

**The Pacific Northwest Laboratory Medicine Sentinel Monitoring Network
Final Report of the Findings of Questionnaire 9
Systems to Detect Laboratory Problems or Errors**

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BACKGROUND

The Pacific Northwest Laboratory Sentinel Monitoring Network was created in January 1995 to gather ongoing information about practices in hospital, independent and physician office laboratories. To date, nine questionnaires have been released to the network, exploring issues related to: testing quality; access to testing services; laboratory-related problems and errors; personnel training and changes; proficiency testing participation; and testing systems with non-traditional mechanisms for quality control. The data gathered thus far have provided network participants, interest groups and regulators with information about trends in laboratory medicine, based on actual practices and experiences in testing facilities.

QUESTIONNAIRE 9

Questionnaire 9 was mailed to 425 network laboratories in May 1998. The intent of this questionnaire was to evaluate the use and effectiveness of systems to detect laboratory-related problems or errors. Two hundred fifty-three laboratories returned a completed questionnaire in time for analysis, a 60% response rate. Data from this questionnaire were analyzed using Microsoft Access™ and Raosoft SurveyFirst™. Tests of significance were performed using Student's t-Test at 95% confidence limits ($p=0.05$). Demographic characteristics of the respondents are summarized in Table 1.

Table 1 - Questionnaire 9 respondents (N=253 laboratories)

Demographic characteristic	Percent
STATE	
Alaska	10
Idaho	20
Oregon	25
Washington	45
LABORATORY TYPE	
Physician office laboratory (POL)	59
Hospital	29
Independent laboratory (IL)	12
CENSUS BUREAU DESIGNATION	
Urban	57
Rural	43
ACCREDITATION STATUS	
Yes	34
No	66

FINDINGS

In the first five questions, we asked about systems to detect problems and errors, to assess whether laboratories used the system and how formally data were reviewed and shared with staff. We asked the following:

Does your laboratory:

- 1) track corrected reports?
- 2) track patient redraws?
- 3) track patient complaints?
- 4) track physician complaints?
- 5) have a problem log (or equivalent system)?

For each of these systems:

Are numbers and reasons tracked for trends?

Are findings shared with staff in regular review sessions or staff meetings?

Are written reports of the findings generated?

If Yes, how often? Who reviews a copy of written reports?

Rank the effectiveness of this system to detect problems or errors (check one):

very effective; moderately effective; minimally effective; not effective.

Corrected patient reports

For corrected patient reports, we also asked if participants had a written policy for handling corrected reports. Table 2 and Figure 1 summarize the responses to these questions.

Table 2 - Corrected patient reports (N=252 respondents)

	Percent of labs responding "Yes"								
	All	POL	Hospita 1	IL	Labs with MT or MLT*	Labs with no MT or MLT*	Annual test volume (x 1000)		
							<10	10 to 50	>50
Do you track?	60	55	61	80	60	58	52	53	73
Written policy?	52	45	55	77	59	31			
Numbers & reasons tracked for trends?	33	24	41	63	37	21			
Are findings shared with staff?	43	39	43	67	44	40			
Are written reports generated?	30	22	35	57	31	27			
*At least one medical technologist (MT) or medical laboratory technician (MLT) as testing personnel									

