

Description of a Formal Clinical Pathology On-Call Simulation Workshop in Preparing Pathology Residents to Address Common After-Hours Phone Calls

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ABSTRACT

Objectives: Residents take clinical pathology call beginning in the second year of residency. However, this additional responsibility often causes anxiety in residents who may have had only limited contact with laboratory sections they will be covering on call. We set out to improve the practical knowledge and comfort of the residents before taking clinical pathology call.

Methods: A scenario-based simulation-style workshop was developed to acquaint residents with the common issues that arise, and guide them through acquiring the necessary data and developing an action plan. A nine-question survey was given before and after the workshop to determine if the workshop improved their comfort level with taking call.

Results: Of the nine questions, the six questions dealing with clinical pathology laboratory section-specific knowledge showed that residents were less anxious and more confident about taking call after the workshop.

Conclusions: A scenario-based workshop is an effective way to acquaint residents with the basics of taking call, and teaches practical approaches to common clinical pathology issues.

At the Penn State Hershey Medical Center (Hershey, PA), pathology residents take call covering both clinical pathology (CP) and anatomic pathology (AP) services. AP issues typically relate to after-hours frozen sections and autopsies. CP call covers a much wider array of issues and clinical laboratory sections, including blood bank, chemistry, microbiology, and others.

Several articles have described the benefits of CP residents taking call,¹⁻⁴ which include improving patient care and providing a chance for pathology residents to develop their problem-solving skills. A teaching strategy that is often described includes a “log” or “journal” of on-call experiences from which other trainees may learn.⁵⁻⁷ To our knowledge, only one other description of training for pathology residents before taking call has been published,⁸ which described a lecture, conference, and laboratory series. In contrast, we describe the implementation of a scenario-based curriculum to prepare residents for taking call by actively participating in simulations of the types of issues resident will deal with while on call.

New Accreditation Council for Graduate Medical Education (ACGME) requirements delay residents from taking out-of-hospital call until the second year of residency, which decreases exposure to many of the interesting questions that arise. To bridge the gap between the fresh second-year resident knowledge and the knowledge needed to successfully take call, we designed and implemented a workshop for residents at the end of the first year, just before taking their first call. Previously, no specific instructions were given to the residents taking CP call, other than to “call the attending.” Not providing residents with specific instruction before covering call is not optimal, and resulted in anxiety.

Materials and Methods

The intervention designed is a 3-hour workshop, in which the residents about to take call role-play through the most common scenarios encountered by residents taking CP call at Hershey Medical Center; **Table 1** includes a list of scenarios. The three junior residents who are about to start taking call sit together across the table from a senior resident and faculty member. The scenarios are led by the senior resident and/or faculty member with the junior resident responding and asking questions from the leader to gather more information before making a decision.

Each scenario was made as realistic as possible, for example, portraying a clinician upset that a specimen was rejected or a nurse pleading for acceptance of a mislabeled specimen because the patient is difficult to draw blood from. After the scenario simulation was finished, the resident acting as the on-call resident and the other junior residents could ask additional questions, and offer suggestions for how they would have handled the situation. Then, after all the residents had a chance to ask questions and offer opinions, the faculty member and/or senior resident running the scenario discussed the important aspects of each scenario. The important practical learning points were stressed. Because many scenarios dealt with practical aspects of our hospital system, many scenarios could be discussed quickly.

Importantly, the residents who participated also had rotated through the transfusion medicine and chemistry services, and were familiar with the reasoning behind particular decisions, but not with the practical aspects of making decisions during the off hours. It was imperative that residents had a strong familiarity with decision-making concepts (eg, when and why it is okay to switch a patient's Rh-type), because the workshop time did not allow for an in-depth discussion of the pathophysiology underlying each issue.

Before the workshop, a nine-item questionnaire was distributed to the junior residents, who answered each question on a 5-point scale (1 = strongly disagree, 5 = strongly agree). The same questionnaire was distributed after the workshop. The questionnaires were anonymous. Results were tabulated, grouped, and then averaged by question and pre/post status, and tests for statistical significance were performed using STATA 12 (StataCorp, College Station, TX).

Results

Of the nine items on the questionnaire, six showed statistically significant increases from the preworkshop survey to the postworkshop survey **Table 2**. Most notably, all of the items gauging resident comfort level with taking CP call and answering questions posed by clinicians and medical technologists demonstrated improvement.

Discussion

The overarching goal of this workshop was to effect a shift in the resident's mindset of how to approach a clinical question: first by evaluating the information presented, then questioning what further information was needed to assess the clinical scenario, learning how to assimilate this information into an action plan, and knowing when to call the attending physician, especially when the problem at hand was complex. The workshop aimed to incorporate the competencies of medical knowledge, professionalism, and systems-based practice.

Providing practical knowledge of common scenarios enables residents to be more confident and comfortable with taking call. By "debriefing" after each simulated scenario, the knowledge is reinforced in the learner, and ideas that may not have been covered by the resident are brought forth by the more-experienced faculty or senior resident leading the simulation. We also tried to simulate some of the different ways in which a clinician, nurse, medical technologist, and pathologist may approach the same patient issue.

