The Pacific Northwest Laboratory Medicine Sentinel Monitoring Network
Final Report of the Findings of Questionnaire 5
Laboratory Personnel Training

Kathleen M. LaBeau [1], Marianne Simon [2] and Steven J. Steindel [2]

[1] Office of Laboratory Quality Assurance
Washington State Department of Health
1610 N.E. 150th Street
Seattle, Washington 98155
206 361-2802

[2] Centers for Disease Control and Prevention
Public Health Practice Program Office
Division of Laboratory Systems
Laboratory Practice Assessment Branch (MS G-23)
4770 Buford Highway N.E.
Atlanta, Georgia 30341

April 1997

BACKGROUND

The Washington State Office of Laboratory Quality Assurance (LQA) and the Centers for Disease Control and Prevention (CDC) created the Pacific Northwest Laboratory Medicine Sentinel Monitoring Network in January 1995, to provide ongoing information about practices in hospital, independent and physician office laboratories (POLs). The initial network was comprised of laboratories located primarily in Washington state (90%), with the remainder located in Alaska, Idaho and Oregon. During the third year of this project, our goal was to expand the size of the network by soliciting additional laboratories from states other than Washington. By increasing the number of participant laboratories from diverse locations, we hoped to minimize any biases that may be inherent in Washington state's health care environment and to further enhance the credibility of the data generated through this network's activities. To achieve this goal, letters were sent, in December 1996, to directors in 1,013 laboratories in Alaska, Idaho and Oregon, requesting their voluntary participation in this network. As of March 1997, 201 new laboratories agreed to participate.

In January 1997, demographic information was obtained from the October 1996 licensing applications in Washington state and from the Health Care Financing Administration (HCFA) Clinical Laboratories Improvement Amendments (CLIA) database for the initial network laboratories. Participant laboratories were deleted from the network if their current testing category was waived or provider-performed microscopic procedures (PPMP) only, or if they had closed or indicated that they no longer wished to participate in this network. With these changes in the initial laboratories and the addition of the new laboratories, the network is now comprised of 436 laboratories. Two hundred twelve (49%) are located in Washington, 115 (26%) in Oregon, 69 (16%) in Idaho and 40 (9%) in Alaska.

Using 1990 United States Census Bureau designations, 63% of the network laboratories are categorized as urban and 37% as rural. Sixty-two percent are POLs, 26% are hospital and 12% are independent laboratories. (Figure 1) Of the laboratories categorized as "POLs" by this network, 79% are POLs or clinics, 7% are community health clinics, 4% are student health clinics, 2% are health departments, 1% are health maintenance organizations (HMO) and 7% are other types. The distribution of laboratories by size, based on annual test volumes, is summarized in Figure 2.

Figure 1
LabTypes and Locations (N=436)

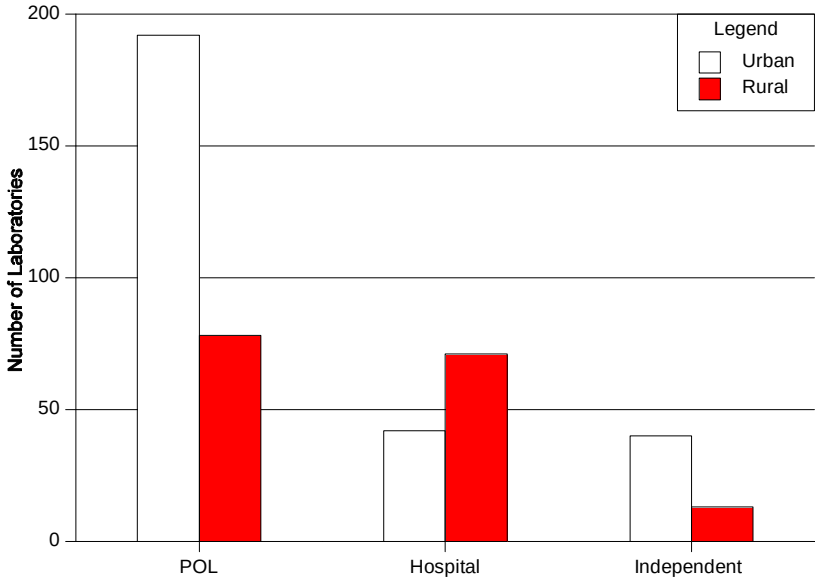
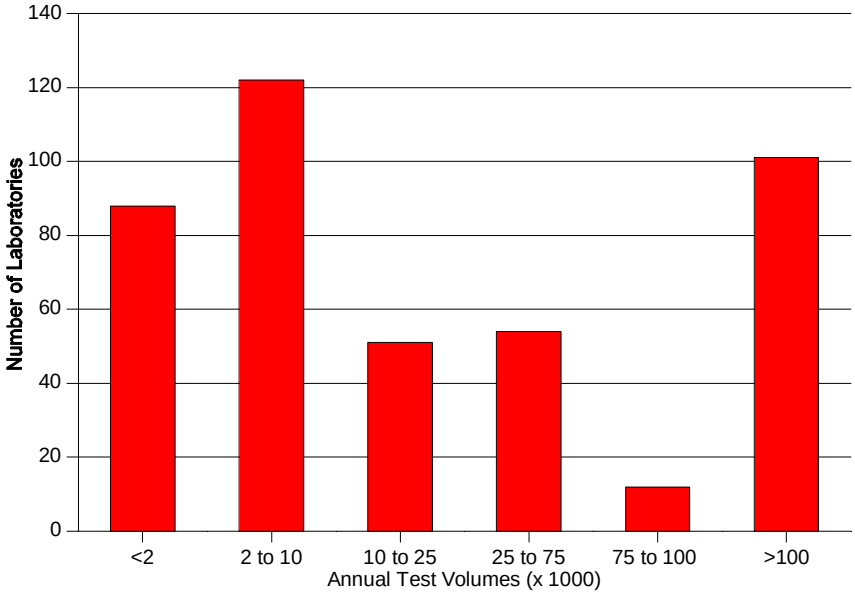


