Definition of a White Paper: An expository paper to initiate an awareness of the issue and/or to educate people about the elements of an issue or problem. It does not include a statement of policy or infer action taken by the Society.

Practice Levels and Educational Needs for Clinical Laboratory Personnel

White Paper June 21, 2007

I. INTRODUCTION

In July 2005, the American Society for Clinical Laboratory Science (ASCLS) Board of Directors commissioned a task force entitled "Practice Levels and Educational Needs for Clinical Laboratory Personnel". This task force was asked to address issues raised in ongoing, unresolved discussions among laboratory professionals concerning the preparation of students for the current clinical laboratory environment. Laboratory managers expressed frustration with the discrepancy between the skills possessed by graduates of laboratory educational programs and the needs in today's workplaces. Managers further expressed concern that the workforce shortage that existed today was only the tip of the iceberg based on the aging demographics of their current employees. Laboratory employees and educators were discouraged by the lack of well-defined practice roles for technicians and technologists/scientists and by the lack of opportunities for career advancement within the laboratory. With the current workforce shortage in mind, the task force attempted to tackle issues that might help employers use available personnel more effectively and improve recruitment and retention in the clinical laboratory profession.

The task force was a collaborative project that included representatives from ASCLS, Clinical Laboratory Management Association (CLMA), American Medical Technologists (AMT), American Society for Clinical Pathology (ASCP) and Industry (Abbott Diagnostics). The task force membership included CLT/MLT and CLS/MT educators and laboratory managers from diverse laboratory environments and geographic locations.

The task force used the 6 Sigma / DMAIC (Define, Measure, Analyze, Implement, and Control) process improvement methodology as a roadmap. In October 2005, the task force met to "Define" the major problems facing the profession and establish the project goals. The task force then began the "Measure" phase of the process which involved collecting data in order to validate the problems defined by the task force, identify additional important problems, and solicit creative ideas for solutions. Measurement included:

- A review of literature related to clinical laboratory levels of practice.
- A review of scopes of practice in several health professions.
- Focus groups of laboratory educators and managers conducted at national professional meetings.
- A national survey used to collect quantitative data as well as comments on a proposed model.

In July 2006, the task force met again to review the information from the literature review, the comparisons with other health professions, and the focus groups. The literature review and focus groups confirmed that the current system was not working and did not meet the current needs of the profession. Problems that were identified include the fact that associate degree and baccalaureate degree personnel are often used interchangeably, that non-certified employees are hired to perform laboratory tests, that employees lack the communication skills needed for today's workplace, and that laboratory practitioners are leaving the profession because there are limited opportunities for advancement. Based on that information, the task force developed a model that defined the educational and certification requirements for laboratory practitioners at each level of practice. The task force designed a web-based survey to collect feedback on the model from as many laboratory professionals as possible. To ensure that the survey data would be meaningful, a pilot version was distributed in early November 2006. Following analysis of the pilot study results, additional changes were made to the survey document. The web-based survey was widely disseminated in January 2007 through the cooperation of laboratory professional associations as well as the National Accrediting Agency for Clinical Laboratory Sciences.

The task force met in February of 2007 and began the "Analyze" phase of the process which included a review of the responses to the survey. Based on this analysis, the model was revised. Following this meeting, the task force met by teleconference to discuss the implications of this new model and to make recommendations for laboratory educators, managers, practitioners, and professional organizations. In this white paper, the task force presents the information collected in the measurement phase of the process, the revised model, and a discussion of the implications of this model for the laboratory profession.

II. MEASUREMENT

A. Literature Review.

The task force reviewed publications on the knowledge and skills expected of clinical laboratory practitioners at different levels of practice and with increasing years of experience. The ASCLS and ASCP Levels of Practice documents and the 2005 report on "The Clinical Laboratory Workforce" by the Bureau of Health Professions were also reviewed. Appendix A lists the references reviewed by the task force. Key findings include:

- There is considerable overlap in the scope of practice between CLT/MLT and CLS/MT practitioners.
- CLS/MT practitioners perform more complex technical tasks, management tasks, and more communication tasks than CLT/MLT practitioners; however many of the CLT/MLT tasks require problem solving and high-level reasoning.

- At entry level, the CLS/MT practitioners perform core tasks more frequently than advanced tasks or management skills. Five years later, the core task responsibilities remain at a high level and advanced technical management tasks increase (without additional education). These tasks are primarily in laboratory operations and communication/consultation areas.
- 64% of CLS/MT practitioners perform routine tests "frequently" and the same percentage reported that they "never or rarely" perform specialized tests.
- The percentage of workers who reported being "very satisfied" with the level of challenge in their jobs declined from 37% to 17% between 1993 and 2002. Job satisfaction does not differ for CLT/MLT or CLS/MT practitioners.
- CLT/ MLT programs have a higher number of new students and a higher attrition rate than CLS/MT programs.
- 55% of educational programs have changed curricula during the past year but only 5% have eliminated any content.

B. Scope of Practice Reviews.

The task force reviewed the scopes of practice in the professions of Pharmacy, Physical Therapy, and Occupational Therapy (see Appendix B). Information was collected through interviews and from web sites. Only Occupational Therapy has true articulation and a "career ladder" beginning with the assistant level. In each profession, the scope of practice differentiating the entry level and the baccalaureate or masters level is well defined. The difference in the scope of practice between baccalaureate/masters and the doctoral level is not clearly defined in any of these professions. Due to state licensure, the scope of practice for the disciplines varies from state to state. All the disciplines are struggling with many of the same issues as the clinical laboratory profession.

C. Focus Groups.

Two focus groups were conducted in the first quarter of 2006. The first was conducted at the Clinical Laboratory Educator's Conference (CLEC) and the second was at the Clinical Laboratory Management Association's (CLMA) ThinkLab. The former group was largely made up of educators and the latter group was made up of administrators of hospital laboratories. The discussion guide can be found in Appendix C and an expanded list of findings is provided in Appendix D. Because the focus groups were small in size and the sample was not random, the task force could not draw conclusions about laboratory practice in all settings. However, the results of the focus groups were used in combination with other data to inform the task force and guide the survey development. Key findings from the focus groups include:

- There is little difference in the scope of practice between associate degree and baccalaureate degree personnel.