We feel that the simulation-based approach is a better way to impart the practical knowledge that a resident on call needs to know. A lecture on specimen processing may include information on labeling requirements, but does not teach a resident how to talk with a nurse or clinician to explain why a mislabeled specimen needs to be re-collected. A scenario-based method was also better to explore systems-based practice such as appropriate stewardship of resources or test utilization.

We attempted to evaluate the success of this workshop by assessing resident comfort level with taking call before and after the workshop. Most of the questionnaire items demonstrated marked improvement in the residents' comfort level with taking call. The questionnaire items 5 to 9, which dealt with calls from individual laboratory sections, reflected the increased familiarity achieved through the workshop. By exposing junior residents to the types of calls they should expect from each laboratory section, they quickly became more comfortable handling calls. They also learned some of the nuances underlying each call. For example, we discussed why the laboratory cannot accept mislabeled or unlabeled blood samples, and why the pathologist might make a rare exception for a truly irreplaceable specimen such as tissue or a difficult-to-obtain sample such as cerebrospinal fluid, provided other safety criteria are met. These types of practical knowledge "pearls" increased resident knowledge and ability to approach both common and unusual questions.

Evaluation of the impact of this educational intervention is necessarily limited by the small sample size of three residents. Our pathology program has three or four residents per class year, with a total of 16 residents in the entire program. This intervention was tailored to the first-year residents before the start of their CP call, naturally limiting our sample

Table 11
Clinical Pathology Call Workshop

Case Vignettes

1. A medical technologist from the specimen processing area is calling regarding two unlabeled tubes of blood from a 2-year-old leukemia patient. The nurse would like to come down and relabel the tubes. She emphasizes that the patient is a child and has already had multiple blood draws today.
 2. A medical technologist from the specimen processing area is calling with green and lavender top test tubes that were sent down for two different patients. The nurse is certain that the labels were switched, and would like to relabel the tubes with the correct patient names.
 3. A cerebrospinal fluid (CSF) specimen is sent down from the interventional radiology suite without a label. The nurse would like to label it so it can be analyzed. No other CSF specimens were collected in the suite today and no other CSF samples have been received in the specimen processing area today.
 4. A nurse from the emergency department would like the samples on two separate trauma patients sent down to the laboratory in one bag to be analyzed and reported. The tubes are labeled appropriately.
 5. A nurse is questioning why the laboratory is refusing to run any of the specimens sent down in the same bag as a urine container with the lid ajar and leaking.
 6. A medical technologist from the clinical chemistry laboratory is calling with a critically low glucose value on an outpatient from a family practice clinic. The specimen was collected at 10:00 am in a non-gel green top tube. It is now 11:30 pm.
 7. A medical technologist from the clinical chemistry laboratory is calling with a critically high phenytoin level on an outpatient from the neurology clinic. The specimen was drawn correctly 3 hours ago at our phlebotomy site. No neurology resident or attending physician has called the laboratory back.
 8. A medical technologist from the special chemistry laboratory is calling with an abnormally low hemoglobin A_{1c} value in a patient. An abnormal hemoglobin variant is also noted on the high-performance liquid chromatography tracing.
 9. A medical technologist from the send-out testing area is calling because 10 genetic tests for mucopolysaccharidosis, including both point mutations and full gene analysis, are ordered on an infant in the neonatal intensive care unit (ICU) who has been an inpatient for 3 months. The tubes of blood are down in the laboratory now, waiting to be sent out.
 10. A medical technologist from the clinical chemistry laboratory is calling with a request to run a sodium level on a sample from a bottle of breast milk. The pediatric nephrologist is demanding that it be run.
 11. A hematology/oncology fellow calls and states that he needs leukapheresis for a patient with a WBC count of $100 \times 10^9/L$. How do you proceed?
 12. The medical ICU fellow calls and describes an acutely ill patient with suspected malaria. How should he or she proceed with laboratory testing?
 13. An internal medicine fellow from the medical ICU calls regarding a patient with suspected thrombotic thrombocytopenic purpura. How do you proceed? No slide review has been performed as of yet. No ADAMSTS13 has been performed or drawn yet.
 14. It is 8 pm and a general surgeon would like to know where the result is on the adrenal gland he removed yesterday. How do you proceed?
 15. It is 8 pm and a colorectal surgeon would like to know the results of a complete blood count he ordered 3 hours ago. How do you proceed? The patient is on an inpatient floor. The sample is not in the laboratory yet.
 16. An infectious disease intern would like to know what antibiotic the cultures on their medical ICU patient is sensitive to. How do you proceed?
 17. An orthopedic surgery resident would like to know how to get a culture of a hip prosthesis that was just removed.
 18. A hematology oncology fellow from the medical ICU is calling. She would like human leukocyte antigen–matched platelets for a patient. How do you proceed?
 19. A medical technologist from the blood bank is calling. A patient in the operating room has taken 8 units of O–. How do you proceed?
 20. A medical technologist from the blood bank is calling. An Rh-positive platelet unit was just issued to an 18-year-old Rh-negative girl. How do you proceed?
 21. A trauma surgery attending physician is calling and seeks help dosing Rh immune globulin for a pregnant trauma victim.
 22. A neurosurgery fellow is calling. How much fresh frozen plasma should an 80-kg woman taking warfarin with an international normalized ratio of 8.0 and subdural hematoma receive?
 23. An internal medicine intern from the medical ICU is calling. How much cryoprecipitate should a patient in disseminated intravascular coagulation receive?
 24. A general surgery intern is calling. How many doses of platelets should a patient with a platelet count of $45 \times 10^9/L$ receive before a gastrostomy?
 25. A pediatric hematology oncology fellow is calling. She needs granulocytes for a 14-year-old girl. How do you proceed?
 26. A medical technologist from the blood bank is calling. Mrs. Jones has had a transfusion reaction. What information do you want? How do you proceed?
 27. A medical technologist from the blood bank is calling. The medical ICU has taken 3 doses of platelets on a patient who will be getting a central venous catheter for dialysis tomorrow. How do you proceed?
 28. An obstetrics and gynecology resident is calling and asks: “What does it mean that my patient has an anti-Fy^a?”
 29. A medical technologist from the blood bank is calling. A patient in the operating room has a completely positive screen and panel, and the clinical team is asking for 2 units of packed RBCs emergently.
 30. It is Friday at 9 pm. The hematology/oncology service just accepted a patient transfer this afternoon. Where should the fellow leave the bone marrow aspirate he just performed for flow cytometry and molecular analysis?
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Table 2
Survey Responses^a