Figure 1 Corrected reports

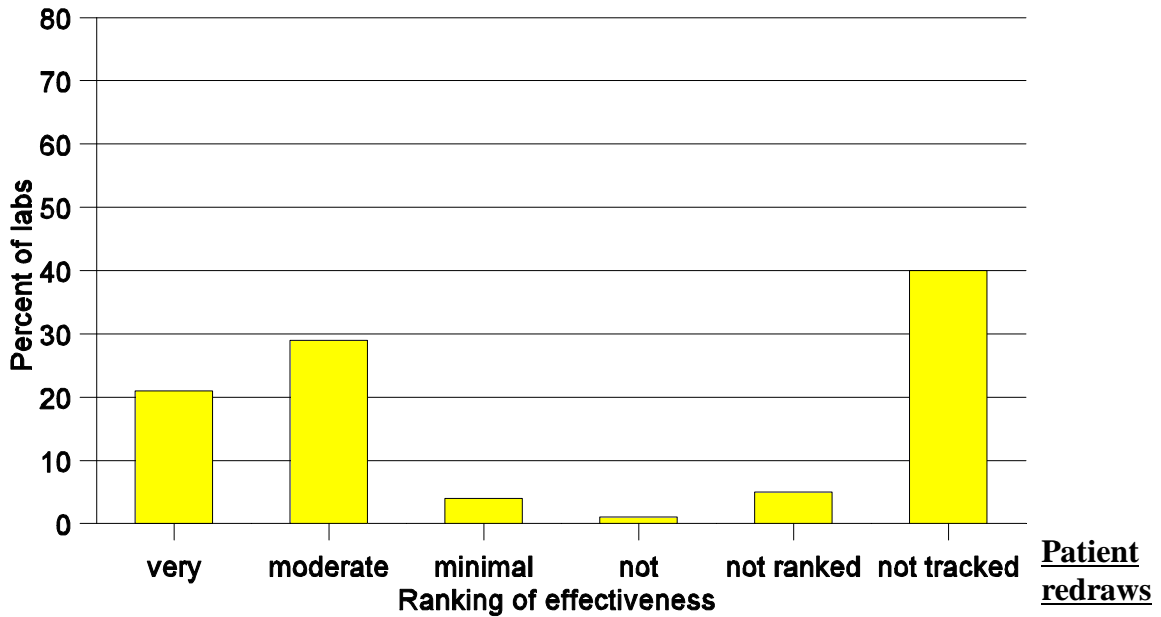


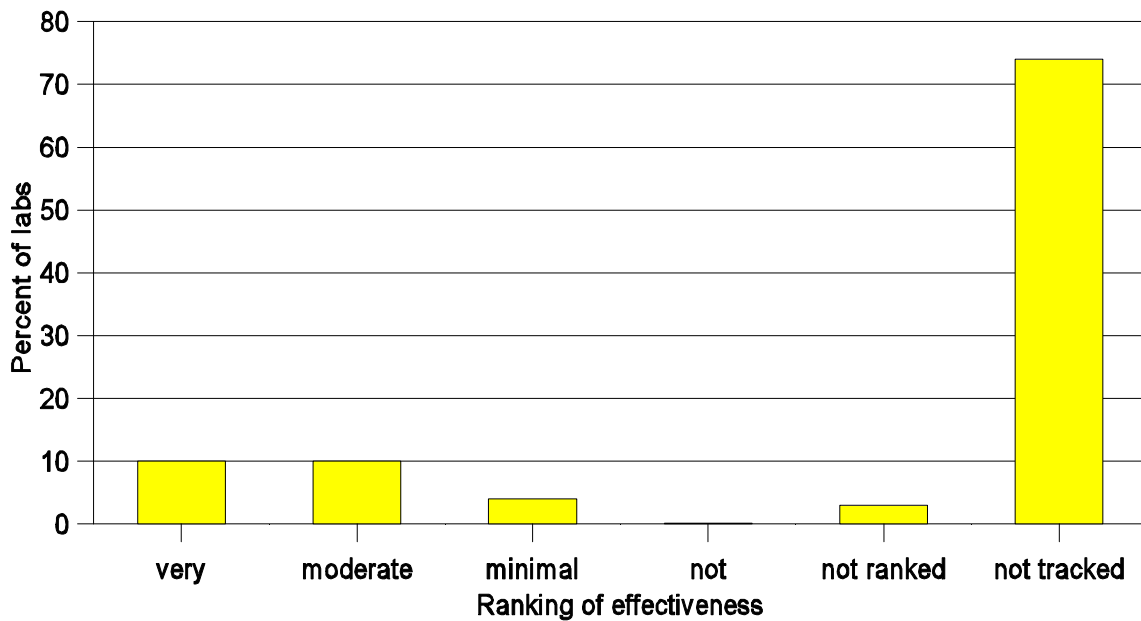
Table 3

and Figure 2 summarize the responses to these questions.

Table 3 - Patient redraws (N=251 respondents)

	Percent of labs responding "Yes"								
	All	POL	Hospital	IL	Labs with MT or MLT	Labs with no MT or MLT	Annual test volume (x 1000)		
							<10	10 to 50	>50
Do you track?	26	27	23	33	25	29	26	20	30
Numbers & reasons tracked for trends?	19	18	19	20	18	19			
Are findings shared with staff?	19	18	20	20	18	23			
Are written reports generated?	13	11	16	17	13	13			