Figure 2
Lab Sizes (N=436)



A questionnaire requesting general laboratory information was mailed to all new laboratories in February 1997. These laboratories completed information about their accreditation status, test specialties, testing complexity, and numbers and types of testing personnel.

By combining the information obtained from this questionnaire and from the Washington Medical Test Site (MTS) and CLIA databases, we found that 31% of the total network laboratories were accredited by a private organization: 15% of the POLs were accredited; 54% of hospital and independent laboratories were accredited. We recognize problems with some new network laboratories confusing their accreditation status with participation in proficiency testing or with other non-CLIA programs. For example, laboratories indicated they were accredited but: included the name of a proficiency testing organization that does not accredit laboratories (i.e., American Academy of Family Physicians, Wisconsin State Laboratory of Hygiene, Idaho Bureau of Laboratories); checked the American Association of Blood Banks (AABB) as their accrediting organization but did indicate that they performed any immunohematology; or included the name of a certification program for environmental water testing. Questionable responses that were obvious were entered into the appropriate category.

Information about test specialties and test complexity appears in Table 1. We recognize and assume problems with the new laboratories understanding test specialties and complexity. This was noted with the original network laboratories when they completed general laboratory information on Questionnaire 1 in October 1995. Data obtained from the new network

laboratories were not confirmed using the CLIA database.

Table 1 - Test Specialties Performed by the Network (N=392 Labs)

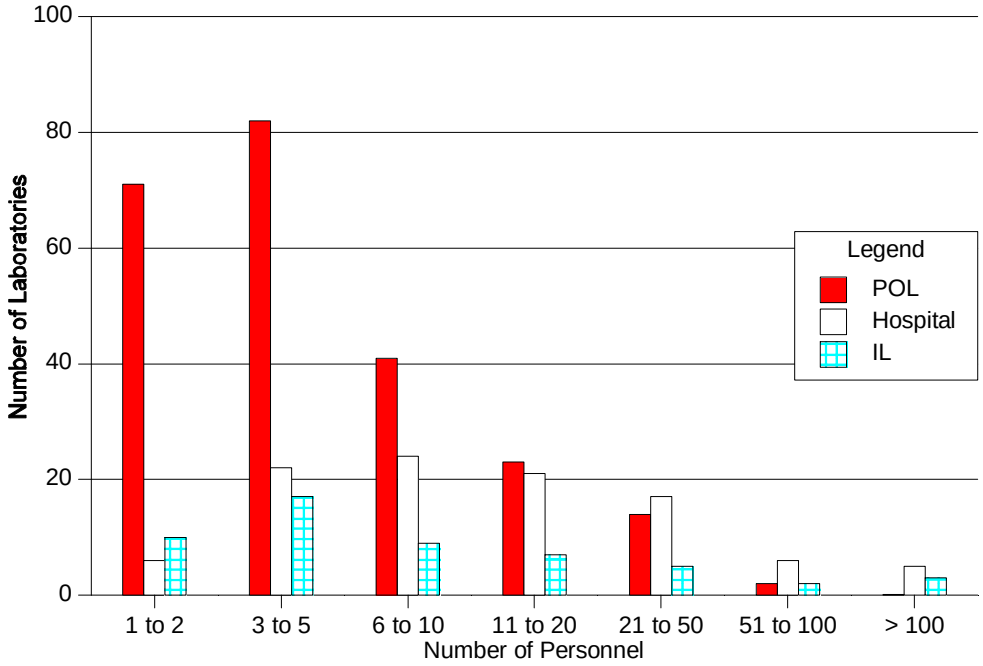
Test Specialty	Percent of Labs Performing Moderate or High Complexity Testing
Chemistry	68
Hematology	75
Microbiology	72
Diagnostic Immunology	63
Immunohematology	29
Pathology/Cytology	15
Histocompatibility	1
Clinical Cytogenetics	1
Microscopic Procedures	70 *

*Included are responses of moderate and high complexity, provider-performed microscopic procedures (PPMP) and "waived". Although there are no waived microscopic procedures, these were included in the count. For licensure purposes, laboratories in Washington state are instructed to count microscopics in one category called Microscopic Procedures; laboratories under CLIA are instructed to count microscopics under the specialty for the element being examined (i.e., KOH preparations and wet mounts would be counted under Microbiology; nasal smear for eosinophils would be counted under Hematology).

A total of 5635 testing personnel were tallied from the 387 laboratories that provided this information. Figure 3 shows the distribution of laboratories according to the numbers of testing personnel. Seventy-two percent of these laboratories had at least one individual performing testing that had formal laboratory training (a medical technologist or medical laboratory technician). Ninety-two percent of the hospital and independent laboratories had at least one formally trained individual among their testing personnel compared with 58% of the POLs.