- The skill mix in laboratories is driven by a few key factors including state laws, laboratory budgets, CLT/CLS availability, and relationships with educational programs.
- The lack of clear distinctions between levels of practice serves to reduce the externally perceived professionalism of laboratory practitioners.
- The lack of differentiation of job scope combined with unclear career paths, low wages, and increasing alternatives is demoralizing and seems to increase retention problems among younger laboratory professionals.
- Curricula in educational programs are viewed as reflecting "the way it has always been" with some specific additions as a result of new technology.
- More automation and greater use of software with clinical algorithms will increase the need for associate degree level practitioners.
- More baccalaureate degree practitioners will be needed to develop clinical algorithms, for test utilization consultation especially in the area of molecular testing, for troubleshooting automated methods, and for the expanded technological skills for areas such as molecular testing.
- The advanced practitioner or clinical doctorate is seen by some as providing a career ladder beyond the baccalaureate degree.

D. Survey.

The task force determined that it needed to survey a large population of laboratory educators, managers, and laboratory practitioners in order to validate the findings of the literature review and the focus groups and also to provide an opportunity for the profession to comment on the task force's preliminary proposal for a new model. To ensure a robust survey instrument, a pilot survey was first developed, the results of which were used to identify possible ambiguities in the wording of the questions and to identify appropriate choices to include as objective responses to the survey questions. A non-random solicitation to laboratory leaders and select educators occurred. Fifty-two respondents completed the survey. The task force then analyzed the results and modified the survey as deemed appropriate.

The final survey was deployed in January of 2006 and open for web-based responses for approximately 30 days. In that time just over 2500 responses were received. An analysis of the survey method and responder demographics identified specific limitations on the ability to generalize the data.

Key methodology and responder demographic limitations:

- Responders formed a convenience sample (self-selected, not random) which attracted largely CLS/MT certified respondents from metropolitan areas with more than 20 years experience (nearly 11% met all three criteria; CLS/MT responders were more than six times more common than CLT responders).
- The CLT respondents were skewed towards smaller facilities.
- Rural respondents tended to be associated with smaller facilities.

Notwithstanding these limitations, the large number of responders and the consistency of responses gave the task force confidence that important perspectives were being brought forward. Since this survey was always described as advisory in nature, conclusions were drawn based on subgroup analysis as opposed to relying only on analysis of the total sample. The model as presented in the survey is shown in Appendix E and the survey itself with responses to objective questions is shown in Appendix F. Key findings from the survey:

- A rationale was presented for concluding that the current situation is not appropriate. More than 95% of respondents indicated that there was a need for change (some need, great need or critical need) based on the presented rationale and their own experience. Approximately 2/3 of the respondents indicated that there was great or critical need.
- Approximately 2/3 of respondents indicated that neither certification level nor educational attainment level drove significant job differentiation in practice.
- More than 2/3 of respondents agreed to some degree with the proposed model in which the scope of practice for professionals with an Associate Degree would be narrowed versus the current situation. More than 40% thought there was good or great justification for this change. Respondents with an Associate Degree and Educators of that population as well as representatives of management did not agree with the majority.
- Nearly 45% of respondents did not want to see the model implemented as described and over 1000 respondents chose to provide free text comments on why not. These comments have been included in Appendix G.

III. THE PROPOSED MODEL FOR LEVELS OF PRACTICE IN CLS.

Based on the data collected in the literature review, focus groups, and national surveys, the task force revised the model to reflect a new vision and new standards for the levels of practice in the clinical laboratory science. The model attempts to make the educational process more realistic, attainable, and differentiated. The model represents "**what should be**" rather than "what is". It differs from "what is" in several important ways. First, the model more clearly differentiates levels of practice based on education, certification, and experience. Second, the model affirms the importance of certification and verified competency at all levels of practice. Third, the model defines the practice skills that should be taught and can be expected of new practitioners at each level. In some areas that are not currently well differentiated, the model includes a description of specific practice skills to better differentiate the levels (e.g. associate degree practice skills in blood bank and microbiology). Finally, the model represents a true career ladder from entry level positions through the clinical doctorate. This model will not work with today's curriculum, availability of certificate and associate degree candidates, and possibly some state licensure requirements. However, the model is compliant with and exceeds the current CLIA requirements.

The model assumes that:

- Practitioners receive national certification at each level.
- Practitioners at each level are responsible for performing and/or supervising the duties performed at lower levels.
- Skills needed at all levels include, but are not limited to: Communication, Troubleshooting, Quality Control, Patient Safety, Basic Laboratory Safety (OSHA/EPA), Ethics, Interpersonal Skills, Cultural Awareness, IT /Computer Skills, Terminology, Basic Laboratory Operations.
- Competency must be verified at all levels of practice.
- Systems for documenting continued competence and recertification would be available at each level of practice.
- An individual could enter at the certificate, associate degree level, baccalaureate degree, or master's degree level.
- Once graduates of educational programs enter the workforce, additional education would be available and required for those who wish to advance their knowledge, skills, and level of practice.

Definitions:

- **Training** = structured instructional program leading to competence in a practice skill prior to independent practice. This could be offered by an employer, formal educational institution, or professional society.
- **Additional education** = Continuing education programs, formal coursework, or programs leading to additional certification or an advanced degree.
- **Certificate** = Certificate indicating completion of a structured or defined educational program.
- **Relevant experience** = Supervised experience in the practice skill.

Proposed Model for Levels of Practice in CLS

Level	Practice Skills:	*Education*	Relevant Experience	Certification
I	Phlebotomy	HS/GED + Training	No	CLA or Certificate
	Specimen Processing			
	Order Entry – Accessioning			
	Culture set-up			
	Specimen Processing (Histo/Micro/Cyto)			
	Waived Testing	HS/GED + Additional education	Yes	
II	Automated Chemistry, Immuno-Chemistry, Coagulation, Hematology, Urinalysis	Associate	No	CLT / MLT
	Less complex Microbiology *(procedure/media selection and culture inoculation; specimen preparation and inoculation/loading of automated ID/Sensitivity instrumentation, direct microscopic procedures, i.e. gram stain; recognition of potential organisms, likely sources and significance of culture findings; confirmatory testing and sub-culturing; non-waived antigen kit tests; macroscopic screening for parasites; urine cultures)*			
	Less complex Blood Banking *(ABO, Rh, antibody screen, crossmatch, direct antigblobulin testing, blood and component release)*			
	Manual Differentials with higher review of abnormal results			
	Urine Microscopy			
	Less complex Body Fluids (cell count, automated chemistries, gram stain)			
III	Body Fluid Microscopy with higher level review of abnormal results	Associate	Yes	CLT / MLT
IV	Blood Bank	Baccalaureate	No	CLS / MT
	Body Fluids			
	Immunology			
	Microbiology			
	Molecular testing that follows established protocols			
	Advanced Techniques in Hematology / Bone Marrows			
	Advanced Techniques in Coagulation			
	Advanced Techniques in Chemistry (Electrophoresis, etc.)			
	Advanced Techniques in Immunochemistry and Drug Testing (HPLC, etc.)			