Figure 2 Patient redraws



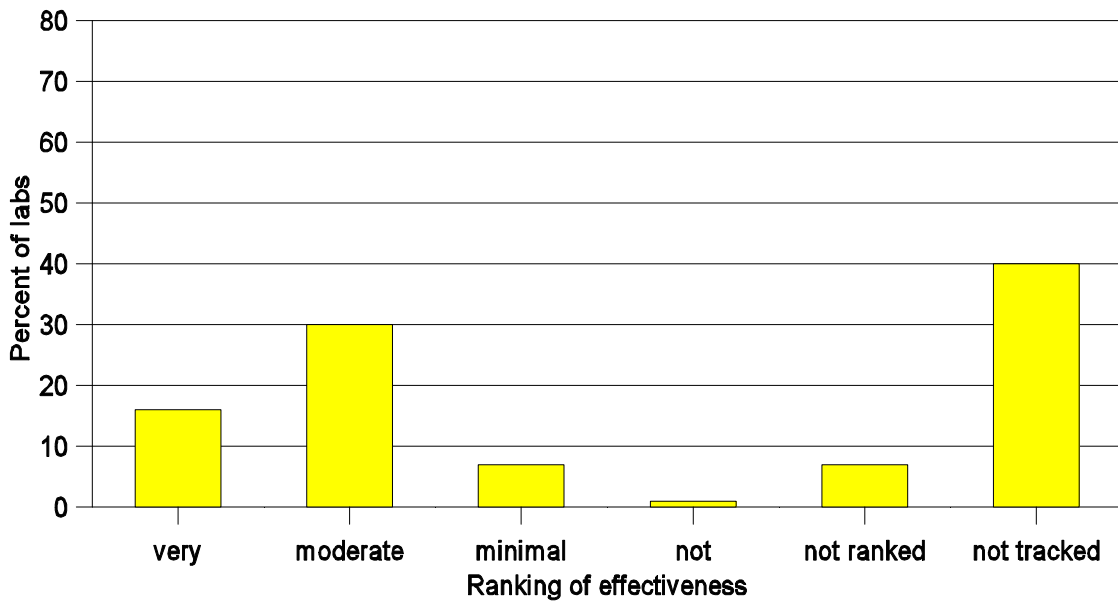
Patient complaints

Table 4 and Figure 3 summarize the responses to these questions.

Table 4 - Patient complaints (N=251 respondents)

	Percent of labs responding "Yes"								
	All	POL	Hospital	IL	Labs with MT or MLT	Labs with no MT or MLT	Annual test volume (x 1000)		
							<10	10 to 50	>50
Do you track?	60	52	68	83	64	44	49	57	76
Numbers & reasons tracked for trends?	39	27	53	57	43	19			
Are findings shared with staff?	56	46	68	77	59	44			
Are written reports generated?	38	24	53	67	42	21			

Figure 3 Patient complaints



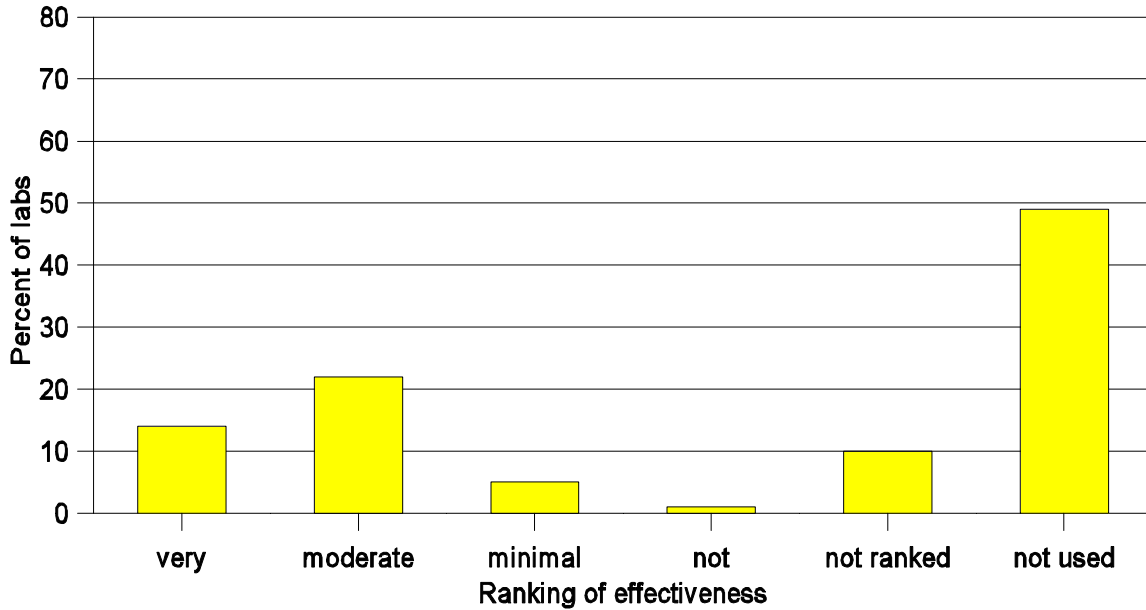
Physician complaints

Table 5 and Figure 4 summarize the responses to these questions.

Table 5 - Physician complaints (N=252 respondents)

	Percent of labs responding "Yes"								
	All	POL	Hospital	IL	Labs with MT or MLT	Labs with no MT or MLT	Annual test volume (x 1000)		
							<10	10 to 50	>50
Do you track?	51	39	68	70	55	35	36	55	68
Numbers & reasons tracked for trends?	31	21	43	47	34	19			
Are findings shared with staff?	46	33	64	67	49	33			
Are written reports generated?	31	19	43	57	33	21			

Figure 4 Physician complaints



Laboratory problem log

Table 6 and Figure 5 summarize the responses to these questions.

