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Letter to the Editor—Forensic Lab Directors' Perceptions of Staffing Issues[1]

Sir:

Directors of public forensic science labs outlined concerns about critical staffing issues. Responding to a web-based survey, directors evaluated 46 staffing issues grouped into six sections: demographics, caseload, recruitment, turnover, retention and performance issues. Respondents provided a description of their laboratory system, operating procedures, capacity (cases analyzed per scientist per year), cases (evidence related to a specific crime, e.g., the homicide of John Doe), and the extent of outsourcing to private labs. Employee performance was evaluated as pressure to complete cases, adequacy of resources and extent of training.

Advantages of web surveys include low cost, self-administration, quick turnaround and high degree of acceptability (1). Electronic mail requesting participation was sent to 250 directors of the American Society of Crime Laboratory Directors (ASCLD) in December 2002. Assurance of anonymity, survey goals and the importance of responding were emphasized. A reminder email was sent two weeks after the initial request and follow-up phone interviews were conducted to clarify specific items.

55 usable responses (22%) are reported. Response rate for mailed surveys typically ranges from 10 to 50 percent (2). Local, state and federal forensic laboratories are represented; populations served range from 59,000 to 22 million. Number of scientists range from 2 to 280 with an average of 34. Employees include, on average, 24 bachelor, 5 masters and 1 Ph.D. level. The typical lab system has 5.4 labs. Minimum regular hours worked per week reported are 25 and the maximum, 43. Maximum number of overtime hours per week is 15, the average is 2.76 hours. Maximum "off bench" work per week is 20 with an average of 10.13. Top pay for non-supervisor scientists varies from $28,800 to $116,000, with an average of $59,087. Age of oldest case varies from 0 to 480 months with an average of 28.22 months. The average number of additional forensic scientists needed is 9, with the minimum number of additional scientists needed at 1 and the maximum needed at 70.

Table 1 provides information about laboratory description and performance. 89.6% of labs measure productivity and 86.4% offer career development opportunities. But 82% need more tools to increase productivity and quality. 80% use interns. 77% feel that their retention methods are successful, but 56% lose forensic scientists to the public sector and 48% lose scientists to the private sector. 34% say that turnover is a problem. Only 21% have a sufficient number of scientists that they need. Almost 71% would not send more cases to private labs if they had funding.

Table 2 presents the relationship between total number of cases per scientist and pressure to perform. As expected, as number of cases increase, labs experience increased pressure to perform. As cases increase scientists are pressured to complete cases too quickly ($r = .391$; $p < .01$) and scientists are pressured to get a particular result ($r = .355$; $p < .01$). In addition, as number of cases increases, the pressure for scientists increases to complete cases in a timely manner ($r = .282$; $p < .05$). Six of the non-significant resource allocation items investigated are correlated in the hypothesized direction. As total number of cases increases, scientists do not have proper equipment, enough time, adequate resources, enough information from the DA, enough time to prepare for courtroom testimony and the needed resources to provide courtroom testimony. Four 'adequacy of training' items are not significantly related to caseload.

Table 3 provides qualitative data on why forensic scientists terminate employment. Two reasons predominate: personal issues and salary. 32% cite personal issues such as mentioned moving closer to family and spouse transfers. 31% cite salary as reason for termination. 8% cited career opportunities elsewhere. 6% cited retirement. 5% mentioned pursuit of an advanced degree and 5% mentioned better facilities or resources elsewhere. Lack of fit for forensic work, high stress work environment, supervisors who lack scientific experience and dislike of military type organizations were also mentioned.

Table 4 provides strategies that are used to retain scientists. Directors suggest the use of management techniques, such as a supportive work environment and communication meetings. Increased pay and bonuses aid retention. Hiring people with personal links to the area is also used as a retention strategy as is offering travel to conferences and technical meetings.

One director commented that DNA is the only unit understaffed and that 20–30% of the demand consists of excessive number of redundant items demanded by prosecutors and detectives. Clandestine labs are also an issue. Another director stated that what is desperately needed is stable funding for training and additional full time staff. Additional forensic scientists are essential to assure more timely analyses of major cases, according to one respondent; inclusion of property crimes (burglaries) in the DNA data bank will increase the hit rate significantly.

Implications of Staffing Issues

Staff shortages exist in public forensic labs nationwide. Lab directors report a range of one to seventy additional scientists needed. Labs need, on average, an additional fifty scientists in order to meet

[1] This paper represents the opinions of the authors and not their organization.

TABLE 1—*Laboratory description.*

	Percentages	
	Yes	No
Do you . . . Measure productivity?	89.6	10.4
Provide career development opportunities?	86.4	13.6
Need more tools to increase productivity and quality?	82.0	18.0
Have interns?	80.4	19.6
Are retention methods successful?	77.5	22.5
Lose forensic scientists to public sectors?	56.3	43.8
Lose forensic scientists to private sectors?	48.0	52.0
Have multiple labs?	46.8	53.2
Maintain a DNA convicted offender databank?	45.9	54.1
Have shadow programs for students?	45.7	54.3
Is turnover a problem?	34.0	66.0
Would send more cases to private labs if I had the funding?	28.9	71.1
Have a sufficient number of scientists needed?	21.2	78.8
Have shortage of applicants?	8.0	92.0

TABLE 2—*Relationship between # Cases and Forensic Scientist Performance.*[1]