Level	Practice Skills:	*Education*	Relevant Experience	Certification
V	Infection Control/Epidemiology	Baccalaureate + Additional education	Yes	CLS / MT
	Method Evaluation/Test Development			
	Patient Education			
	POC Oversight			
	Front Line Supervision			
	Research Protocols			
	Safety Officer			
	Student/Staff Education and Training Oversight			
	Technical Consultation			
	Informatics			
	Cellular Therapy - Stem Cell Transplantation			
	Cytogenetics	Baccalaureate + Additional education	Yes	Specialty Certification
	Advanced Molecular / PCR *(Modify existing tests, troubleshooting, method evaluation, research and development)*			
	Advanced Flow Cytometry			
	Histocompatibility			
	Specialist in (BB, Chem, Heme, Coag, etc)			
VI	Compliance/Coding/Regulatory	Masters Degree in relevant area	Yes	CLS / MT plus other relevant certification
	Quality Management			
	Risk/Patient Safety Management			
	Operations/Business Management *(Overall management of the laboratory, Regulatory Affairs / Compliance, Quality Assurance, Process Improvement, Information Management, Personnel Management, Productivity and Performance Monitoring, Inter and Intra disciplinary management, Financial Management (capital, operating, and personnel), Projecting and Monitoring, Contractual Agreements/Business Planning*)			
	Technical Management (*Coordinates, plans, manages and monitors testing activities and R & D, Data Management and Problem Solving, Instrument Selection, Test Development and Method Evaluation)*			
	Educational Program Director			
VII	Clinical Assessment	DCLS or PhD	No	CLS / MT plus other relevant certification
	Evidence based practice/research			
	Grand Rounds			
	Laboratory Services Clinical Consultation			
	Patient Counseling			
	Grant-funded Research P.I.			
	Test Utilization/Assessment/Protocol Development			
	Test Ordering			

IV. IMPLICATIONS AND RECOMMENDATIONS

The proposed model was developed after extensive data collection and analysis to address problems in the laboratory profession identified by educators, managers, and practitioners. The model describes what laboratory practice would look like if the profession were able to start from scratch and design a system that ensured patient safety, encouraged practitioners' professional development, and facilitated the effective use of laboratory personnel at all levels. Of course, it is not possible to start from scratch, so moving from "what is" to "what should be" will be a complicated and lengthy process. The first step in this process is seeking consensus from laboratory professionals on this model as the vision of "what should be." This will involve discussions on the implications of the model among educators, managers, and practitioners.

Implications for Educators and Students

The model provides educators with a clear guide for curricula at each level of practice. Using this model as a guide, educators can focus on the theory and technical skills that graduates need to function in their professional careers and can avoid teaching topics that will not be needed for entry-level practice. Often educators struggle to fit more content into their programs in order to accommodate advances in science and technology. The model can serve as a means to limit the breath of material covered and allow educators to emphasize the depth of understanding in those areas needed for clinical competence at a given level. Clinical laboratory students should find curricula more meaningful and relevant to the expectations in their entry-level jobs. Well defined curricula should also facilitate progression from one educational level to the next.

The model may raise concerns for educators if it is viewed as requiring fewer credits and courses for some programs. However, the model does not necessarily suggest that the length or number of credits in educational programs be reduced, rather that the content of the courses be focused on the specific knowledge, skills, and attitudes needed for competence at that level of practice. It is likely that, by limiting the material that must be covered at a given level, educators could devote more time to higher level skills such as troubleshooting, problem solving, and communication.

This model will only work if there are sufficient educational programs and those programs are accessible to students and meet the needs of rural and/or underserved areas. New programs will be needed and new methods of education will be required to enable practitioners to advance from one level of practice to the next. The model will also require more partnerships between educational institutions and clinical affiliates in order to provide the necessary clinical education.

Implications for laboratory managers.

At each level of practice, the proposed model would have an impact on clinical laboratory management. The first level of practice includes new standards for training and certification and this should result in higher skill levels in these important areas of clinical laboratory practice. The ability to

advance along a career ladder should also lead to a higher level of professionalism and decreased turnover among Level I practitioners. The educational preparation and practice skills of the Level II and III practitioners would be appropriate for physician office labs, for most small rural hospitals, and for routine testing in the majority of clinical laboratories. By assigning advanced procedures to the Level IV and V practitioners, managers can make better use of laboratory professionals with baccalaureate degrees and more clearly distinguish between the CLS/MT and CLT/MLT level of practice. The fifth level of this model provides new recognition for baccalaureate level practitioners who obtain specialized experience, education, and certification. The requirement for a Master's degree for Level VI practitioners recognizes the need for higher degrees for these advanced leadership roles. At the highest level of practice, a new clinical role for laboratory practitioners is defined that would improve laboratory services and patient care through clinical consultation to mid-level practitioners and physicians. Using this model, laboratory managers could assign work responsibilities based on the practice skills that can be expected from a practitioner at each level of practice. Employee morale should improve as a result of the well defined career ladder through which motivated individuals at all levels of practice can advance.

As laboratory managers study this model, they may be concerned about implementing this system in their current laboratories with today's workforce and educational options. The model assumes an adequate supply of practitioners and accessible educational programs and this does not exist today. Recruitment, education, and retention of laboratory professionals are essential, not only for the success of this proposed model, but also for the future of the laboratory profession. A strategy for ensuring an adequate supply of practitioners and educational programs must be included in the implementation plan and will require a commitment of resources from all stakeholders in the laboratory profession.

Implications for laboratory practitioners

In focus groups and surveys conducted by the task force, laboratory practitioners expressed a great deal of frustration with the lack of differentiation between the current levels of practice. This model addresses that concern by providing a well defined career path for laboratory professionals. The model makes it possible for individuals to enter at one level, gain employment, and move up the ladder through additional education, certification, and experience. The emphasis on education and certification should increase laboratory practitioners' sense of professionalism and progress in their careers. At the higher levels of practice, the model describes roles for clinical laboratory professionals that recognize their expertise and ability to contribute to the health care system. Young laboratory practitioners may be more likely to stay in the profession when they see opportunities for advancement through education, experience, and advanced certification.

