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A Case Study of Forensic Scientist Turnover

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Abstract

Little attention is devoted to retention issues in forensic organizations despite the vulnerability of technical staff during dynamic employment cycles. This article documents the difficulty that one large state crime laboratory system had retaining newly hired forensic scientists. A new staffing model was created to offset a DNA-case backlog; the organization hired technicians to provide technical support for more highly skilled scientists. However, the staffing model proved unsuccessful because there was excessive staff turnover. Salaries that were not competitive with the private sector, and the lack of upward mobility discouraged new employees. The career motivations of forensic scientists are not fully understood. Interventions to increase scientist retention included realistic job previews, shadow and internship programs, upgrading positions and salary structure, and linking with universities to create new training programs.

Introduction

Forensic science is undergoing a revolution that is being driven by technology (Friedman 1999; Nimmich 1998). New methods and instrumentation for the biological sciences have created unprecedented opportunities to collect and examine criminal evidence. This has created backlogs in forensic laboratories, particularly in DNA analyses. The need for an adequate supply of trained forensic scientists to perform complex analyses is a significant challenge for forensic laboratories.

Forecasting Staffing Needs

Ralph Keaton, Executive Director of the American Society of Crime Laboratories, Laboratory Accreditation Board, estimates that the current population of forensic scientists is about 10,000 (personal conversation February 2001). An additional 10,000 new forensic scientists are needed over the next decade to address an expanding case backlog (Fisher 2003; Long 2001). Ironically, while job opportunities and funds for scientific research are increasing, the number of science degrees awarded continues to decline (Finn 2001).

Staffing challenges in forensic laboratories exist nationwide. Staff turnover in Indiana laboratories has created a one-year backlog despite a $1 million federal grant (Multiple Problems Hit Indiana Forensics Lab 2002). Understaffing in the Massachusetts' state laboratory system has been

blamed for weakening its law enforcement capability (Study Cites Forensics Woe in Massachusetts 2002). Research that examines employee-staffing issues in public agencies is sparse (Selden and Moynihan 2000). Outsourcing laboratory services has increased as resource constraints further limit government services (Avery 2000).

Forecasting staffing needs involves anticipating the workforce needed to meet organizational objectives. But public agencies are usually poor planners (Ospina 1992; Selden et al. 2001), and laboratories are no exceptions. Forecasting staffing in public laboratories is particularly difficult because estimating caseloads is difficult. Reliable and valid measures of productivity often do not exist. There is a general lack of consensus on the definition of caseload, which can be configured as cases, items in a case, and other units of work. Variations from laboratory to laboratory in the use of batch processing and team analyses make it difficult to accurately predict the personnel needed to process cases in scientific laboratories. Yet the importance of accurate and precise measurement is widely acknowledged in order to build effective human resource systems (Ramlell 2003).

Employee Turnover Costs

Although accurate forecasting of staffing needs is important, losing productive employees through turnover impacts organizational effectiveness as well. Employee turnover is costly to organizations and is often unacceptably high (Cascio 2000). The cost of turnover for technical jobs, such as forensic scientists, increases as the complexity of the job increases (Joinson 2002).

There are various methods for calculating the cost of turnover. One method involves multiplying a fixed percentage of the annual salary by the number of employees that quit the organization (Hanson 2000). For example, if 100 employees, who each earn $35,000, leave an organization with a turnover rate of 30 percent, the fiscal impact to the organization is $1,050,000. Turnover costs also include additional costs to the organization, such as the cost of attracting and interviewing replacements, administration, severance pay, unemployment compensation, testing, travel and moving expenses, medical examinations, and acquiring and disseminating information (Pinkovitz et al. 1997). Turnover costs for an experienced scientist in biotechnology may exceed $250,000. A calculator to identify turnover costs in an organization is available at the following Website: www.uwex.edu/ces/cced/publicat/turn.html.

Forensic Science Laboratory Case Study

To further examine these issues, retrospective staffing data for a large public state forensic laboratory system in the northeastern United States were reviewed. In one year, 53 new scientists were hired. New legislation had increased caseload dramatically and expanded the scope and responsibility of state forensic science laboratories, necessitating the new hiring.