Table 6 - Problem log (N=253 respondents)

	Percent of labs responding "Yes"								
	All	POL	Hospital	IL	Labs with MT or MLT	Labs with no MT or MLT	Annual test volume (x 1000)		
							<10	10 to 50	>50
Do you have a problem log?	69	61	76	93	76	47	57	73	82
Numbers & reasons tracked for trends?	43	38	46	60	47	31			
Are findings shared with staff?	54	47	65	63	58	43			
Are written reports generated?	37	32	42	53	40	29			

Figure 5 Problem log

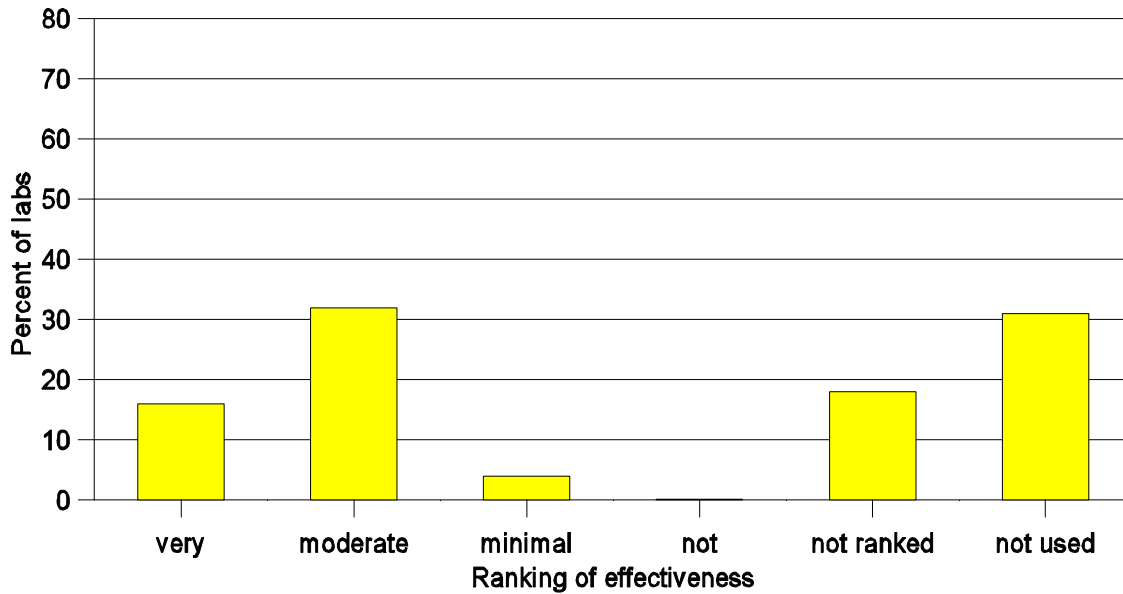


Table 7 shows an overall comparison of these five different systems for all laboratories.

Table 7

System	Percent of laboratories responding "Yes"			
	Track/use	Share with staff	Track numbers & reasons for trends	Written reports
Problem log	69	54	43	37
Patient complaints	60	56	39	38
Corrected reports	60	43	33	30
Physician complaints	51	46	31	31
Patient redraws	26	19	19	13

For each of these systems, except patient redraws, a higher percent of independent laboratories track, monitor and write reports than hospitals and a higher percent of hospitals track, monitor and write reports than POLs. A higher percent of large laboratories do these activities than smaller laboratories and a higher percent of laboratories with medical technologists or technicians do these activities than laboratories without these types of personnel.

Figure 6 summarizes the frequency with which laboratories generate written reports of their monitors. Figure 7 summarizes the types of personnel who review these reports.

Figure 6 How often are written reports generated?