Setting out defined job functions at each level helps differentiate the levels of practice, but it also places limitations on practice at all levels. There are many practitioners who are currently performing laboratory tests that would not be included in their scope of practice in the proposed model. Any strategy of implementation for this new model must recognize the value of current laboratory practitioners and

protect their jobs. The transition from current practice to the proposed model will be difficult, but without a vision and a plan for change, the frustrations of the present will continue.

Recommendations

For this model to be successfully implemented, laboratory educators, managers, practitioners, certification agencies, accreditation agencies, and professional organizations will all need to work together to plan the transition from "what is" to "what should be." In order to implement this model,

Laboratory **educators** must

- Revise current curricula to match the model.
- Develop new educational programs that are accessible and allow for an uncomplicated progression from level to level.
- Work with managers to identify mechanisms for Level I training.
- Work with certification and accrediting agencies to ensure that the model is reflected in examination content and accreditation standards.

Laboratory **managers** must:

- Educate administrators and human resource departments on the new model and update job descriptions to reflect the new levels of practice.
- Work with human resources departments to ensure that pay scales are commensurate with practitioners' education and experience at all levels of practice.
- Revise staffing plans based upon the new levels of practice to maximize the use of practitioners at each level of practice.
- Ensure that their employees only perform the practice skills that are within their scope of practice.
- Support educational programs by providing the clinical affiliations needed for practice skill development.

Laboratory **practitioners** must:

- Plan their careers using the model as a guide.
- Seek the education and experience needed to move up the career ladder.
- Maintain and document continued clinical competence.

Laboratory **certification agencies** must:

- Revise or develop examinations for all levels described in the model.
- Work with their sponsoring organizations and their accrediting agencies (e.g. NCCA) to develop a plan for defensible certification examinations in the transition time between the old and new standards for laboratory practice.

- Provide affordable and accessible methods for documenting continued competence.

Laboratory **accrediting agencies** must:

- Work with their sponsoring organizations to develop standards and guidelines based on the model levels of practice.
- Educate program directors, paper reviewers, and site visitors on new standards.
- Develop standards and guidelines for new programs that may be developed.

Laboratory **professional organizations** must:

- Inform members about the proposed model and provide opportunities for members to be involved in discussions and recommendations.
- Identify champions to speak at conferences, publish papers, and promote the new model.
- Revise the Body of Knowledge to match the model.
- Provide membership opportunities for practitioners at all levels of practice.
- Provide the continuing education needed for each level of practice.
- Work with educators to develop educational materials and programs for new levels of practice.
- Work with certification and accrediting agencies to ensure that the model is reflected in examination content and accreditation standards.
- Promote evidence-based research to validate the need for and effectiveness of the model.
- Lobby state and national legislative bodies for increased funding for clinical laboratory educational programs and students.

Next Steps

The task force used the 6 Sigma DMAIC (Define, Measure, Analyze, Implement, Control) process to address problems with the current levels of practice in the laboratory profession. The task force proceeded through the “Define” phase in several meetings that resulted in goals, objectives, and a research plan. In the “Measure” phase, the task force collected data from literature, interviews, focus groups, and surveys. The proposed model and recommendations are the result of the “Analyze” phase and it is now time to move to the “Implement” and “Control” phases of the process. This will require a continued commitment from all the organizations represented on this task force and the additional involvement of other stakeholders such as certification agencies and accrediting agencies.

~~1.~~ Given the complexity of the laboratory profession, the path forward will not be easy. However, after listening to the concerns of so many, the task force came to believe that a new vision for the laboratory profession is necessary. Without a change in the status quo, problems such as student attrition, blurred lines of responsibility and compensation among laboratory personnel with different education levels, attrition of talented laboratory professionals due to ineffective use of their skills, and lack of advancement opportunities will continue. In addition, the professional status of clinical laboratory

practice and laboratory practitioners suffers when professional organizations fail to agree on the common and appropriate scopes of practice for laboratory personnel at all levels. A necessary first step will be to share the proposed model with all members of the laboratory profession for discussion and input. Feedback from these discussions will be used to finalize the model before it is presented to participating organizations for approval. Therefore, the task force recommends that

1. The participating organizations accept the white paper with the proposed Model for Levels of Practice.
2. ASCLS create a new inter-organizational task force to move the new model through the steps necessary for implementation and validation. This task force should
    - Work with participating organizations to develop a process for distribution of the white paper and new model that includes a method for obtaining support from members.
    - Study the impact of this model on state licensure.
    - Determine the number of laboratory practitioners needed at each level of practice and determine the ability of the educational programs to meet that demand.
    - Consider developing a strategy for validating the model through evidence-based research.
    - Suggested timeline:
        - Fall 2007: Develop a plan and process for dissemination that includes a power point presentation for on-line distribution with accompanying script and Q&A component to promote review, dialogue and input from all participating organizations' members.
        - February 2008: Present model for discussion at the Clinical Laboratory Educators' Conference.
        - March 2008: Submit the model to all participating organizations.
        - Spring 2008: Seek membership support of new model.
        - Summer 2008: Submit the model to all participating organizations for final review, support, and approval.

Task Force Members and Affiliations

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V. APPENDICIES

APPENDIX A: References

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APPENDIX B: Comparison of levels of practice in other health professions.

	Education	Articulation	Supervision Required	Limitations	Independent Practice
Pharmacy					
Pharmacy Technician	Associate Degree	No	Yes	Yes	No
Pharmacist *	5 Yr Baccalaureate Degree	Yes	No	Varies	Yes
Pharm D	Doctorate (4 - 7 yrs)		No	No	Yes
Physical Therapy					
PT Aide	On the job training	No	Yes	Yes	No
PT Assistant	Associate Degree	No	Yes	Yes	No
Physical Therapist *	5 Yr Baccalaureate Degree	No	No	No	Yes
Physical Therapist	5 Yr Master's Degree	Yes	No	No	Yes
Doctor of PT	DPT (Doctorate)		No	No	Yes
Occupational Therapy					
OT Aide	On the job training		Yes	Yes	No
OT Assistant	Associate Degree or Certificate	Yes	Yes	Yes	No
Occ Therapist *	Baccalaureate Degree	Yes	No	No	Yes
Occupational Therapist	Baccalaureate / Master's Degree	Yes	No	No	Yes
Occupational Therapist	Master's Degree	Yes	No	No	Yes
Occupational Therapy Doctor	OTD (Doctorate)		No	No	Yes

** No longer an option*

APPENDIX C: Discussion guide for focus groups (Example from CLMA Study: 3-16-06)

I. Introductions (15 minutes)

- **Moderator introduction**

- **Objectives of the Task Force**
  - Define levels of practice to include knowledge, skills, competencies and attributes.
  - Evaluate titles for all levels of practice
  - Develop a comprehensive career ladder
  - Match educational curriculum to practice needs
  - Develop process to evaluate changing practice needs and adapt education curriculum.
  - Develop measures to monitor outcomes of the process
  - Build consensus, within the profession, related to levels of practice

- **Objective of this focus group** is to gather information that will be used to create a survey which in turn will be disseminated to a representative sample of clinical professionals. The survey will focus on validating the nature of problems associated with scope of practice issues and will explore solutions to those problems.