The organization consists of four laboratories with a total staff of 150. The laboratories provide forensic services to the law enforcement community representing a population of six million people. Forensic services consist of DNA casework and databank analyses and chemistry, toxicology, ballistics, questioned documents, latent fingerprints, and trace examinations. Annually, the four laboratories receive approximately 700 rape cases, 200 homicide cases, and 100 other violent cases, all containing biological evidence. Each case includes approximately ten items for further analyses. More than 10,000 items are received for DNA analyses each year. Article 49B of the New York State Executive Law had recently been expanded to include additional samples from convicted criminals. As a result, the laboratories had

realized a tenfold increase in the number of samples from convicted offenders—3,000 samples had increased to 30,000 per year.

Recruiting Forensic Scientists

Recruiting for new forensic positions involved three primary sources—the Internet, employee and community referrals, and shadow and internship programs.

Internet

The Internet was used to advertise positions and provide an online application that could be downloaded and mailed to the personnel department. A description of the laboratory, job, and salary grades was on the Website as were links to forensic professional organizations, including the American Society of Crime Laboratory Directors, American Academy of Forensic Science, and North Eastern Association of Forensic Science. The Internet received the majority of the applications. More than 1,000 applications were received from applicants in the United States, Canada, Europe, and the Far East.

Referrals

Referrals from employees resulted in numerous candidates. Presentations were also given to professional and university groups to increase the number of applicants from the local community.

Shadow Program

Students from the forensic scientist shadow program composed a pool of candidates. The shadow program had been in operation for several years and provided an opportunity for high school and college students to visit the laboratory and "shadow" a forensic scientist. The shadow spends two hours with a forensic scientist to discuss careers in the laboratory. The forensic scientist demonstrates whatever work they are performing at the time of the visit, which may include working on a difficult criminal case or cleaning bench tops. Two hundred students had participated in the forensic shadow program.

Internships

College juniors and seniors participating in an internship program were also a source of job candidates. The laboratory had 37 paid and unpaid interns who had successfully completed the background investigation and were working on projects. Seventeen were eventually hired for full-time positions.

Selecting Forensic Scientists

Recruiting and selecting forensic personnel is competitive. In addition to the supply and demand factors, all candidates must successfully complete a thorough background investigation. The investigation includes employment history; educational background; an accountable timeline; social companions and personal references; military history; drug use; motor vehicle, criminal, and financial history; medical and mental health history; and weapons owned. Personality tests, work samples, interviews, medical examinations, drug tests, and polygraph tests are also used. One-third of the applicants do not pass the background investigation. More than 90 percent of the applicants are disqualified at some point in the selection process, and many of the remaining 10 percent are unwilling to wait several months for a job offer.

Job descriptions and a virtual tour of the laboratory were posted on the state Website. In six months, more than 1,000 applications were received. The applications were screened for completeness and core-job criteria.

Approximately 750 were further evaluated for relevant job experience and advanced degrees. Of these, 400 applicants were invited to interview. The interview panel was composed of forensic scientists and supervisors. Three hundred applicants underwent the background investigations; 150 applicants proceeded to the drug, polygraph, and integrity tests. Fifty-three people were hired from these finalists. The entire process took one year. An additional 12 support personnel (keyboard specialists and evidence clerks) were also hired using a similar process.

The forensic shadow and the internship programs were effective in applicant self-selection. Self-selection that occurs early in the process reduces hiring costs. Cooperative education programs using part-time employees is an effective means of self selecting applicants for full-time positions.

New Staffing Model and Strategy

Training to become a productive forensic scientist involves a relatively long apprenticeship because a new employee is not productive for at least one year. In addition, senior scientists experience a productivity decline by 50 percent because their time is spent training new employees.

To determine the market value of the services of an experienced scientist, it was estimated that a completed DNA profile in a private laboratory averages $750 per sample. This is probably an underestimate because simple comparisons of the costs of tests conducted in the public laboratory and private service providers ignore significant costs associated with procuring and monitoring outsourced tests (Avery 2000).