Among the new network laboratories, 29% indicated that they routinely used an outside laboratory consultant. This compares closely with the percentage of the original network laboratories that used a consultant (32%). We did not update this information for the original network laboratories.

Figure 3
Testing Personnel (N=387 Labs)



QUESTIONNAIRE 5

Questionnaire 5 was mailed to 435 laboratories in February 1997 (One new laboratory was enrolled in the network after the deadline for the return of Questionnaire 5). The intent of this questionnaire was to investigate the training opportunities and training preferences of laboratory testing personnel. Data from this questionnaire were analyzed using Microsoft Access ™ and further statistical tests were performed using Raosoft SurveyFirst ™. Tests of significance were performed using the Student's t-test, at 95% confidence limits (p=.05).

FINDINGS

Three hundred twenty-two completed questionnaires were returned in time for analysis, a 74% response rate. The laboratories responding to Questionnaire 5 were categorized as follows: 60% POL; 27% hospital laboratories and 13% independent laboratories. Sixty percent were categorized as urban and 40% as rural. Three hundred twenty of the 322 respondents indicated their background and role in laboratory testing. The majority (71%) were medical technologists (MT) or medical laboratory technicians (MLT), 8% were registered nurses or advanced registered

nurse practitioners, 6% were medical doctors and 4% were medical assistants.

Sources of Training

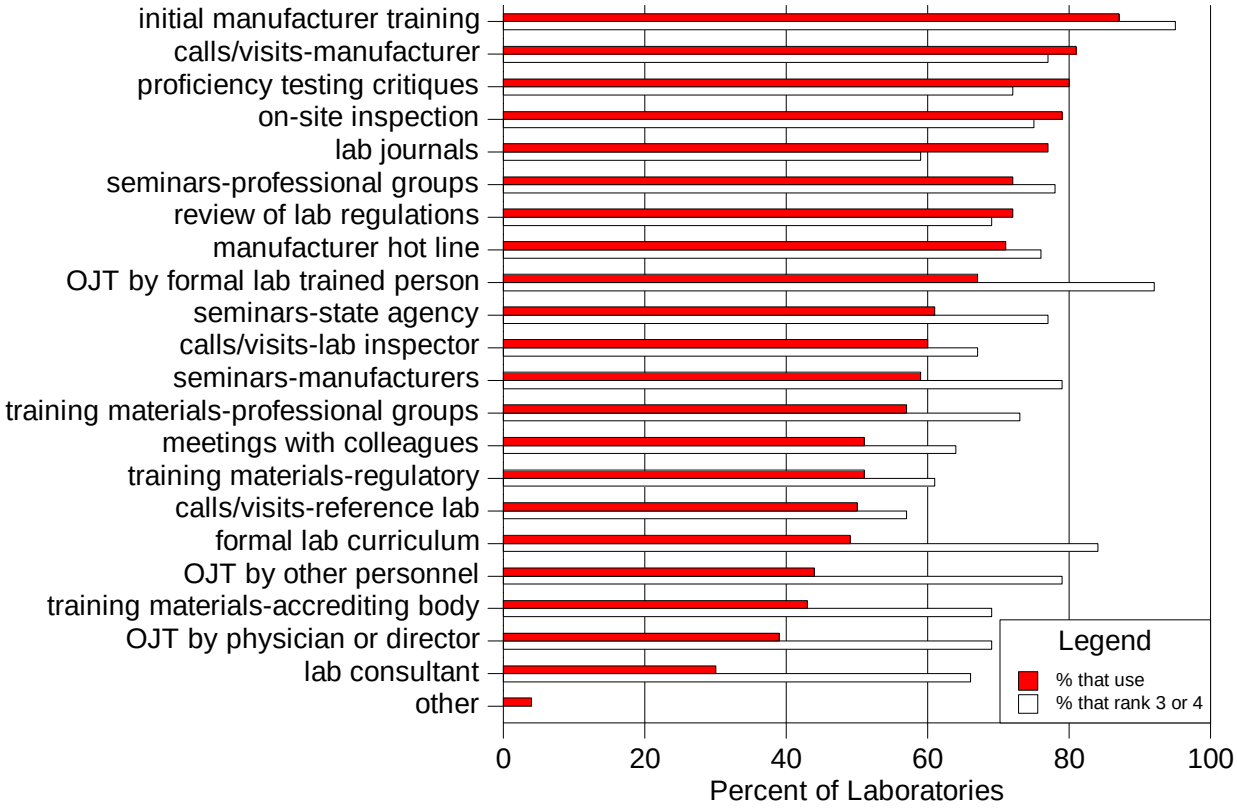
Using a list of 22 sources, participants were asked to indicate the "sources of training or information on issues related to laboratory testing" that they use or have used. For each source of training, the percent of laboratories that used the source was calculated. The most frequently used sources of training by all laboratories were: *Initial manufacturer training on the method or instrument* (87%); *Phone calls or visits by manufacturer's representatives* (81%); *Review of proficiency testing critiques* (80%); *Information gained from an on-site inspection* (79%); and *Review of laboratory journals or other publications* (77%).