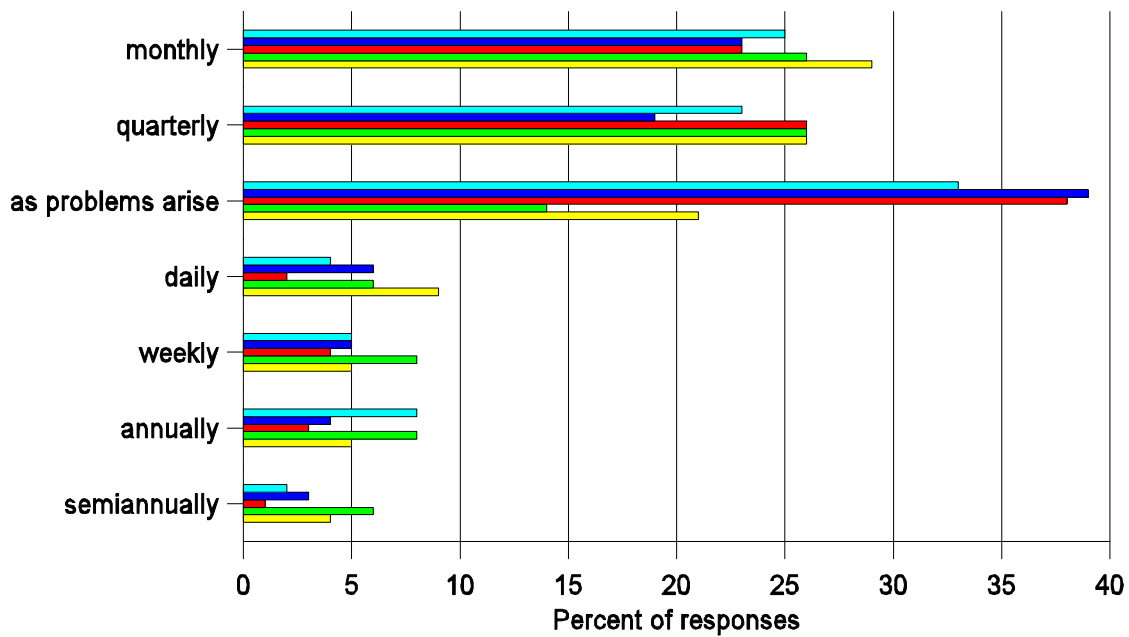
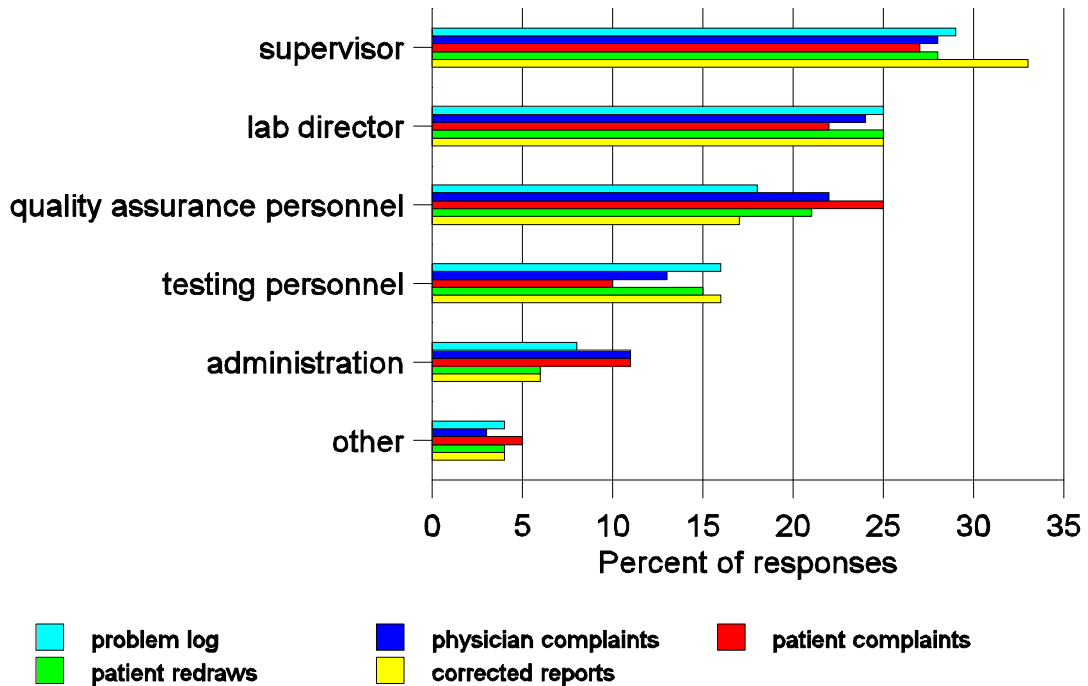


Figure 7 Who reviews reports?



Review of patient charts

In this question, we asked the following:

Does someone involved in your laboratory testing have access to patient charts?

If Yes, are patient lab results compared with patient chart information?

Are formal reviews or studies conducted, where patient lab results are compared with chart information? If Yes, are lab results compared with outcome during these reviews?

Are findings shared with staff during regular review sessions?

Are written reports of the findings generated?

Rank the effectiveness of this system to detect problems or errors.

Table 8 - Comparison of laboratory results with patient chart (N=252 respondents)

	Percent of labs responding "Yes"			
	All labs	POL	Hospital	Independent
Access to chart	83	91	82	43
Compare lab results vs. chart information	63	77	47	37
Conduct formal studies	21	21	25	10
Compare lab results vs. outcome	13	13	14	10
Share findings with staff	10	11	10	0
Are written reports generated	13	11	16	10

Of the 209 laboratories that have access to charts, a higher percentage of POLs (85%) and independent laboratories (85%) compare laboratory results with patient chart information than hospital laboratories (57%). However, a higher percentage of hospital laboratories (30%) conduct formal studies than POLs (23%) or independent laboratories (23%).