A new staffing model was created that would permanently pair two laboratory technicians with one experienced scientist during the apprenticeship period. The logic was that rather than fill all 53 new positions with experienced forensic scientists, technicians filled 38 of the slots. It was estimated that this strategy would save the organization $1,062,442 (Table 1). The staffing model proposed that laboratory technicians would be given less complex tasks, with more complex tasks and data interpretation left to forensic scientists.

Table 1: Salary Costs of Two Staffing Models

Number and Position/Grade	Hiring Rate	Job Rate	Salary plus Benefits at 32%	Total
Staffing Model A				
53 Forensic Scientists GR20	$45,347	$56,193	$74,174	$3,931,222
Staffing Model B				
38 Senior Laboratory Technicians GR12	$28,551	$35,012	$46,215	$1,756,170
15 Forensic Scientists GR20	$45,347	$56,193	$74,174	$1,112,610
Total				$2,868,780
Proposed Savings (A - B)				$1,062,442

In one year, 12 technicians and 4 forensic scientists voluntarily left the organization. The early departure of these employees cost the organization

at least $851,276 (Table 2). This is a conservative estimate because costs associated with recruiting, selection, personnel support, and training are not included in the figure. Comparing Tables 1 and 2, it appears that savings that were anticipated in the new staffing model were not realized.

Table 2: Attrition Costs Among Forensic Scientists

Number and Position/Grade	Hiring Rate	Job Rate	Salary plus Benefits at 32%	Total
12 Senior Laboratory Technicians GR12	$28,551	$35,012	$46,215	$554,580
4 Forensic Scientists GR20	$45,347	$56,193	$74,174	$296,696
Total turnover costs (using one year's salary + benefits)				**$851,276**

In addition, the lost productivity of the forensic scientists in terms of completed DNA profiles was costly (Table 3).

Table 3: Loss of Forensic Scientist Productivity in One Year

400 DNA profiles X $750 X 16 Full-Time Equivalent = $4,800,000

Exit Interviews

Exit interviews were used to identify reasons for the departure of 16 forensic personnel (Table 4). The most common reason stated was low salary—ten of the departures were for jobs with higher salaries. Another frequent response was lack of upward mobility. Laboratory technicians were hired with excellent academic records and previous job experience. These technicians anticipated moving into forensic scientist positions relatively quickly; however, an accurate timeline for promotional opportunities was not provided by the organization. Three people were accepted into law or medical schools. One accepted a position with a federal law enforcement agency, and two were scheduled to enter the state police academy. One left to remain home with young children, and another person married and relocated.

Several common themes emerge in an analysis of the exit interviews. There is a salary discrepancy in the organization because several people were able to move into similar or higher level grade positions in the same or similar state or federal laboratory system. Expectations regarding promotion in the flat organization were not managed sufficiently. In some cases, there is lack of fit between the job and employees' personal values because several scientists changed careers. It also appears that the skills and education of the personnel who were hired may have exceeded the skills necessary for the position.

Table 4: Forensic Scientist Exit Interviews

Case	Title and Grade	Reason for Leaving
1	Senior Laboratory Technician GR12	Accepted a position as a forensic scientist in a state laboratory system at higher pay
2	Forensic Scientist	Accepted a position as supervisor in a city

	GR20	laboratory at higher pay
3	Senior Laboratory Technician GR12	Accepted in medical school
4	Senior Laboratory Technician GR12	Accepted a position in federal law enforcement academy
5	Senior Laboratory Technician GR12	Returned to higher paying job in a clinical laboratory
6	Senior Laboratory Technician GR12	Accepted a position as a forensic scientist in a federal laboratory at higher pay
7	Senior Laboratory Technician GR12	Accepted a position as a forensic scientist in a state laboratory system at higher pay
8	Senior Laboratory Technician GR12	Accepted a position as a forensic scientist in a state laboratory system at higher pay
9	Forensic Scientist GR20	Desired to remain home with young children
10	Forensic Scientist GR20	Accepted in law school
11	Forensic Scientist GR20	Accepted a position in a state laboratory system at higher pay
12	Senior Laboratory Technician GR12	Marriage and relocation
13	Senior Laboratory Technician GR12	Accepted a position in a major pharmaceutical company at higher pay
14	Senior Laboratory Technician GR12	Accepted a position in a hospital at higher pay and disliked night shift
15	Senior Laboratory Technician GR12	Accepted a position in a private laboratory at higher pay
16	Senior Laboratory Technician GR12	Accepted in law school

Discussion

The alternate staffing model proposed to save money proved to be unsuccessful. Turnover costs, including lost salary and benefits, outsourcing casework, and training, exceeded the projected savings. The original staffing model (Model A in Table 1) that proposed hiring forensic scientists in all positions could have been used to strengthen the organization. Instead the early departure of essential personnel attributable to the alternate staffing strategy served to weaken the organization.