Question	Average Preworkshop	Average Postworkshop	P
1. I feel comfortable taking clinical pathology call	1.66	4.00	.001
2. I feel comfortable taking anatomic pathology call	3.33	3.66	.211
3. I feel comfortable calling an attending with a question	4.33	4.66	.211
4. I feel comfortable calling an attending in to do an apheresis procedure	4.33	4.66	.500
5. I feel comfortable dealing with calls from specimen processing	1.33	3.33	.037
6. I feel comfortable dealing with calls from chemistry	1.66	3.66	.037
7. I feel comfortable dealing with calls from microbiology	1.66	3.33	.019
8. I feel comfortable dealing with calls from the blood bank	2.33	3.66	.029
9. I feel comfortable dealing with calls from other clinicians	2.66	4.00	.029

^a Responses were on a 5-point scale (1 = strongly disagree, 5 = strongly agree).

size. We plan on continuing this workshop on a yearly basis, because it was well received, and to collect information on the workshop's impact on clinical effectiveness and competency. Before implementing the workshop there had been minimal formal faculty or technologist concern over resident competency, making it difficult to assess a change in on-call competency. Following the workshop there were no concerns from faculty or technologists regarding resident competency.

There is a large body of literature dealing with the use of simulation in medical education.⁹⁻¹² It is increasingly being used to teach skills to both individuals and teams, and has been shown to have a moderate, but positive, impact on patient outcomes.^{9,11-15} Surgery and anesthesia have large bodies of literature describing the use of simulation and the design of curricula using simulation to teach psychomotor and cognitive skills,¹³⁻¹⁸ likely because of their highly technical and procedure-based practice.

Several reports have shown the use of simulation to help medical undergraduate students acquire skills needed to take medical or surgical internship call.^{14,16-18} These articles focus on the prioritization and patient assessment skills that an intern must possess. One report describes how simulation is used to prepare radiology residents for call.^{1-4,19} Ganguli and colleagues¹⁹ describe the use of a training module consisting of "19 actual emergency department cases," in which first-year learners simulated on-call responsibilities. The radiology simulation set-up is similar to the use of simulation scenarios described in our article. Pathology, as a rule, does not have the types of technical procedures seen in other on-call specialties; however, simulation can still be beneficial to help pathology residents improve their clinical reasoning before taking CP call.

In the current study, implementing a workshop and scenario-based approach made residents more comfortable in dealing with calls about clinical issues. Although a 3-hour workshop cannot fully prepare a resident for every question that may come up while on CP call, a foundation of practical knowledge can be established for the residents to draw from. The workshop was focused on the practical knowledge

needed to take questions on call, and made junior residents significantly more comfortable with taking call.

Having on-call responsibilities is well known as an important aspect of medical education. New ACGME requirements postponing out-of-hospital on-call responsibilities until the second year of residency are aimed at improving patient safety, but may decrease resident exposure to the interesting issues that arise outside regular hours and the problem-solving skills needed to manage them. More research into the dynamics of pathology on-call training is needed. Providing a preparatory workshop is a simple and well-received approach to help residents acquire some foundational knowledge and a structured approach to gathering information and formulating an action plan.

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