Of the 160 labs that compare laboratory results with chart information, 45% do so with each result or daily; 31% as problems arise and 14% weekly, monthly or quarterly.

Of the 32 labs that generate formal written reports, 56% do so weekly, monthly or quarterly.

Figure 8 shows who reviews these reports of chart review studies. Figure 9 shows how laboratories ranked the effectiveness of this system in detecting problems or errors.

Figure 8 Who reviews reports of chart review studies?

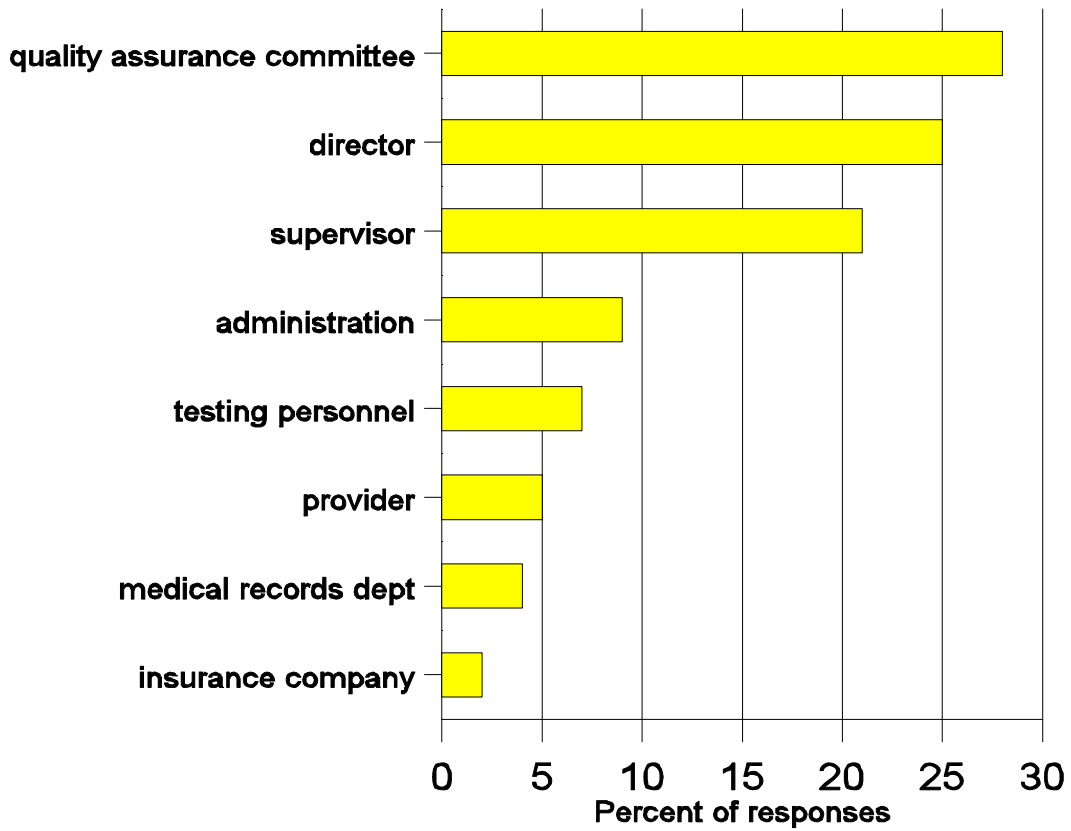
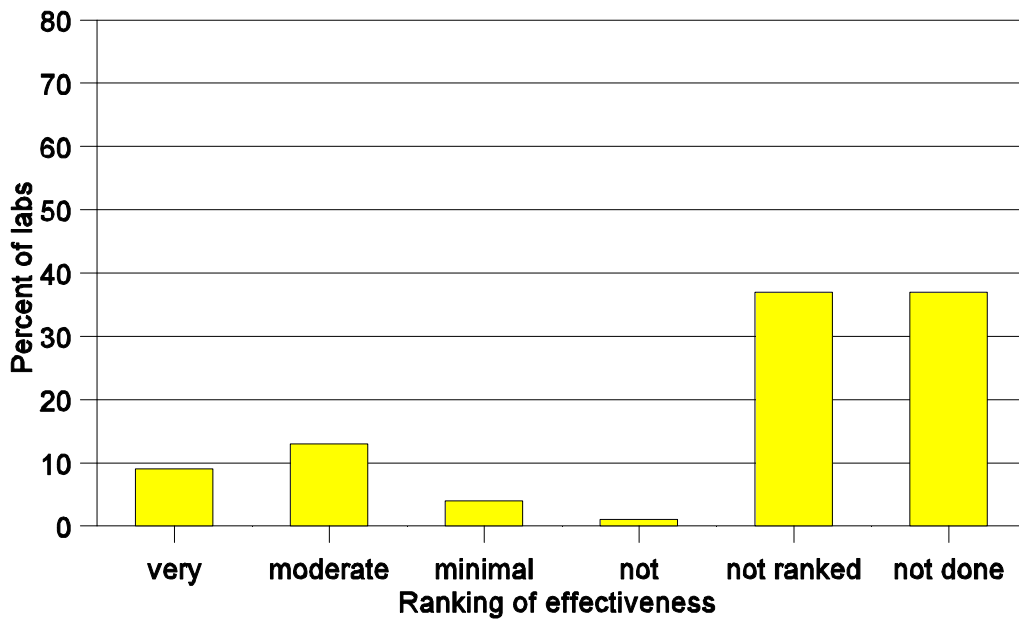