Network participants were asked to rank the degree of usefulness of each source of training that they indicated they use or have used. A ranking system was used where 1 = not useful, 2 = somewhat useful, 3 = moderately useful, 4 = very useful. For each source of training, the percent of laboratories that ranked the usefulness as moderately useful (3) or very useful (4) was determined. Using these criteria, the following were ranked as most useful: *Initial manufacturer training on the method or instrument* (95%); *On the job training by on-site personnel with formal laboratory training* (92%); F*ormal laboratory curriculum* (84%); *On the job training by other on-site personnel* (79%); *Seminars/workshops by manufacturers* (79%); *Seminars/workshops by professional organizations* (78%); *Phone calls or visits by manufacturer's representatives* (77%); and *Seminars/workshops by state agency professionals* (77%). Figure 4 shows a summary of the sources of training that laboratories use and those judged to be moderately useful or very useful (3 or 4).

Thirteen laboratories specified sources of training other than the choices listed in this question. These can be summarized in the following three categories: manufacturer-provided materials or resources (product inserts or manuals, written materials, assistance from service engineers); training by individuals (other instrument users, medical residents or faculty); and miscellaneous reference materials (slides, reference books, audiovisual materials, teleconferences, Washington G-2 Reports, continuing education courses, lending library materials, U.S. Navy materials).

Figure 4

Sources of Training (N=322 Labs)



No statistically significant differences were noted in the frequencies at which hospital and independent laboratories used the various sources of training, except for *Phone calls or visits by reference laboratory representatives.* Fifty-seven percent of hospital laboratories used this as a source of training while only 29% of independent laboratories did. POLs used training sources at lower frequencies than both hospitals and independent laboratories for all but two of the choices listed. (Table 2)

Table 2 - Sources of Training-Hospital, Independent and POLs

Source of Training	**Percent of Labs that *Use* the Source**	
	Hospital & Independent (N=128)	**POL** (N=192)
Initial manufacturer training on instrument or method	93	82
Phone calls, visits by manufacturer's representative	89	75
On the job training by physician, director	41	38
On the job training by person with formal lab training	84	56
On the job training by other on-site personnel	49	41
Phone calls, visits by laboratory inspector	65	57
Phone calls or on-site visits by reference lab representative	Hospital = 57 Independent = 29	52
Training materials by regulatory agencies	54	49
Training materials by accrediting agencies	48	40
Training materials by professional organizations	68	50
Seminars/workshops by state agency professionals	63	58
Seminars/workshops by professional organizations	90	60
Seminars/workshops by manufacturers	80	45
Formal lab curriculum	53	47
Review of lab journals, other publications	89	69
Information gained from on-site inspection	85	74
Review of lab regulations or accreditation standards	80	66
Review of proficiency testing critiques	83	78
Assistance by outside lab consultant	29	31
Technical assistance via manufacturer's hot line	82	63
Informal meetings with colleagues outside of work	60	44

Significant differences were not found between the frequencies at which hospital laboratories and independent laboratories ranked the training sources as moderately or very useful, with one exception. In this case, 69% of independent laboratories ranked *On the job training by a physician or director* as moderately useful or very useful, versus 46% of hospital laboratories. POLs also ranked this as a 3 or 4 at a significantly higher percentage (81%) than hospital laboratories. A significantly higher percentage of POLs ranked *Phone calls or visits by reference laboratory representative* and *Information gained from an on-site inspection* as moderately or very useful compared to combined percentages for hospital and independent laboratories. POLs ranked the following as moderately useful or very useful at significantly lower frequencies than the combined frequencies for hospital and independent laboratories: *Training materials by accrediting agencies; Training materials by professional organizations; Seminars/workshops by professional organizations;* and *Seminars/workshops by manufacturers*. Tables 3 and 4 show the significant differences between laboratory types.

Table 3 - Sources of Training - Hospital, Independent and POLs

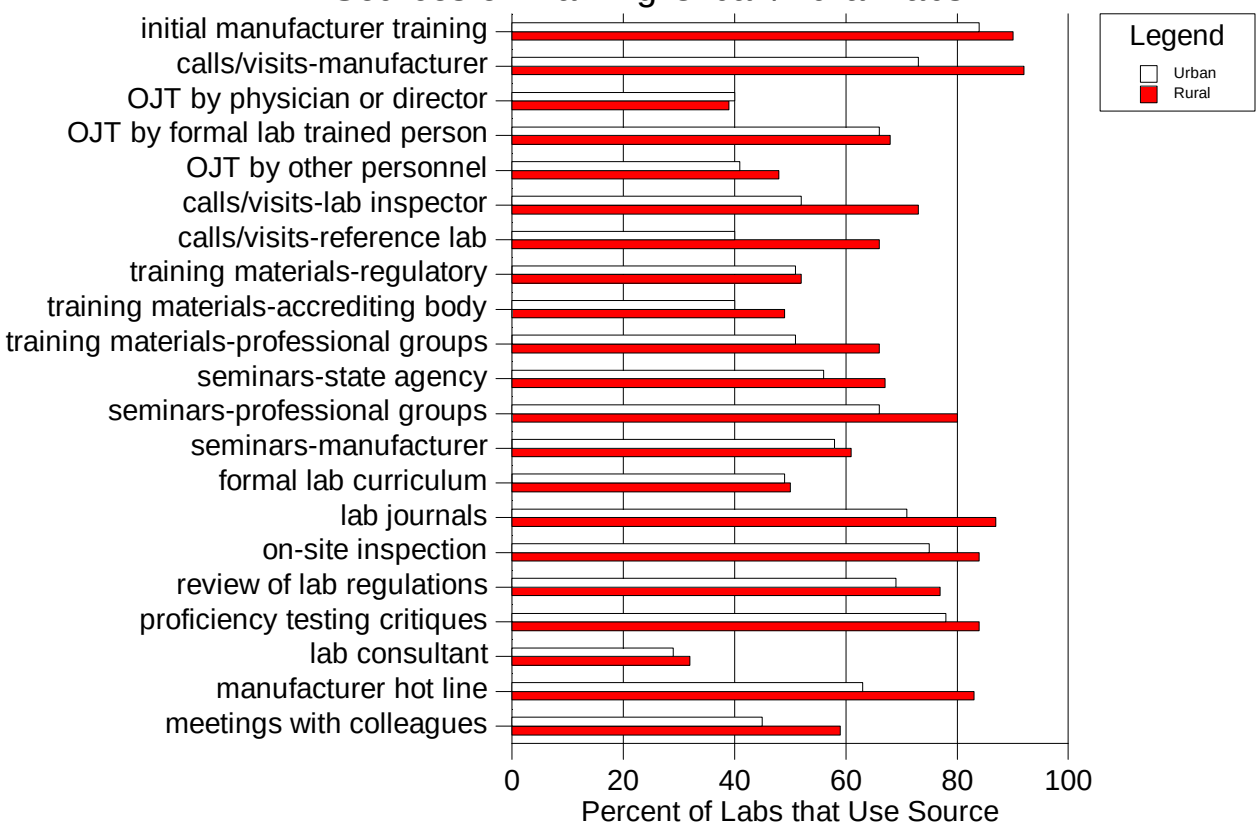
Source of Training	**Percent of Labs that *Ranked* the Source *Moderately Useful or Very Useful***	
	Hospital & Independent (N=128)	**POL** (N=192)
Calls or visits by reference lab representative	48	62
Information gained from on-site inspection	69	80
Training materials-accrediting agencies	77	62
Training materials-professional organizations	80	66
Seminars/workshops-professional organizations	85	71
Seminars/workshops-manufacturers	86	70