A number of factors are related to the cause of voluntary turnover that have an effect on retention rates. Salaries and compensation, job design, social ties, and location have been linked to employee retention (Cappelli 2000). The reasons that employees leave are more complex than generally acknowledged using traditional models of job dissatisfaction (Maertz and Campion 1998; Mitchell et al. 2001). Indeed, 75 percent of the variance in turnover research is unexplained (Griffith et al. 2000). Although some employees seem to use a rational process of considering job alternatives prior to leaving, other employees exit the organization abruptly, without explanation. Mitchell et al. (2001) propose four paths that people take when they leave a job—following a plan, leaving without a plan, leaving for something better, and leaving an unsatisfying job. Each path involves

different thinking processes and behaviors and occurs over time.

In the organization studied, interventions included upgrading forensic science positions to be competitive with other public agencies and private laboratories. Existing laboratory technicians should be reclassified to forensic science positions, and the lowest position in the career ladder should be eliminated. New employees with superior academic records and advanced experience have unmet expectations about the length of time that they are willing to remain in the technician positions.

The shadow and internship programs were successful. Many of the high-school-student shadows applied for an internship when they were a junior or senior in college. Seventeen out of 39 interns were hired. Of those hired, all have remained with the laboratory. Employees from these programs have "self-selected" into the laboratory, and there is a degree of "fit" with the agency environment. The shadow and internship programs were expanded as a solid and reliable source of candidates. In addition, the laboratory has teamed with the University at Albany, State University of New York, to develop a state-of-the-art forensic science program and has expanded an MBA internship program.

Scientists who remained with the organization were interviewed to identify attributes of the organization that can be used for recruiting and retention. Many stated that the organization's policy of continuing education with tuition reimbursement was attractive. In addition, flexible hours while attending classes was seen as a positive component of employment.

Implications for Future Research and Practice

Additional identification of innovative methods to improve retention rates is needed for technical employees in short supply, such as forensic scientists. Although turnover is a well-developed and active topic of empirical research, traditional human resource management theory does not offer specific guidance on retention of knowledge workers (Lee and Maurer 1997).

Future research needs to explain the needs of technical workers in order to understand and reduce turnover and improve retention. The following five characteristics of knowledge workers may yield clues to improving retention rates (Von Glinow 1988). Understanding these professional characteristics may help forensic managers implement successful retention programs.

- Possess expertise in abstract knowledge acquired over a period of time and value developing their knowledge base
- Prefer working autonomously
- May identify with their chosen profession and members of that profession more closely than they identify with the organization
- Have an ethically based sense of responsibility to their clients
- Have professional codes of conduct that they are committed to enforcing

Forensic laboratory managers must recognize the different motivational styles of their employees in order to retain valuable human capital. Strategic human resource management practices, such as better planning and realistic job previews, can be implemented (Becker and Dale 2003). In addition, educational institutions must continue to attract more students to the sciences, as the number of degrees awarded is declining. The Office of

Science and Technology at the National Institute of Justice is working to develop new forensic science curriculums. The National Institute of Justice is documenting the need for forensic scientists in order to develop postgraduate programs in the major forensic science disciplines.

This study may contribute to understanding how to retain forensic scientists. Better forecasting and planning models are needed to anticipate technical staffing needs. Salaries in public agencies must be competitive with the private sector. Traditional models of retention and turnover must be expanded to identify the career motivations of technical personnel. In the forensic laboratory, it is essential that the best scientists are hired and retained so that the best science is available for processing probative evidence.

This paper represents the opinions of the authors and does not reflect the views of their respective organizations.

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