversations with the clinical team are over the telephone. This allowed for realistic phone communication during the simulation. The satellite lab analyzed fabricated (noninfectious) specimens to stay within occupational health regulations.

Table 1. Large-Scale Intensive Care Unit Simulation Objectives

1. Recognize, respond appropriately, and manage care of a deteriorating patient.
2. Demonstrate the use of teamwork and communication strategies in an interprofessional healthcare setting.

Figure 1. A CLS student issues plasma to a nursing student for a bleeding patient. Blood products were issued from the satellite lab in the simulation center.

Briefing

The role of briefing in interprofessional simulation

has been clearly defined.[3] It was a priority to have all students brief together, however, they were in two different locations on UAB's campus. One of the objectives of the simulation was to have the students work together as a team to care for deteriorating patients. It was imperative to brief them as a team to set the tone for the scenarios. To overcome the challenge of having the CLS students in a laboratory three blocks away from where the briefing took place, web conferencing was used, via GoToMeeting. This allowed the CLS students in the lab to virtually join the live briefing and to interact in real time with the faculty member and students in the main briefing room.

Figure 2. Two laboratory science students discuss a specimen while two nursing students discuss a patient's vital signs.

Scenario Development

Our learners consisted of 194 students from seven professions: Clinical Laboratory Science, Respiratory Therapy, Nursing, Physician Assistant Studies, Medicine, Physical Therapy, and Nuclear Medicine Technology. With consideration of both the number and diversity of students, we chose to design 6 scenarios to be run simultaneously. Designing a simulation which included CLS students was a task our experts in simulation had not encountered. It was a priority of CLS faculty to have a real-time simulation where the decisions made by the clinicians were dependent on the results generated in the student laboratory. Therefore, the simulation scenarios occurred over 45 minutes – much longer than the typical 15-20-minute scenario. Below are descriptions of all cases used in our interprofessional simulation:

Case 1

Mr. Abernathy is a 62-year-old male with history of alcoholic cirrhosis and esophageal varices admitted yesterday with liver failure and upper GI bleed. He was transferred to the ICU this morning for hypotension.

Expected Actions by Bedside Providers

Clinical bedside staff assesses the patient, consents for esophagogastroduodenoscopy, consents for blood transfusion, obtains venous access for transfusion, and transfuses one unit of packed red blood cells

Expected Laboratory Actions

Crossmatched blood is already prepared for this patient. The CLS student in the stat lab on the ICU issues the unit of blood, evaluates new specimens for acceptability, and assesses blood products returned by the nurse.

Communication with the Team

A nurse picks up a unit of blood with the request that the night shift nurse handed her. However, this blood request is for one of her other patients. The lab issues the unit and the nurse is expected to catch the error when checking two patient identifiers at the bedside. If the nurse catches the error, there is opportunity for conversation between the laboratory scientist and the nurse to discuss patient identification and work together to obtain the correct blood for the patient. If the nurse does not notice the error and transfuses the unit, the patient shows signs and symptoms of an acute hemolytic transfusion reaction and must communicate with the lab about the transfusion reaction.

Case 2

Mrs. Redmond is a 78-year-old female nursing home resident with a history of diabetes mellitus, hypertension, and chronic indwelling Foley catheter. She was admitted last night with hypotension, fever, and possible sepsis.

Expected Actions at by Bedside Providers

Clinical bedside staff assess the patient, changes the Foley catheter, reviews laboratory results including blood, urine, and respiratory cultures, complete blood count (CBC), and complete metabolic panel (CMP). Clinical staff transports patient to

computerized tomography (CT). Upon return from CT, patient codes, and staff follows advanced cardiac life support (ACLS) protocol.

Expected Laboratory Actions

CLS students evaluate and report plates and biochemical testing from the patient's urine, blood, and respiratory cultures that were collected and plated when she was admitted the previous evening. They also perform a CBC and call any critical chemistry results.

Communication with the Team

Additional specimens are collected for CBC, prothrombin-time/partial thromboplastin time (PT/PTT), and CMP. The CLS student in the stat lab must assess the specimen for acceptability. Often it is not labeled correctly and the CLS student must communicate the need for a recollect. A student in the main laboratory must call a critical glucose to the nurse. This is timed so that it occurs while the patient is being transported to CT and the CLS student must know to ask for the charge nurse as the bedside nurse is not available on the unit.

Case 3

Mr. Bradshaw is a 68-year-old male admitted from the emergency department with acute respiratory failure secondary to a chronic obstructive pulmonary disease (COPD) exacerbation. He initially presented with a 5-day history of productive cough and worsening dyspnea. There is a family member in the room with him.