- **Housekeeping:**
  - Audiotaping so I can listen instead of take notes.
  - There are also some listeners from the committee responsible for developing the final survey. They will not participate.
  - Confidential and used for marketing research purposes only; no personal attributions to any opinions offered.
  - No right or wrong answers, please be candid.
  - Be brief and straightforward

- **Introduction of Respondents:**
  - Name, institution, position
  - Briefly, job responsibilities
  - Briefly, describe your workforce

II. Background (15 minutes)

- What evidence have you seen in your own experience that suggests the varying roles of laboratory employees (CLS, CLT, CLA, etc.) are not clearly articulated? What makes this a problem?
- What evidence have you seen in your own experience that suggests the <u>need</u> for differentiated laboratory employee roles is changing?

III. Factors Impacting the Scope of Practice (30-45 minutes)

- **Job Overlap**
  - Which positions (phlebotomist, CLA / laboratory assistant, CLT, CLS, CLS with advanced degree) report to you directly or do you have in your system? If they don't report to you, who do they report to?
  - To what degree to these positions (ex. CLT or CLS, etc.) have overlap in their responsibilities? In your opinion, to what degree does this overlap create a problem for patient outcomes?
  - What are the drivers of this variation and overlap? (probe for candidate shortage versus budgetary constraints on skill mix versus other things?)
  - If there were no constraints on resources or budget, how would you change the utilization of each of these types? Why? What's stopping you?

  - Is there an ideal mix of these positions? How did you arrive at your decision?
- **Resource needs outside of laboratory**
  - For each of the positions, describe how they are used outside the walls of the laboratory?
  - How is this different than 3 years ago?
  - What indications have you seen that this will change in the future?
  - Are there roles outside of the laboratory for any of these positions that you believe would improve patient outcomes? Which? Why?
  - If so, what unique skills and competencies would be required to service those needs? What other factors, other than the individual's competency, would be needed to allow this type of position to be successful?
- **Changing requirements**
  - For each of the positions, describe how their traditional use has changed today versus 3 years ago?
  - What indications have you seen that changes will continue into the future?
  - What are the drivers of these changes (probe for technology/methods changes, changing roles)?
  - As a result of these changes, what skills and competencies (other than those previously mentioned) will be increasingly needed (by job role); what skills and competencies will be de-emphasized?
  - Do these changing requirements offer an opportunity to provide less training for CLT's with a more narrowly defined job scope (i.e. more fully developed "core laboratory" capabilities – chemistry, hematology, coagulation, urinalysis – rather than transfusion services, microbiology, etc.? If so, what would be the barriers to adoption of this change?

IV. Potential Solutions (20-30 minutes)

- **Use of Extenders (phlebotomists, laboratory assistants):**
  - Has your system used phlebotomists, lab assistants or non-laboratory trained individuals (probe biology majors, junior college graduates) in roles traditionally reserved for CLT or CLS trained individual? Describe the situation?
  - What has been the satisfaction level with the practice? Do they feel that they are paying a price or do they see this as a "no-cost" solution?
  - Now think about CLT's in roles traditionally reserved for CLS?

- **Other solutions:**
  - Would expanding the scope of responsibilities and interaction with non-laboratory personnel worsen the resource shortage or enhance the image of the profession sufficiently to attract more job candidates?
  - What impact would the creation of an Advance Practice Practitioner (Clinical Doctorate / PhD) role have on other aspects of the scope of practice? On the workforce shortage?
  - What bridging strategies might reduce the impact of the workforce shortage even if we can expand the candidates entering the field?
  - To what degree, can we rely on technology, i.e. automation, informatics (autoverification), or process improvement (6 Sigma, Lean) etc to solve the shortage problem and reduce the need for hybrid roles?

V. Conclusion (5 – 10 minutes)

- In thinking back over the entire discussion, is there anything impacting the scope of practice today or in the future that has not been discussed?

APPENDIX D: Summary of comments from focus groups.

This summary does not include all comments that were shared in focus groups, but only those that seem to have the most bearing on the task force and for which observers seemed to express concurrence.

- The mix of CLT's or CLS's or "degreed personnel without certification" (hereafter referred to as non-CLS) in a work environment are driven by a few key factors including state laws, laboratory budgets, CLT/CLS availability (especially in small towns) and relationships with a particular school. For instance, if a hospital has a relationship with a CLT program, there tends to be a higher percentage of CLT's in that workforce.
- There is little uniformity in separation of scope of practice between CLT's, non-CLS and CLS's. Rather it seems to be primarily driven by workforce availability issues with some exceptions for specialized situations (mentioned were blood bank (blood bank seems to be driven by CFR requirements that one person reported as open to interpretation) and coag). In some locations, the distinction is in title only with wage scales and work assignments essentially identical. "Overtraining" of CLT's may also contribute to the overlap of job responsibilities.
- The blurring of job scope serves to reduce the externally perceived professionalism of laboratory technicians since CLA's and CLT's tend to answer questions with less sophistication than CLS'.
- The "public face" of the laboratory is further impeded by high turnover among the lowest skilled employees, i.e. phlebotomists.
- The lack of differentiation of job scope combined with unclear career paths, low wages and increasing alternatives (such as industry, imaging, or other medical professions) is demoralizing and seems to increase retention problems among younger CLS. There is a general feeling that the occupation is comprised of a large very senior group and a group of employees who have completed their training within the past 5 years. In between these two age segments there seems to be a relative higher absence of CLS. In general, CLS are seen as being a more stable workforce than CLT or CLA.
- Increased workload and constant turnover among younger technicians seems to be exacerbating the dissatisfaction of older employees.
- The size of the institution may correlate to the variety and sophistication of work activities available which favor a more enriching experience for CLS.
- School curriculums seem to reflect "the way it has always been" with some specific additions as a result of new technology. There was a sense that a "ground-up" assessment of curricular needs should be made.
- Extending the responsibilities of the CLS to interactions outside of the lab are and will be impeded by the style of the pathologist, the personalities of many lab technicians, and the lack of time due to workforce shortages. The one recurrent mention of external job activities was in the area of POC training and quality management.
- Possible "external" responsibilities could include POCT management, rounds, training, and test utilization consultation/review all of which require more emphasis on communication skills, consultative skills, and management skills than is found in the curriculum today. Some question if these skills should be added to the CLS curriculum or deferred until after several years of experience when the skills would more likely be needed. It is probably more important to learn "how to learn" and "how to find information" and defer specific knowledge and skills to later in the career.
- Increased automation, more software tools, new technologies such as molecular testing are driving changes in the work environment, as well as more balanced workloads (days versus nights) due to increasing Outreach. In general, ability to adapt seems to be more tied to age than certification.
- Future trends are expected to bring more automation, greater utilization of software tools/clinical algorithms, greater need for development of clinical algorithms, greater need for test utilization consultation especially in the area of molecular, greater need for troubleshooting automated methods, and expanded technological skills for areas such as molecular testing. The first two changes will drive increased needs for CLT's, the remainder for CLS'.
- Expanding further the roles of phlebotomists and CLA's will be limited by their lack of computer skills and troubleshooting skills. With increased automation, additional functions in the lab may be possible. At the other end of the educational spectrum, the provision of an advanced practitioner or clinical doctorate is seen as making the profession more interesting and therefore will improve the workforce. It is not anticipated that enough people would avail themselves of this potential to make a negative impact on the existing supply of CLS'.