Table 4 - Sources of Training - Hospital, Independent and POLs

Source of Training	**Percent of Labs that *Ranked* the Source *Moderately Useful or Very Useful***		
	Hospital (N=87)	**Independent** (N=41)	**POL** (N=192)
On the job training by physician or director	46	69*	81*
Calls or visits by laboratory inspector	63	54	73**
Assistance by outside laboratory consultant	63	50	69**
*significant difference from hospital labs		**significant difference from independent labs	

Rural laboratories used nearly every training source at a higher frequency than urban laboratories. Statistically higher frequencies were noted for rural laboratories for the following: Phone calls or visits by manufacturer's representatives, laboratory inspectors and reference laboratory representatives; Seminars/workshops by state agencies and professional organizations; Training materials by professional organizations; Review of laboratory journals; Manufacturer's hotlines; and Informal meetings with colleagues. (Figure 5)

Figure 5



Rural laboratories ranked the usefulness as a 3 or 4 at a significantly lower rate than urban laboratories for the following: *On the job training by a physician or director*; *On the job training by other on-site personnel*; and *Information gained from an on-site inspection*.

Laboratories that do not have any testing personnel with formal laboratory training (no MT or MLT) use training sources at lower frequencies than laboratories with at least one MT or MLT, except: *On the job training by physician or director*; *On the job training by other on-site personnel*; and *Assistance from an outside laboratory consultant*.

The top choices of training sources for non-MT/MLT laboratories were due to the influence of: regulatory agencies -proficiency testing critiques (73%) and on-site inspections (71%); manufacturers -initial training (67%) and calls or visits (60%); and on the job training by a physician/director (62%).

Top choices for sources of training for laboratories with an MT/MLT were provided by: manufacturers -initial training (94%) and calls or visits (88%); laboratory journals (86%); regulatory agencies -proficiency testing critiques (83%) and on-site inspections (82%); and seminars by professional organizations (82%). (Table 5)

Table 5 - Sources of Training - Differences in Personnel

Source of Training	**Percent of Labs that *Use* the Source**	
	Labs with MT or MLT N=235	**Labs with no MT or MLT** N=82
Initial manufacturer training	94	67
Calls or visits by manufacturer representative	88	60
On the job training by physician or director	31	62
On the job training by on-site person with formal lab training	75	44
On the job training by other on-site personnel	43	48
Calls or visits by lab inspector	63	51
Calls or visits by reference lab representative	51	46
Training materials-regulatory agencies	55	41
Training materials-accrediting agencies	48	32
Training materials-professional organizations	64	38
Seminars/workshops-state agencies	65	48
Seminars/workshops-professional organizations	82	43
Seminars/workshops-manufacturers	67	38
Formal lab curriculum	55	32
Lab journals or other publications	86	51
Information gained from on-site inspection	82	71
Review of lab regulations	77	56
Review of proficiency testing critiques	83	73
Assistance by outside laboratory consultant	27	39
Technical assistance via manufacturer's hot-line	80	45
Informal meetings with colleagues outside work	53	46

Using the percent ranking sources moderately useful or very useful, laboratories with formally trained personnel prefer manufacturers, on the job training by on-site personnel with formal laboratory training, formal laboratory curriculum, and seminars for their training. Laboratories with no MT/MLT prefer on the job training (by physicians/directors, personnel with formal laboratory training and other on-site personnel) and resources provided by manufacturers. Table 6 shows the sources of training where the differences in the percent of laboratories ranking the source as a 3 or 4 were significant between these two groups.