	Correlation
Forensic Scientists (FS) have proper equipment to do the job	−.185
FS are adequately trained in scientific methods	.010
FS are pressured to complete cases in a timely manner	.282*
FS are adequately trained to perform the job	.002
FS are comfortable with the quality of analyses per item	.030
FS are adequately trained in scientific testimony	.084
FS have enough time to perform the job	−.224
FS get enough information from the Investigators to do the job	.086
FS have enough time to prepare for courtroom testimony	−.136
FS have adequate resources to perform the job	−.155
FS have the needed resources to provide courtroom testimony	−.094
FS receive adequate post trial critiques	.203
FS get enough information from the DA to do the job	−.023
FS would like to analyze more items per case	.252
FS are pressured to complete cases too quickly	.391**
FS are pressured to extend opinions beyond scientific method	.233
FS are pressured to get a particular result	.355**

[1,**] Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

TABLE 3—*Reasons that forensic scientists leave.*

	Number of Responses	Percentage of Total
Personal reasons (spouse, family issues)	20	32
Salary	19	31
Career advancement	5	8
Retired	4	6
Pursuing advanced degree	3	5
Better facilities elsewhere	3	5
High caseload	1	1
Poor fit	1	1
Overseas travel	1	1
High stress & pressure	1	1
Contract expired	1	1
First line supervisors lack scientific experience	1	1
Dislike military type organization	1	1
Not "cut out" for forensic work	1	1
Total	62	

TABLE 4—*Strategies for retaining forensic scientists.*

- Maintain sufficient staffing
- Supportive work environment
- Higher pay than competitors
- Technical and managerial training
- Ability to advance within the organization
- College tuition
- Flexible work hours
- Provide private offices
- Send to professional seminars and conferences
- Allow time to participate in research
- Provide the tools they need, not what I think they need
- 3, 4, 5 year bonus plan
- Merit raises
- Work with Personnel to evaluate pay scales & upgrade classifications
- Challenging diversity of our lab
- Meet collectively twice a year to match operating plans with strategic plan
- Let folks run with ideas that they develop
- Play to individual technical strengths
- Promotion to senior criminalist
- Personal freedom (within limits) to manage own caseload
- Hire people with link to local area
- Very aggressive professional development
- Opportunity to transfer to location of choice (if we have a lab there)
- Hiring from within for supervisor positions
- Great area to live in
- Good morale in lab
- Responsibility for a sector of activity
- One major trip per scientist per year
- Training in primary area (like latent prints) and secondary area (like footprints)
- 15 days away from lab per year to attend professional meetings & training

a standard of one scientist per 30,000 population (3). There is a relationship between staff capacity and amount of outsourcing cases to private labs. As a laboratory's capacity increases, the impetus and organizational culture for outsourcing increases. It should be noted that outsourcing is often funded by grants from the National Institute of Justice. Without these funds, there would be very little outsourcing of DNA casework or DNA data bank.

Three significant correlations between lab capacity and pressure to perform items are noted. As casework capacity increases, pressure to complete cases too quickly increases significantly, pressure to extend opinions beyond the scientific method and pressure to get a particular result also increases significantly. At issue here may be that larger capacity laboratories are suffering from their own success. Interestingly, in many cases one would predict that as productivity increases, the pressure to complete a case would decrease. However, these data suggest otherwise. It is likely that as police and prosecutors become more aware of the power of DNA technology, they want it done on all cases immediately.

Capacity and quality of a laboratory with fixed staffing resources represents a trade-off situation. Increasing capacity with a given number of forensic scientists will decrease the resources needed for quality assurance functions. A reengineering of the total process is needed to increase capacity and maintain quality. This can be accomplished using robotics and batch processing. Process mapping, high performance teams, and six sigma performance measurement tools are needed by all laboratories. Skill sets that identify and correct root causes of analytical casework errors are fundamental for continuous improvement in quality. Quality assurance workforce development programs from academic institutions are needed to address these critical needs. From the individual forensic scientist's perspective, the increase in demand for services nationwide creates an increase in job flexibility and choice of job possibilities (4,5). For the forensic organization, however, recruiting and replacing lost scientists can be costly.

Critical issues such as staffing shortages and outsourcing impact the performance of public labs. Interestingly, our findings are similar to a Bureau of Justice census of public labs (6). Data is also needed from additional sources, such as laboratory customers (district attorneys, detectives, community) and employees.

Regarding benchmarking one forensic scientist per 30,000 in the population, Fred Tulleners, Department of Justice Lab Director commented that using this staffing ratio, his lab could perform testing for additional offenses, such as burglaries, assaults and property crimes. Lesser offenses are currently put on hold as serious cases await completion (Tulleners, personal communication). Forensic labs must develop sophisticated staff estimates using agreed upon, common standards. In addition, forensic labs must develop estimates of the value and costs of their services to the community (7). Additional research is needed to benchmark other performance measures, such as number of CODIS ready profiles developed per forensic scientist or per unit of funding.

One source of value is that crime labs are instrumental in helping to stop criminals early in their criminal careers. Ninety-four percent of serious offenders previously committed minor crimes earlier in their criminal career (8). Felons whose most serious prior convictions were for forgery or passing bad checks had DNA matches in 12 rape cases, 8 homicides, one rape-homicide, an assault, a robbery and a car jacking (9). Arrests for violent crimes appear to be embedded in long careers dominated by arrests for nonviolent crimes (10). The implications of well-staffed crime labs include reduction of crime nationwide (11).

Outsourcing of cases to private labs is a trend in DNA, and we suspect, may turn out to be the rule. Outsourcing is often recommended as a method to reduce case backlog in labs. However, we found evidence of some resistance to outsourcing. Only 29% of surveyed directors would send more cases to private labs even if they received additional funding. Despite reduction of backlog that outsourcing offers, some directors are reluctant to rely on outside help. Lab employees themselves may exert pressure to resist outsourcing efforts in the lab. One lab director reported that employee performance increased dramatically when the lab began outsourcing. According to this director employees stated that they would work "on their own" to resolve case backlogs "as a matter of pride." Additional dialog is needed in the forensic science community for these important staffing issues.

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