APPENDIX E. The model as presented in the survey

(format dictated by Survey Monkey methodology)

Key assumptions:

1. This model assumes that practitioners receive national certification at each level.
2. The model is progressive in that it assumes that duties performed at each level include all the duties of lower levels.
3. Certain skills would be needed at all levels and are only listed here: Communication, Troubleshooting, Quality Control, Patient Safety, Basic Laboratory Safety (OSHA/EPA), Ethics, Interpersonal Skills, Cultural Awareness, IT /Computer Skills, Terminology, Basic Laboratory Operations.

The model describes multiple educational levels and the skills and knowledge that a laboratory practitioner can be expected to possess at each level.

PROPOSED MODEL

Educational Level: High School Diploma Plus Certificate
Practice Skills:
---Phlebotomy
---Specimen Processing (including culture set-up)
---Order Entry – Accessioning

Educational Level: Associate Degree
Practice Skills:
---Waived Testing
---Basic Point-Of-Care Testing (performing)
---Routine Rapid Testing (Beta-Strep, Monospot, etc)
---Basic/Automated (Chemistry, ImmunoChemistry, Coagulation, Hematology, Urinalysis)

Educational Level: Baccalaureate Degree
Practice Skills:
---Blood Bank
---Body Fluids
---Immunology
---Microbiology
---Advanced Techniques in Hematology / Bone Marrows
---Advanced Techniques in Coagulation
---Advanced Techniques in Chemistry (Electrophoresis, etc.)
---Advanced Techniques in Immunochemistry and Drug Testing (HPLC, etc.)

Educational Level: Baccalaureate Degree Plus (Plus = Additional education or certification that allows the laboratory professional to practice at an advanced level.)
Practice Skills:
---Advanced Molecular / PCR
---Cytogenetics
---Cellular Therapy - Stem Cell Transplantation
---Histocompatability
---Infection Control/Epidemiology
---IT Systems
---Medicare Compliance/Coding/Regulatory
---Method Evaluation/Development
---Patient Education

---Personnel Supervision
---POC Oversight
---Process Supervision
---Quality Management
---Research Protocols
---Risk Management
---Safety Officer (OSHA, EPA)
---Specialist in (BB, Chem, Heme, Flow Cytometry, etc)
---Student/Staff Education and Training
---Technical Consultation

Educational Level: Professional Doctorate or PhD in Clinical Laboratory Science
Practice Skills:

---Business Management
---Clinical Assessment
---Evidence based practice/research
---Inter-professional collaboration
---Laboratory Services Clinical Consultation
---Operations Management
---Patient Counseling
---Project development and grant writing
---Test Utilization/Assessment/Protocol Development
---Program Director

APPENDIX F: Survey results. Number of responses = 2507

Survey Questions:	Percent	Number
Where is the facility in which you work?		
Alabama	1.0%	24
Alaska	1.2%	31
Arizona	1.7%	42
Arkansas	0.6%	16
California	5.0%	126
Colorado	3.1%	77
Connecticut	0.6%	15
Delaware	0.4%	10
District of Columbia	0.8%	20
Florida	4.3%	107
Georgia	3.0%	75
Hawaii	0.6%	16
Idaho	0.7%	17
Illinois	4.2%	106
Indiana	3.2%	79
Iowa	1.6%	41
Kansas	1.4%	35
Kentucky	1.0%	24
Louisiana	1.5%	38
Maine	0.3%	7
Maryland	1.4%	34
Massachusetts	2.3%	58
Michigan	2.6%	64
Minnesota	5.3%	133
Mississippi	1.3%	33
Missouri	2.1%	53
Montana	0.9%	22
Nebraska	2.9%	72
Nevada	0.7%	17
New Hampshire	0.2%	6
New Jersey	1.8%	46
New Mexico	0.4%	9
New York	2.4%	59
North Carolina	2.9%	73
North Dakota	0.9%	22
Ohio	3.7%	93
Oklahoma	1.0%	25
Oregon	1.8%	46
Pennsylvania	3.4%	84
Puerto Rico	0.3%	7
Rhode Island	0.5%	12
South Carolina	1.9%	47
South Dakota	1.3%	33
Tennessee	2.0%	51
Texas	7.5%	187