Table 6 - Sources of Training - Differences in Personnel

Source of Training	**Percent of Labs that *Ranked* the Source *Moderately Useful or Very Useful***	
	Labs with MT or MLT N=235	**Labs with no MT or MLT** N=82
On the job training by physician or director	53	92
On the job training by other on-site personnel	74	89
Calls or visits by lab inspector	63	81
Calls or visits by reference lab representative	50	79
Assistance by outside lab consultant	61	75
Training materials by regulatory agencies	58	71

Recent Training on Laboratory-Related Topics

Network participants were asked "In the past year, has anyone on your staff attended at least one training course covering a laboratory-related topic? If you checked No ... indicate the primary reason that you or others on your staff did not attend a laboratory-related session." Seventy-five percent of all respondents indicated that they had attended a laboratory-related training session in the last year.

There were no significant differences in the frequencies at which urban and rural laboratories attended training. POLs attended training at a significantly lower frequency than hospital or independent laboratories. Laboratories with no MT or MLT attended training at a significantly lower frequency than laboratories with at least one MT or MLT as testing personnel. Laboratories with less than two testing personnel attended training at a significantly lower frequency than laboratories with three or more personnel. Table 7 shows these differences.

Table 7 - Labs that Attended a Lab-Related Training Course in the Last Year

Percent of Labs											
All N=322		**Urban** N=194	**Rural** N=128		**POL** N=194	**Hospital** N=87	**IL** N=41		**WA** N=148	**ID** N=61	**AK** N=28	**OR** N=85
75		72	80		64	92	90		79	70	75	72

No MT or MLT N=83	**MT or MLT** N=236		Number of Testing Personnel				
			1 to 2 N=72	**3 to 4** N=74	**5 to 10** N=91	**11 to 20** N=42	**> 20** N=40
55	82		51	72	79	90	98

Of the 80 laboratories that did not attend any laboratory-related training in the last year: 25% did not feel that additional training was necessary; 15% did not have time off to attend training; and 20% did not have funding provided to attend training. Fourteen percent of laboratories gave multiple reasons and 23% gave a reason other than the choices listed. These other reasons are summarized as follows: Not aware of classes of interest (7 labs); Too busy to attend (4 labs); Perform very limited testing (4 labs); Distance too far (2 labs); Lack of courses appropriate for small labs (2 labs); Courses were too expensive (1 lab); State did not take class on the road (1 lab); Lack of local interest (1 lab); and No lab person until recently (1 lab).

Improving Access to Training

Using a list of 10 choices, participants were asked "Which of the following would improve your access to training on laboratory-related issues? List your top three choices, with 1=your first choice, 2=your second choice and 3=your third choice." For each choice, the percent of laboratories that gave a ranking of 1, 2 or 3 was calculated.

The top three choices were: *Workshops more conveniently located* (64%); *Audio or video tapes* (57%); and *More printed materials provided by professional organizations, regulatory agencies, accrediting agencies or reference laboratories* (52%). (Figure 6) These same choices were ranked in the highest three percentages when looking at: different laboratory types (POL, hospital, independent); different laboratory locations (urban, rural); and different personnel types (with or without MT or MLT).

We were interested to learn whether non-MT or MLT personnel would benefit from more laboratory-related training courses being offered through non-laboratory professional organizations, with whom they may be affiliated. Announcements for laboratory training courses, offered by laboratory professional organizations, often do not target nurses, medical assistants, physicians and other providers, although these individuals comprise a large segment of laboratory testing personnel. In addition these same personnel may feel more comfortable attending seminars

or workshops with others having similar backgrounds, or may wish to focus most of their training time in courses offered by the professional organization with whom they are affiliated. When looking at laboratories that had no MT or MLT, 30% ranked *Information on laboratory issues provided through non-laboratory organizations* as one of their top three choices for improving access to laboratory-related training. (Table 8)

Figure 6

Improving Access to Training (301 Labs)

