2008 ACLPS Panel Discussion on Resident Education in Clinical Pathology

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Abstract

A curriculum in clinical pathology (CP) was developed under the auspices of the Academy of Clinical Laboratory Physicians and Scientists (ACLPS) in 2006. At the 2008 ACLPS meeting in Philadelphia, PA, a panel was convened to address the current challenges in resident education and how to overcome them. Current challenges include the heterogeneity of the discipline (which requires analytical, medical, and managerial knowledge), the diverse repertoire of clinical laboratory testing, and the need to better integrate the resident into the workflow of the laboratory, especially with respect to clinical consultation. Recommendations of the panel include the incorporation of active learning, clinical consultation, and competency assessment into CP resident training. A summary of the panel discussion is presented herein.

Since publication of the Academy of Clinical Laboratory Physicians and Scientists (ACLPS) clinical pathology (CP) curriculum in 2006, pathology programs have been working to implement the curriculum. Two major issues in the implementation of this curriculum are how to teach it and how to assess learning efficacy. At the 2008 ACLPS meeting in Philadelphia, PA, a panel discussed these challenges to resident education and how to overcome them.

Challenges for CP Resident Training

In anatomic pathology, residents are readily integrated into the day-to-day workflow, have graduated responsibility, and benefit from many hours of “face time” with attending physicians reviewing slides and fielding questions from clinicians. In contrast, integration of CP residents into the laboratory medicine workflow is traditionally more challenging. The diversity and complexity of modern laboratory testing precludes the acquisition of in-depth knowledge of analytic methods for all tests. CP is a heterogeneous discipline requiring many different skills. All of the CP subdisciplines require interpretive skills based on experience, and most also necessitate special management prowess. All require underlying scientific and clinical knowledge that spans a wide range of medical topics.

To facilitate teaching by faculty and learning by residents, most training programs have adopted sequential training in the different CP subdisciplines. This approach allows for a superficial review of the key elements of these components but often relatively little in-depth assessment. For example, in a 3-month rotation in clinical chemistry, a
Work-hour limitations and short training periods also present challenges for CP resident education. Some programs, including those of most of the panelists, have extensive schedules of didactic sessions that, while time-consuming, provide an efficient means of imparting basic knowledge. In some cases, work-hour limitations have engendered a shift-work mentality that is not conducive to self-directed learning. Time limitations also constrain the teaching efforts of the faculty. Faculty members often have diverse job duties, including significant administrative, teaching, and research roles. In some of these roles, resident shadowing may be inappropriate and faculty may be geographically separated from residents (ie, in different buildings), further limiting resident-faculty interactions. Limitations of faculty availability in CP training were also highlighted as a significant finding in a survey conducted by the Program Directors’ Section of the Association of Pathology Chairs (PRODS) during 2008.3

Methods for Promoting Active Learning

Despite or perhaps because of these challenges, all panelists agreed that for CP programs to be successful in imparting useful scientific, clinical, and practical training, CP residents need to be active learners in analytic aspects of laboratory testing and in clinical consultations. Specific variations in learning techniques and in resident research activities have been the focus of recent articles.4-6 Herein, we focus on how active learning might be achieved. Clinical consultation formats are summarized in Table 1, and active learning approaches are listed in Table 2. Items that received the most extensive discussion by the panel and the audience are highlighted in the following sections. (An unabridged recording of the panel discussion can be downloaded at https://depts.washington.edu/lmaclps/meeting.html.)

Technical and Analytic Training

Technical and analytic training represent the traditional foundation on which all CP residency programs build their curricula. Panelists and audience members agreed that the best way to learn was “by doing.” Thus, active learning involves going into the laboratory and performing tests, preparing reports, analyzing data (including quality control data), and participating in regularly scheduled sign-out sessions with attending pathologists to review testing data and interpretive reports in real time. Similarly, the development or validation of a new test provides an opportunity for resident participation and learning, as long as the time spent on special projects and research does not compromise the ability of the resident to acquire the necessary core of basic knowledge. Resident participation in research projects is discussed in more detail elsewhere.4

Integration of CP residents into the workflow is challenging for other reasons as well, especially for smaller training programs. Smaller programs may have a limited volume of more esoteric laboratory tests that are performed in house. Some testing (eg, thyroid function tests other than thyroid-stimulating hormone and thyroxine) may be limited to a few requests per month or bypass the hospital laboratory altogether, being sent directly from the physician’s office to a specialty laboratory. Smaller training programs also may not have the luxury of year-round resident coverage on all CP services. Therefore, it is difficult to integrate residents into the workflow if the tasks to be done by a resident are done more often and more efficiently by an attending pathologist or by a technologist.
Further technical and analytic knowledge can be imparted through resident participation in conferences that highlight the testing method and its clinical interpretation and usefulness. A good example of integrating diagnostic test education within a residency program is by conducting clinical microbiology “plate rounds” in the laboratory with members of the infectious disease clinical team. This is an opportunity to teach clinicians about various aspects of diagnostic microbiology through discussion of select patients and reviewing test results, discussion of test performance characteristics, and review of how infectious organisms are detected and classified using current technologies.