Where is the facility in which you work?	Percent	Number
Utah	1.7%	42
Vermont	0.5%	12
Virginia	2.3%	59
Washington	3.1%	78
West Virginia	0.5%	13
Wisconsin	2.9%	72
Wyoming	0.4%	11
Not Working	1.1%	28
How would you characterize the community in which your facility resides?		
Large Urban (>1 million)	20.90%	524
Urban (100,000 - 1 million)	38.60%	967
Suburban (near an urban center)	22.10%	555
Rural (no urban area nearby)	18.40%	461
Where do you work most of the time?		
Small hospital/clinic (<500,000 billables per year, typically with less than 200 beds)	18.40%	461
Medium sized hospital (500,000-1.5 million billables typically 200-400 beds)	20.80%	522
Large hospital / medical center (> 1.5 million billables, typically >400 beds)	17.60%	441
Integrated Health Care System	5.90%	149
Reference/Independent Laboratory	7.60%	190
Physicians' Office /Group Practice	4.70%	117
College /University / Hospital Ed Program	10.80%	270
Not working	0.90%	22
Other (please specify)	13.30%	334
What title comes closest to describing your primary job function?		
Phlebotomist	0.20%	6
Laboratory Assistant	0.40%	9
Clinical Laboratory Technician/ MLT	4.30%	108
Clinical Laboratory Scientist / MT	28%	701
Research Technician /Technologist	1.10%	28
Laboratory Supervisor	15.30%	383
Laboratory Manager	13.50%	339
Laboratory Director / Administrative Director	8.70%	219
PhD Scientist (Clinical Chemist, etc)	2.50%	62
Medical Director/Pathologist	1.90%	47
CLS/MT Educator	7.70%	192
CLT/MLT Educator	2.80%	71
Not working	0.70%	17
Other (please specify)	12.90%	324
How many years have you been working as a laboratory professional?		
Less than 2 years	4.30%	108
Greater than 2 years to 5 years	3.70%	94
Greater than 5 years to 10 years	7.30%	182
Greater than 10 years to 20 years	18%	451
Greater than 20 years to 30 years	36.50%	915
Greater than 30 years	30.20%	757

What is the highest degree you have attained?	Percent	Number
High School	1.10%	27
Associate	7.60%	190
Baccalaureate	53.60%	1343
Master's	25.40%	637
Doctorate (Ph.D, Ed.D)	6.80%	170
Medical Doctor	2.20%	56
Other (please specify)	3.30%	83
Which of the following clinical laboratory science certification(s) do you possess? Check all that apply.		
Phlebotomist (AMT, ASCP, NCA, AAB)	1.90%	47
Clinical Laboratory Technician/ MLT	15.20%	381
Clinical Laboratory Scientist / MT	77.20%	1934
Specialist (Histology, micro, blood bank, etc.)	14.30%	357
Lab Supervisor (ASCP, NCA,ABB, etc)	4.90%	123
Lab Director (Medical or Administrative)	3.80%	94
Pathologist (AP, CP or both)	2.10%	52
Not certified	4.40%	109
Other (please specify)	7.60%	191
Are you licensed by your state?		
Yes	25.40%	637
No	74.60%	1870
In the Introduction you have just read, a case for change was made. Considering what you have read and your own experience, to what degree do you believe a change is needed?		
No need	1.20%	31
Minimal need	3%	75
Some need	29.80%	741
A great need	43.80%	1088
A critical need	22.20%	551
From the list below, select all those statements that are true of your work environment:		
There is very little difference in the job responsibilities of workers with different certifications	64.10%	1605
There is very little difference in the job responsibilities of workers with different educational levels	64.70%	1620
There is very little difference in the salaries of workers with different certifications	41%	1027
There is very little difference in the salaries of workers with different education levels.	41.20%	1033
Our lab has current openings for laboratory positions that have been vacant for more than 90 days	45.40%	1137
Non-certified employees have been hired to do jobs previously restricted to certified personnel	27.30%	685
In my organization, laboratory practitioners have left the field for higher paying jobs within the last 2 years	51.60%	1293
New graduates of CLS/MT educational programs do not have the skills needed for current laboratory practice	17.80%	447
New graduates of CLT/MLT educational programs do not have the skills needed for current laboratory practice	21.30%	534
There are limited career advancement opportunities for laboratory employees in our institution	78.30%	1961
None of the above	5.10%	128

	Percent	Number
One of the more significant changes in the proposed model is that practitioners with an associate degree (AS) would be precluded from performing microbiology and blood bank testing. This would allow AS students to have more time for general education courses simplifying the completion of a BS degree in the future if desired. To what degree do you think that this represents a valid justification for the change assuming that existing employees would be grandfathered.		
Not a justification	15.40%	383
Minimal justification	14.60%	364
Some justification	28.80%	717
Good justification	30.50%	760
Great justification	10.80%	269
Now that you have seen the proposed model, what do you believe are the advantages when compared to the current situation? (choose all that apply)		
Improved morale	27.90%	698
Easier to fill jobs	15.20%	382
Clearer career paths	65.40%	1638
CLT / MLT programs would not be as difficult	23.80%	595
CLS / MT programs would not be as difficult	6.60%	166
Less on-the-job training would be required	25.80%	647
Better patient care	32.10%	803
Clearer distinctions between workers with different education and certification levels	74.20%	1858
Employers would know what to expect from new employees at each educational level	61.40%	1539
Easier for managers to assign work responsibilities to complete the daily workload	40.80%	1021
More students would enter and complete educational programs	20.50%	513
More laboratory employees would stay in their field	21.10%	528
Greater recognition of the value of laboratory testing in patient care	30.60%	766
Laboratory professionals would be given more respect for their education and skills	42%	1052
None of the above	9.10%	227
What do you believe are the disadvantages when compared to the current situation? (choose all that apply)		
Decreased morale	17.80%	446
Harder to fill jobs	42.70%	1070
Harder for managers to assign work responsibilities to complete the daily workload	37.20%	932
Associate degree laboratory workers would find their jobs to be less interesting	57.40%	1438
Laboratory practitioners would not be good at patient counseling or clinical consultation	7.50%	187
Hospitals would not hire laboratory practitioners with professional doctorates	36.50%	914
Patients would have a more difficult time gaining access to laboratory services	4.80%	120
Friction between laboratory employees at different levels of practice would develop or increase	50.30%	1259
Greater difficulty in moving from one level of practice to the next	28.40%	712
Laboratory professionals would be given less respect for their education and skills	12.50%	313
None of the above	8.40%	210
Other (please specify)	10.50%	263

	Percent	Number
Assuming there is consensus on the new model, what do you foresee to be the greatest difficulty in implementation? (select one)		
Getting policy decision makers (CMS, Federal/State Governments, CLIA) to agree	22.50%	564
Schools will not be willing to change their curriculum	2.70%	67
Certification agencies will not be willing to change their requirements and tests	3.40%	84
Hospital Administrators and Lab Managers will not be willing to pass over available candidates to conform to this model	25.90%	648
Employees would resist the changes in their work environment	11.40%	285
Licensure laws would be hard to change	4.50%	112
CLTs /MLTs will resist the limits on their scope of practice	23.60%	591
Other (please specify)	6.20%	155
Want to see this model implemented ?		
Yes	55.40%	1390
No	44.60%	1117

APPENDIX G:

Survey results to Question 16: "If NO, what changes would you make? Would you move skills from one educational level to another?"