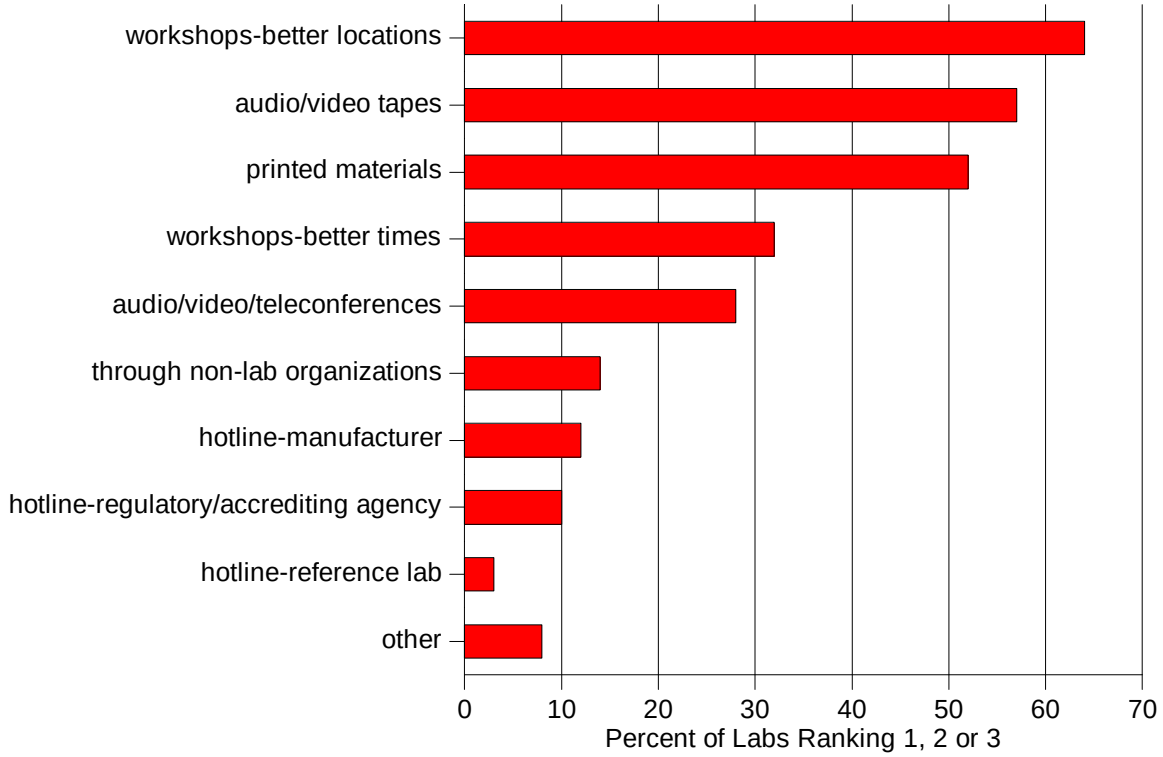


Table 8 - Improving Access to Laboratory Training

	Percent of Labs that Ranked Choice as 1, 2 or 3						
	POL N=180	**Hospital** N=83	**IL** N=38	**Urban** N=180	**Rural** N=121	**No MT/MLT** N=73	**MT/MLT** N=226
Workshops- more convenient location	61	67	71	59	70	42	71
Audio or video tapes	55	64	55	60	54	52	60
More printed materials	52	48	58	54	48	52	51
Workshops- more convenient times	37	23	29	36	26	27	34
Audio/video/teleconferences	21	43	26	23	34	15	32
Information provided by non-laboratory organizations	19	7	8	16	12	30	9
Consultation hotline- manufacturers	11	12	16	10	14	12	11
Consultation hotline- regulatory/accrediting agency	7	15	11	6	15	5	10
Consultation hot line- reference laboratories	5	1	0	4	2	7	2

Twenty-three laboratories gave reasons other than the choices listed. These are summarized as follows: Related to time constraints (6); Workshop scheduling, format, fees (5); Assistance by regulatory agencies -checklists, workshops, consultation (3); Printed materials -journal abstracts, self-study courses, distance learning (3); Internet information, hotlines (2); Interactive computer training, multimedia education (2); Hands on training (1); Networking with other lab employees (1).

Among the 97 laboratories that chose *Workshops presented at more convenient times*, 83 specified a preference for weekday or weekend. Forty-seven percent of these laboratories chose weekdays, 53% chose weekends. Sixty-nine laboratories specified a preference for time of day, with 41% choosing mornings, 25% afternoons, and 35% evenings.

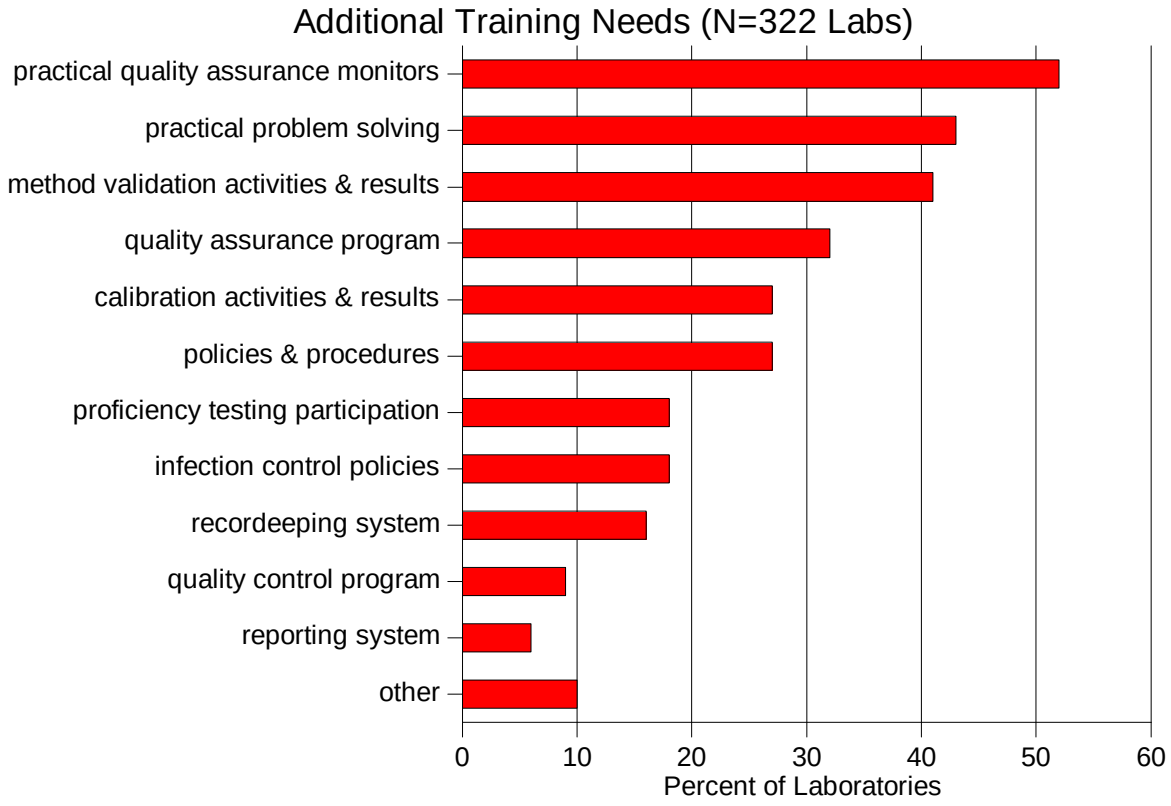
Additional Training Needs

Using a list of 12 choices, participants were asked "In which areas of laboratory testing do you feel your staff needs additional training? Check all that apply." For each choice, the percent of

laboratories that checked the choice was calculated.