Managerial Training

Active involvement of residents in managerial aspects of the laboratory was also deemed to be helpful because they will likely have managerial or supervisory roles as part of their future professional life. Many graduates of residency programs believe that they are least prepared for management responsibilities when they begin their first job. Participation in quality improvement and quality assurance activities or implementation of a new laboratory information or testing system provides vivid experiences, managerial challenges, and clinical issues that residents may draw on in their future careers. Understanding how reimbursement for laboratory testing affects our activities is a critical issue for any laboratory operation and one to which residents in some institutions are never directly exposed.

Along similar lines, decisions about funding for equipment or staffing requires analysis and justification to the financial stakeholders. Exposure to return-on-investment analyses and methods borrowed from the manufacturing industry for improving operational efficiency and reducing variability, such as LEAN and Six Sigma, will give residents experience for the administrative or managerial roles that they may assume as future laboratory directors.

Clinical Consultation

The other major focus of CP residency training is clinical consultation. Panelists and audience members agreed that clinical consultations should be a primary responsibility of CP residents during their training. For this to be truly effective, CP residents need to be better integrated into the clinical service. At the core of this kind of learning is apprenticeship, or “reproducing the job of an attending clinical pathologist as both observer and participant.” Apprentice-style learning seems to be the most popular learning method among pathology residents and is commonplace in other medical specialties. Insufficiency of training programs in providing opportunities for clinical consultation and experience in laboratory management was also highlighted as a significant finding in the 2008 PRODS survey.

There was also discussion about whether CP residents should participate in cross-training or team rounds with other clinical residency programs. For example, a CP resident could attend internal medicine or subspecialty service rounds and serve as a liaison for the laboratory in this setting. There are specialties for which team rounds make good sense and are of clear mutual benefit to the services involved, eg, clinical microbiology with the infectious disease team.

### Table 11
Clinical Consultation Activities in Clinical Pathology

<table>
<thead>
<tr>
<th>Activity</th>
<th>ACGME Competencies&lt;sup&gt;*&lt;/sup&gt;</th>
</tr>
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<tbody>
<tr>
<td>Selection of proper tests</td>
<td>PC, MK, PBLI</td>
</tr>
<tr>
<td>Suggestions for proper sequencing and/or timing of tests</td>
<td>PC, MK, PBLI, ICS, SBP</td>
</tr>
<tr>
<td>Suggestions of alternative tests</td>
<td>PC, MK, PBLI, ICS</td>
</tr>
<tr>
<td>Recommendations concerning specimen type, volume, storage, transport, etc</td>
<td>PC, MK, ICS, SBP</td>
</tr>
<tr>
<td>Sign-out of complex test interpretations</td>
<td>PC, MK, PBLI</td>
</tr>
<tr>
<td>Interpretation of results and discussion with ordering physician(s)</td>
<td>PC, MK, PBLI, ICS, P</td>
</tr>
<tr>
<td>Formal consultations (eg, transfusion reaction workups, smear review)</td>
<td>PC, MK, PBLI, ICS, P</td>
</tr>
<tr>
<td>Patient interactions (eg, monitoring infusions or supervising apheresis procedures, obtaining patient history for coagulation workups)</td>
<td>PC, MK, PBLI, ICS, P</td>
</tr>
<tr>
<td>Analysis of expected and unexpected change(s) in results for a particular patient</td>
<td>PC, MK, PBLI, SBP</td>
</tr>
<tr>
<td>Analysis and communication of reference ranges</td>
<td>PC, MK, PBLI, ICS, P</td>
</tr>
<tr>
<td>Informing physician about the influences of analytic and biologic factors on results</td>
<td>PC, MK, PBLI, ICS, P</td>
</tr>
<tr>
<td>Advising test orderers on costs of tests and whether the costs are reimbursable</td>
<td>MK, PBLI, ICS, P SBP</td>
</tr>
<tr>
<td>Advising on laboratory testing protocols for clinical trials and research studies</td>
<td>MK, SBP</td>
</tr>
<tr>
<td>New test evaluation, eg, performance characteristics, methods, workload, cost</td>
<td>MK, ICS, P, SBP</td>
</tr>
<tr>
<td>Making recommendations to ordering physician and/or laboratory with respect to send-out testing</td>
<td>PC, MK, ICS, P</td>
</tr>
<tr>
<td>Recommendations concerning follow-up testing</td>
<td>PC, MK, ICS</td>
</tr>
<tr>
<td>Communication of root cause analysis of testing errors</td>
<td>ICS, SBP, P</td>
</tr>
</tbody>
</table>