Expected Actions by Bedside Providers

Clinical bedside staff assess the patient, give nebulizer treatment and positive pressure ventilation, receive and act on sputum culture results, and address code status with the patient and family member with patient refusing endotracheal intubation.

Expected Actions by the Laboratory

CLS students process Mr. Bradshaw's respiratory culture and were provided critical blood gas results to convey to the staff.

Communication with the Team

The CLS student in the stat lab had to communicate critical blood gas results to the clinical team.

Case 4

Mr. Sanchez is a 58-year-old male admitted 2 days ago with acute respiratory failure secondary to pneumonia. He is intubated and on antibiotics.

Expected Actions by Bedside Providers

Clinical bedside staff assess the patient. Notice he has increased oxygen requirements without change in x-ray or respiratory mechanics. They suspect a pulmonary embolus and should call nuclear medicine to perform a bedside perfusion scan.

Expected Actions by the Laboratory

The CLS students identify the bacteria in his sputum specimen from 24 hours ago. Susceptibility testing reveals a multi-drug resistant organism. They also perform a urinalysis.

Communication with the Team

The CLS students call the patient's nurse about the multi-drug resistant organism and communicate susceptibility testing.

Case 5

Ms. Thompson is a 35-year-old who is 1-hour post vaginal delivery of a male infant at 39 weeks gestation. She had increased vaginal bleeding prior to delivery. She was transferred from labor and delivery due to increased vaginal bleeding post-partum.

Expected Action by Bedside Providers

Clinical bedside staff assesses the patient and notes increased vaginal bleeding. They must help mother stay calm because she is very worried about her baby.

Expected Action by the Laboratory

The CLS students in the main lab will add a crossmatch to the type and screen already completed. Fresh frozen plasma and packed red blood cells are issued from the ICU lab as requested by the patient's nurse.

Communication with the Team

Ms. Thompson needs blood emergently. It is essential the students at the bedside communicate this to the student in the ICU lab. Due to the urgency of the situation, the students in the main lab call the nurse as soon as the packed red blood cells are crossmatched. The CLS students also need to be able

to communicate the option for uncrossmatched, emergency released blood, if necessary.

Case 6

Mrs. Lockens is a 40-year-old female with a history of stroke and residual right-sided weakness. She is to be seen by physical therapy for help with walking.

Expected Action at the Bedside

Clinical bedside staff assesses the patient. They are awaiting physical therapy. During ambulation, the patient develops chest pain. The physical therapy team would escalate the situation and call her physician.

Expected Action by the Laboratory

The CLS students analyze her CBC.

Opportunities for Communication

The CLS students do not have any planned interaction with this scenario. The bedside team could order basic lab tests and the CLS students would receive the specimens.

Additional Specimens

To keep the laboratory as realistic as possible, a few other details were added. Specimens were prepared for many additional patients that were not part of the actual interprofessional simulation. Extra gram stains, hematology slides, blood bank specimens, urinalysis specimens, and bacterial plates were available for testing. Some were labeled "STAT" to help students learn to prioritize specimens. Additionally, CLS faculty called about these additional specimens, acting as a nurse, physician, or other healthcare professional.

Debriefing

The majority of learning in simulation occurs during debriefing.[4] With consideration of the size and length of the simulation, debriefing occurs in 3 phases – 1) at the bedside within each scenario, 2) with all of the students in one large group, and 3) within each profession. Faculty wanted to be sure to emphasize that students work together as a team, therefore, CLS students who were in the main lab during the scenarios walked over to the simulation center to participate in debriefing. Each room debriefed so that students reflected on their care of the patient and had all of their medical questions answered prior to focusing on teamwork and communication. Then all participants transitioned into the conference room for whole group debriefing. Through this debriefing, students discussed team work and communication. The students identified a new level of understanding about each other and the roles they play in patient care. It proved to be an excellent way to emphasize the vital role the laboratory plays in healthcare. Afterward, students grouped with others of the same profession and discussed what they learned about themselves and about students in other professions from the simulation. Debriefing was conducted by faculty trained in debriefing using the framework of "debriefing with good judgement".

CONCLUSIONS

As mentioned, the clinical laboratory is vital to healthcare. Getting out of the box and being a willing participant in healthcare teams is essential to effective patient care. Classroom discussion can start this process. Simulation is a natural second step to helping students gain the confidence they need to be prepared to be a part of an interprofessional environment. Although barriers abound any time multiple professions are slated to come together for an activity, they can be overcome with careful planning and creative thinking. In the dynamic world of healthcare, students have to be prepared.

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