Figure 9

Review of patient charts



Review of final

laboratory report prior to release

Laboratories were asked the following:

Does your laboratory review final patient reports for accuracy prior to release?

If Yes, do you review reports:

For agreement with data on lab logs?

For agreement with data on instrument printouts?

To assure manual computer entry was accurate?

To assure data transmission through computer interface was accurate?

For abnormals, critical values, improbable values?

For clinical relevance, content, appropriateness?

For agreement with patient history, diagnosis, presentation?

For agreement with other lab results?

For agreement with other diagnostic test results?

Of the 241 laboratories that responded to this question, 87% stated that they review final laboratory reports for accuracy prior to release. We found no significant differences in this rate between laboratory types or personnel types.

Table 9 - Review of final report for accuracy (N=241 respondents)

Type of review	Percent of laboratories responding "Yes", where applicable			
	All	POL	Hospital	Independent
Abnormals, critical, improbable values	99	99	99	100
Vs. Instrument printouts	88	88	88	86
Vs. Data on lab logs	85	90	79	81
Manual computer entry accuracy	85	79	88	100
Clinical relevance, content, appropriateness	77	82	64	86
Vs. Other lab results	76	85	69	55
Computer interface accuracy	72	72	72	72
Vs. Patient history, diagnosis, presentation	60	77	36	37
Vs. Other diagnostic test results	56	70	41	33

Relatively high percentages of POLs responded that comparisons to manual computer entry (36%) and computer interface data (55%) were not applicable, showing that they are not as computerized as hospitals and independent laboratories (where these percentages were significantly lower). This is also supported by the higher percentage of POLs comparing results with laboratory logs and the lower percentage of POLs comparing data with computer entries than hospital and independent laboratories. Higher percentages of POLs compare laboratory results with patient history, diagnosis, presentation, other laboratory and diagnostic test results

than hospital and independent laboratories.

In 51% of all laboratories, clerical checks of laboratory results versus laboratory logs, instrument printouts, manual computer entry and computer interface data are reviewed by only the person performing the test. For other reviews that require a higher degree of judgement and verification (abnormals, critical, improbable values; clinical relevance; history, diagnosis and presentation; other laboratory and diagnostic test results), only 31% of the laboratories have the person performing the test as the only reviewer. For these latter types of reviews, a higher percentage of the responses about who reviews results shifted from testing personnel to supervisors, directors, and quality assurance personnel.

Table 10 - Who reviews final reports?

Type of review	Who reviews? (Percent of all responses)		
	Testing person and/or another testing personnel	Supervisor, director and/or quality assurance personnel	Nurse and/or doctor, provider
Lab logs	72	26	<1
Instrument printouts	75	23	<1
Manual computer entry	73	23	2
Computer interface data	67	28	3
Abnormal, critical, improbable	58	37	2
Clinical relevance	50	42	5
History, diagnosis, presentation	45	41	6
Other lab results	52	39	5
Other diagnostic tests	43	44	7

When nurses, doctors or providers review the test results, it is likely that these are done upon receipt of test results and not “prior” to release of the laboratory result, which was the intent of this question. These responses do however show important types of review for accuracy that are integral to a comprehensive patient evaluation rather than an isolated laboratory test result.

DISCUSSION

In this questionnaire, we looked at a variety of ways that laboratories can assess the accuracy of their testing and detect problems and errors.

Corrected reports detect errors that occur throughout the testing process, but focus on the post-analytic phase of testing. (Findings from Questionnaire 4 [July 1996] showed that the highest percent of reasons for corrected reports were due to errors created in the reporting phase of

testing). Sixty percent of Questionnaire 9 respondents track corrected reports and 33% track numbers and reasons for trends.