- Comments are listed in order of decreasing frequency (Numbers in parenthesis are an estimate of how many people made a similar comment)
- This does not include the many comments saying that we need to increase pay and recognition for profession and work toward licensure)

Comments Filtered by Job Function

CLT / MLT (51 comments)

1. There should be an MLT – Plus (other routes besides BS to advance) (13)
2. Keep Micro and Blood Bank at CLT level (12)
3. This is bad for rural settings (4)
4. This will hurt the supply of students and practitioners (3)
5. BS level people should do the non-bench work (2)

CLS / MT (229 comments)

1. Keep Micro and Blood Bank at CLT level (48)
2. Move skills from PhD to lower levels (MS or BS Plus) (13)
    a. Program director
    ~~c.~~b. Business and operations, management, Management skills, Administrative Director
3. This is bad for rural settings (13)
4. There should be recognition for on the job experience (12)
5. CLT/MLT practitioners should be more limited (6)
    a. should not perform automated tests requiring critical judgments / troubleshooting,
    b. AS degrees should only perform POCT
6. This will hurt the supply of students and practitioners (6)
7. Question the need for a PhD especially in small institutions (4)
8. Move skills from BS Plus to BS (3)
    a. Staff education, QM, Method Evaluation, IT systems, Compliance
    b. Safety Officer, R & D, POCT oversight
9. There should be an MLT – Plus (other routes besides BS to advance) (2)

Supervisor (141 Comments)

1. Keep Micro and Blood Bank at CLT level - Some suggestions for limits: (33)
    a. BB: allow automated blood bank testing and "first level" manual testing, ABO /Rh, blood product preparation – not antibody ID and discrepancy resolutions at BS level.
    b. Micro – allow routine culture set ups and follow-up cultures, Gram stain – not identification
2. Move skills from PhD to MS or BS Plus (16)
    a. Management. Administrative Director, operations management, grant writing, test utilization, program directors
3. This will hurt the supply of practitioners (12)
4. Move skills from BS Plus to BS (10)
    a. IT /computer, supervision, management, safety, technical consultation, research, education of students / training, PCR
5. This is bad for rural settings (7)
6. There should be recognition for on the job experience (7)
7. There should be an MLT – Plus (other routes besides BS to advance) (6)
8. CLT/MLT practitioners or HS + Certificate should be more limited (5)
    a. AS should not do micro – but can do BB (and visa versa)
    b. Specimen processing should be done by at least the AS degree
9. Question the need for a PhD (2)

10. Add to model – toxicology, histotechnology (2)
11. Move BS to BS Plus (for microbiology) (1)

Lab Manager (157 Comments)

1. Keep Micro and Blood Bank at CLT level - Some suggestions for limits: (34)
    a. BB: allow basic BB (antigen typing, reagent QC, prep of reagents, simple compatibility testing)
2. Move skills from PhD to MS or BS Plus (23)
    a. Management. operations management, program directors, grant writing, test utilization, Inter-professional collaboration
3. This is bad for rural settings (18)
4. This will hurt the supply of practitioners (14)
5. There should be recognition for on the job experience (13)
6. Move skills from BS Plus to BS (9)
    a. More molecular, management, advanced items. student / staff training
    b. Operations, business management,
7. CLT/MLT should be more limited (4)
    a. Move automated to BS level (some instruments are very complicated)
8. Question the need for a PhD (3)
9. Move waived testing to HS level (3)
10. There should be an MLT – Plus (other routes besides BS to advance) (1)

Director (108 Comments)

1. Keep Micro and Blood Bank at CLT level - Some suggestions for limits: (26)
    a. BB: gel system, type and screens, blood product prep and issue
    b. Micro: set ups & automation
2. Move skills from PhD to MS or BS Plus (22)
    a. Especially business management, lab operations
3. This will hurt the supply of practitioners (12)
4. This is bad for rural settings (9)
5. Question the need for a PhD (8)
6. CLT/MLT should be more limited (3)
    a. should not do toxicology, automated instruments
7. There should be recognition for on the job experience (2)
8. Move waived testing to HS level (2)
9. Move skills from BS+ to BS (2)
10. Improve curriculum (2)
    a. Formal training in customer service
    b. Focus CLS /MT training on management / supervisory skills + more complex testing (molecular, genetics, electrophoresis)

Ph.D (16 comments)

1. Allow CLTs to do more (3)
2. This will make it harder to fill positions (3)
3. Move skills to a higher level (3)
    Method Eval and QM → Ph.D, Technical consultation should be higher
    No certification below doctorate level (1)
4. DCLS not needed (1)

MD / Pathologist (16 comments)

1. Don't limit CLTs (4)
2. This will hurt staffing (2)
3. This will hurt rural areas (2)

CLS Educators (70 comments)

1. Move skills from PhD to MS or BS Plus (23)

   a. Program director (most frequent comment in this category)
   b. Staff training
   c. Molecular
2. Keep Micro and Blood Bank at CLT level (10)
3. This will hurt the supply of practitioners (5)
4. This is bad for rural settings (4)
5. Question the need for DCLS (4)
6. CLT/MLT practitioners should be more limited (3)
   a. Not all Chemistry and Hematology
   b. Not smear review
   c. Not tests requiring independent judgment
7. How would the advanced training to get the BS Plus work? (1)
8. Phlebotomy should not do culture set up (1)

CLT Educators (51 Comments)

1. Keep Micro and Blood Bank at CLT level (29)
   a. Also bench teaching
   b. Keep Micro and BB with appropriate limits
2. This is bad for rural settings (11)
3. Move skills from PhD to MS or BS Plus (3)
   Program director, administration, Molecular
4. Ph.D in CLS is not needed (2)
5. This will cause program closures, reduction in pay for CLTs (2)
6. Restrict CLTs – should not do microscopy (1)

Comments filtered by Rural: 461 respondents said they were in rural communities. 215 commented on #16.

1. The model is too restrictive - keep Micro and Blood Bank at CLT level (67)
2. This is bad for rural settings – would be hard to find staff (38)
3. This will exacerbate the personnel shortage (16)
4. Advancement should be based on experience, qualifications of the person and not simply on education (14)
5. Move skills from the PhD to the Master's degree level or BS level – especially management (14)
6. Move skills from BS Plus to BS – teaching, supervision (6)
7. Question the need for the PhD level (5)
8. Move Associate Degree tasks to the HS level (waived testing) (3)
9. Raise the requirements Move POCT to Associate Degree, BS degrees for everything (3)
10. The model is unrealistic for financial reasons (2)
11. The CLS curriculum should be updated to meet future needs (1)
12. The AS should not do micro (1)