The choices given by the highest percentage of laboratories were: *Implementing practical, effective quality assurance monitors and/or studies* (52%); *Learning about practical approaches to solving laboratory testing problems* (43%); and *Understanding method validation activities and results* (41%). (Figure 7)

Figure 7



The choices given on the questionnaire were closely related to regulatory standards. However, laboratories were given an opportunity to list any type of additional training needs under the choice of "other". Thirty-one laboratories listed other topics for additional training:

- Specific technical training - fungus, KOH, hematology, microbiology, recognition of early cells, basics in all areas, protimes, drugs, chemistry, INRs, Chlamydia, viral load, wet mounts, gram stains, UA, parasitology (6 labs)
- New test/technology updates (5 labs)
- Marketplace issues - billing, reimbursement, managed care contracts, CPT codes, ICD-9 codes, insurances, Medicare billing, issues for office personnel, competition, competitive markets (4 labs)
- Interpersonal skills - teams, self managed teams, communication, client service and sales training (3 labs)
- Statistics (2 labs)
- Quality control / problem solving (2 labs)
- Miscellaneous - lab training for non-lab personnel, lab training for nurses, hands on experience, coordinating send outs, general lab medicine, expectations of regulatory boards, competency validation, computer training (Word and Excel), recording on the job injuries.

Statistically significant differences were noted in the percentages of laboratory types that needed additional training for the following: *Developing working policies and procedures; Developing a quality assurance program; Implementing practical quality assurance monitors; Learning about practical approaches to solving laboratory testing problems;* and *Understanding method validation activities and results.* Table 9 shows these differences.

Table 9 - Additional Training Needs - POL, Hospital and Independent Labs

Training Topic	**Percent of Labs that Indicated the Need for Additional Training**		
	POL (N=194)	**Hospital** (N=87)	**Independent** (N=41)
Working policies/procedures	22	39	22
Quality assurance program	24	48	37
Practical quality assurance monitors	42	70	63
Problem solving	40	53	34
Method validation	35	49	49

When comparing urban and rural laboratories, statistically significant differences in training needs were noted for: *Developing a quality assurance program* (26% urban, 41% rural) and *Developing infection control policies and practices* (12% urban, 27% rural).

Table 10 summarizes significant differences in additional training needs between laboratories with a MT or MLT and those without.

Table 10 - Additional Training Needs - Differences in Personnel

Training Topic	**Percent of Labs that Indicated the Need for Additional Training**	
	No MT or MLT (N=83)	**MT or MLT** (N=236)
Developing a recordkeeping system	24	14
Developing a quality assurance program	23	35
Implementing quality assurance monitors	30	61
Problem solving	27	47
Method validation activities	25	46

DISCUSSION

For all respondent laboratories, the training sources most frequently used are provided by manufacturers, regulatory agencies and laboratory journals and other publications. Laboratories showed a preference for practical training on methods and instruments in use by manufacturers and by on the job personnel. A strong preference for seminars was also noted. In the last year, individuals from 75% of all respondent laboratories attended a training course on a laboratory-related topic. Among those not attending training, one quarter of the laboratories felt that no additional training was necessary. Access to training would be improved for the majority of laboratories if seminars or workshops were held in "better" locations. Audio visual tapes and printed materials were also recognized as preferred ways to broaden access to training. Using a list of training topics that reflected regulatory standards, laboratories indicated their preference for learning how to implement practical quality assurance monitors and problem solving activities. Understanding method validation activities was another topic that had a relatively high level of interest.

POLs used nearly all training sources at lower frequencies than hospital or independent laboratories. POLs showed a higher preference for training by their physician/director, reference laboratory representatives, laboratory inspectors, and outside laboratory consultants versus hospital and independent laboratories. A significantly lower percent of POLs attended training in the last year.

Rural laboratories were able to recognize training opportunities from all sources at a higher degree than urban laboratories. Rural laboratories showed a preference for audio visual conferences, teleconferences or satellite conferences and for regulatory hotlines as mechanisms to

improve their access to training.

Laboratories with no MT or MLT as testing personnel used sources of training at lower frequencies (except for training by on-site personnel and laboratory consultants) and attended training courses at a significantly lower rate than laboratories with an MT or MLT. Thirty percent of the laboratories without an MT or MLT indicated they would benefit from more laboratory-related courses offered through non-laboratory professional organizations. These laboratories showed a higher preference for training in recordkeeping activities, and a lower preference for training in quality assurance, problem solving and method validation than laboratories with an MT or MLT as testing personnel.

Depending on the preferences of different categories of laboratories and testing personnel, there are clear roles for manufacturers, regulatory agencies, accrediting agencies, reference laboratories and professional organizations to provide laboratory training to receptive audiences.