Patient redraws detect errors primarily in the pre-analytic phase of testing - in particular specimen collection and handling. This evaluates an important aspect of patient contact and convenience. Twenty-six percent of Questionnaire 9 respondents track patient redraws and 19% track numbers and reasons for trends.

Patient complaints detect problems in customer service, which for patients are primarily related to specimen collection and convenience. In this questionnaire we found that 60% of laboratories track patient complaints and 39% track numbers and reasons for trends.

Physician complaints again detect problems in customer service, which for physicians cover all aspects of testing services, including: test accuracy, turnaround times, communications, billing issues, etc. Fifty-one percent of laboratories responding to Questionnaire 9 track physician complaints and 31% track numbers and reasons for trends.

Laboratory problem logs focus on the analytical phase of testing. This is a very tangible, practical system for testing personnel and supervisors to use for feedback on daily operations. Sixty-nine percent of respondents to Questionnaire 9 said they had a laboratory problem log and 43% track numbers of problems and reasons for trends.

We received comments from many POLs (18 laboratories) showing that they did not feel it necessary to track numbers and reasons for problems since they occur with such low frequency and can be dealt with immediately and effectively as they occur. They also stated that communications between testing personnel, office staff, nurses and providers are frequent and direct and therefore formal reports are not necessary. The following are examples of comments that best summarized these ideas:

“There are only 2 techs and we have daily contact with our physicians. If they have an issue, we usually talk face to face with chart and results in hand. Not a lot of need for lengthy reports”

“We are a small lab in a family practice setting. We meet each problem individually as it occurs, keeping in mind trends”

“We are a very small clinic with 7 team members and sharing of information is easy and effective”

“When you’re a small enough group (1 lab person, 2 PA’s) formal review is not needed. We discuss and review informally”

While these previous types of reviews are reactive to problems that have occurred, reviews of final patient reports represent a proactive mechanism to detect errors before release. Eighty-seven percent of respondents review patient reports for accuracy before release. Depending on the type of data reviewed the percent of laboratories that verify reports ranged from 56% to 99%.

Finally, we looked at chart review as another mechanism for test accuracy assessment and due to the tremendous interest in outcome studies. While 83% of respondents have access to charts and 63% compare laboratory data with chart information on some frequency, only 21% do formal studies and 13% do outcome studies. POLs and hospitals have higher access to charts and therefore make chart comparisons to a higher degree than independent laboratories.

This study shows a variety of ways that laboratories can track problems and assess the accuracy of their laboratory testing. We observed a wide variation in the proportion of laboratories that use these quality assurance activities, depending on the type of testing site and access to additional patient information. One quality assurance plan does not fit all laboratories. We found that POLs reviewed clinical relevance, patient history, diagnosis and other laboratory and diagnostic test results to a higher degree than hospital or independent laboratories. In addition, the laboratory result in a POL can generally be reviewed with the patient, the chart, the nurse and doctor available within a narrow time of its release. In that light, POLs may legitimately have minimized quality assurance plans, with few formal reviews and reports, that are highly effective, due to these advantages. Independent laboratories, on the other hand, must employ a more comprehensive range of quality assurance activities, with more stringent studies and reports, since they generally have little patient information beyond what is provided on the test request.

When comparing the results of this study to the results from Questionnaire 1 (June 1995), we find there have not been any significant shifts, since then, in the proportion of laboratories using comparable quality assurance activities to track problems or errors. Despite the growing interest in correlating test results with patient outcomes, we did not see a rise in the proportion of laboratories performing outcome studies, from our earlier study. (Table 11)

This study allows network laboratories to compare their quality assurance activities with other laboratories like their own. Laboratories may use this information to investigate and adopt new activities to enhance their assessment of testing accuracy and to reduce their laboratory problems or errors.

Table 11 Quality assurance monitors studied through the network

Quality assurance monitor or activity	Questionnaire 1 (June 1995) N= 207 respondents	Questionnaire 9 (May 1998) N = 253 respondents
	Percent of labs that formally use	Percent of labs that track for trends

Review of proficiency test results	98	not studied
Review of quality control results	91	not studied
Documentation of personnel competency	79	not studied
Staff meetings	75	not studied
Specimen acceptability	67	not studied
Review final report for accuracy and clinical content	64	56 to 99, depending on type of data reviewed
Incident reports	64	not studied
Correlation studies	56	not studied
Ordering accuracy	50	not studied
Problem logs	not studied	43
Frequency of corrected reports	38	33
Patient satisfaction assessment	35	39
Physician satisfaction assessment	28	31
Evaluation of patient history vs. laboratory result	27	not studied
Comparison of patient outcome vs. laboratory result	19	13
Frequency of patient redraws	not studied	19
Frequency of repeat analysis	16	not studied