ACGME, Accreditation Council of Graduate Medical Education.
* Each consultative activity is linked to 1 or more of the 6 ACGME competencies: patient care (PC), medical knowledge (MK), practice-based learning and improvement (PBLI), interpersonal and communication skills (ICS), professionalism (P), and systems-based practice (SBP). There may be circumstances in which one or more consultative activities can be linked to ACGME competencies other than the ones listed.
or hematopathology and transfusion medicine with the hematopathology-oncology team. In theory, and in practice in some institutions, other areas can be similarly covered to the benefit of patient care, eg, endocrinology with medicine and toxicology with the transplant service. The integration of a pathology resident on an in-patient service is harder to accomplish but could involve a 1- or 2-week minirotation at the end of the corresponding CP core block, by which time residents have already had several weeks of exposure to the particular discipline. These rotations would provide pathology residents with a better idea of how other clinicians use laboratory tests and, perhaps, make them more adept at working with these clinicians.

### Evaluation of Competency

The other major area for the panel’s consideration was the evaluation of competency (see also Alexander). It is important to link the competency assessment to the specific learning objectives established for each CP rotation, and it should be consistent with the list of duties and objectives. In addition, the method of evaluation should be clearly defined and consistent with the written objectives. It is important that high standards for resident responsibilities be set for each rotation.

The panelists commented on different methods for evaluating competency. The panelists focused on the 2 broad areas of data interpretation and clinical consultation. Objective evaluation of technical and analytic competency is straightforward. Methods include microscopy unknowns, oral examinations, problem sets, and written examinations. In contrast, objective evaluation of clinical consultation is difficult. One audience member commented that the “three As” of clinical consultation are availability, affability, and ability, probably in that order of importance. How one weighs various attributes such as enthusiasm, helpfulness, thoroughness, intelligence, knowledge, and perseverance is inherently subjective. Most evaluations are based on encounters at sign-out, rounds, morning report, and clinical conferences. Resident presentations provide an opportunity for faculty to assess residents’ abilities to understand literature and apply logical thinking. Some programs use 360° evaluations to capture data on resident professionalism from technical staff, administrative staff, and clinicians. It may also be possible to use some service volume metrics such as the number and complexity of clinical consultations per unit time.

When implementing a curriculum, it is helpful for teachers to provide frequent feedback to students, and vice versa. The more significant the deficiency, the more important it is for feedback (in either direction) to be timely and to include a specific and clearly articulated plan for improvement. It is also helpful to ask residents for their impression of how things are going and what they perceive are their own strengths and weaknesses and those of the program. Because residents rarely offer this information spontaneously, one can use tools such as a self-assessment questionnaire or a brief informal discussion at one or more points during the rotation. Based on resident feedback and learning needs, the didactic schedule for the rotation can be modified to optimize the learning experience. Residents and faculty also provide feedback regarding the 6 competencies defined by the Accreditation Council of Graduate Medical Education (ACGME): patient care, medical knowledge, practice-based learning and improvement, interpersonal and communication skills, professionalism, and systems-based practice. (These competencies are described in more detail under “common program requirements” on the ACGME Web site, http://www.acgme.org). However, the
ACGME competencies are quite broad in scope, limiting the usefulness of this feedback.

Also, as is the case in other medical fields, multiple individual ACGME competencies can apply to single clinical tasks. For example, recommendations concerning specimen type could relate to patient care, medical knowledge, interpersonal and communication skills, and systems-based practice (see Table 1 for additional examples). Many forms of evaluation are task-based rather than skill-based, and when tasks incorporate several skills, a conflict is set up in terms of how to evaluate each skill objectively. There is a clear need for competencies to be more specifically defined for each subdiscipline within CP.

Conclusions and Future Directions

Teaching CP is challenging because of the complexity and scope of the modern laboratory and the need to integrate residents into clinical consultation. Depending on the resources available, programs will implement the CP curriculum in different ways. Nevertheless, the following seem to be common features and requirements cited by the ACLPS panelists and many audience members: (1) technical and analytic training through active learning in the laboratory; (2) preparation and participation in multidisciplinary, case-based conferences; (3) clinical consultation; and (4) frequent and timely feedback between the faculty and residents.

Many issues need to be addressed. Guidelines to integrate clinical consultation should, in our view, be developed for each CP service. These guidelines need to be specific enough to be meaningful but flexible enough to allow for significant operational differences between CP training programs. Tools for more effective competency assessment and feedback need to be developed. The ACGME competencies are broad and lack some of the analytic and consulting skills that are specific for CP. Competency assessment, in our view, needs to address a minimum level of achievement that should be attained by all trainees. This level of competence is a bit like a state driver’s test: What does someone need to know to practice without causing harm to others? As a profession, of course, we strive for excellence that goes well beyond minimal competence.

These developments need to be specific for the individual subspecialties of CP. Finally, improvement of education in CP at the medical student level would improve the education of physicians at the resident level and beyond, including physicians outside the field of CP.

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References