THE CENTER
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Diagnostic Imaging Professionals in California

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Overview/Description of Workforce

The diagnostic imaging professions provide vital services in the modern health care system, and as with other types of healthcare workers such as registered nurses and clinical laboratory scientists, there is a current labor shortage within these professions. A 2001 American Hospital Association (AHA) study reported a 15.3 percent vacancy rate for imaging technologists and technicians, with the highest rate – about 17 percent -- in the west. Twenty percent of hospitals reported vacancy rates of over 20 percent for imaging professionals, and 68 percent said it was more difficult to recruit imaging technologists and technicians compared to 1999.[1]

The diagnostic imaging workforce includes several related professions, and a variety of specialties within these professions. In this brief we will concentrate on four major types of diagnostic imaging professions (radiographic technology, diagnostic medical sonography, cardiovascular technology, nuclear medicine technology), each of which uses different technologies to produce images of body tissues, organs, bones, vessels, and other internal structures.

Supplemental Table 1 displays the major categories of imaging professions and examples of specialized professions within these categories. The professions vary by the type of technology they use and the bodily organs and related systems on which they focus. Radiologic technologists and technicians, primarily known as radiographers, use X-rays to perform diagnostic imaging. Radiographers can also pursue advanced training in three major sub-specialties: mammography, computed tomography technology and magnetic resonance technology.[2] Mammographers specialize in using X-rays to make images of the breasts for cancer screening. Computed tomography technologists use the technology known as Computed Axial Tomography, more commonly known as the CAT scan, which has the advantage of producing 3-dimensional X-Rays. Magnetic resonance technologists use Magnetic Resonance Imaging (MRI), a technology that utilizes both magnets and radio waves to create images.

Diagnostic medical sonographers use sound waves, or ultrasound to image the body. A sub-specialty of this field is opthalmic ultrasound biometry, which uses ultrasound to image the eyes prior to cataract surgery.[3]

There is a high degree of crossover between diagnostic medical sonography and another of our professions, cardiovascular technology. Like diagnostic medical sonographers, cardiovascular technologists use ultrasound to image the cardiovascular system. Many of these technologists actually enter the field through the diagnostic medical sonography educational pathway. However, cardiovascular technologists use other technologies besides ultrasound. They may use other non-invasive procedures such as thermography, which images the heat produced in the body to detect thermal abnormalities. They may also specialize in invasive procedures, the most well known being the coronary angiogram, or heart catheterization. In this procedure, catheters are inserted through an artery into the heart as X-rays are taken during the procedure to determine levels of fat and cholesterol build-up.[4] Another sub-specialty in this field is peripheral vascular technology, in which the technologist focuses on imaging of the vascular system, excluding the heart.

Nuclear medicine technologists use radioactive compounds called tracers, and diagnose abnormalities by observing higher or lower concentrations than normal in specific locations. Some nuclear medicine technologists specialize in a technology known as Positron Emission Tomography, or the PET scan. The PET scan is unique because it images cell metabolism rather

than tissue structure. It is especially valuable for detecting cancer, because cancer cells have higher metabolic rates than normal cells.[5]

History of the Professions

The diagnostic imaging professions trace their origins to the discovery of X-rays in 1895. Initially, physicians themselves performed X-rays, but as use of the procedure grew, they found that doing X-rays was time consuming. In response, they began training assistants to do radiographic work. The first recognition of X-ray workers as a professional class occurred in 1920, when the Radiological Society of North America (RSNA) was founded.[6] The American Society of Radiologic Technologists (ASRT), originally known as the American Association of Radiological Technicians, was founded in 1921. The American Registry of Radiologic Technicians (ARRT), an organization that provides certification testing for radiologic technology professionals, soon followed.

Growth of the Professions

The diagnostic imaging professions have expanded and evolved considerably since attaining professional status. In 2001, there were 226,973 radiographers, nuclear medicine technologists, and radiation therapists registered with ARRT.[7] Radiation therapists fall under the radiologic technology umbrella but do not perform diagnostic imaging. At that time, there were about 159,000 radiologic technologists and technicians and 87,000 diagnostic medical sonographers, cardiovascular technologists, and nuclear medicine technologists employed in the United States.[8] National employment for radiographers is expected to grow by about 24 percent by 2010.[9]

In California there were about 15,000 radiologic technologists and technicians, and 7,000 diagnostic medical sonographers, cardiovascular technologists, and nuclear medicine technologists employed in 2001.[10] The California Employment Development Department (EDD) projects that between 2000 and 2010, employment of radiographers will grow by 24 percent and employment of nuclear medicine technologists will grow by 18 percent.[11]

Work and Practice Patterns

The general job responsibilities of diagnostic imaging workers involve assisting physicians in gathering and synthesizing relevant patient history and clinical data and making diagnoses. Diagnostic imaging professionals perform diagnostic procedures, record their results, and observe patients during diagnostic procedures. Workers must apply their knowledge of the risks inherent in imaging procedures, such as excessive and unnecessary exposure to radiation or radioactive materials, to keep their own and their patients' exposure to radiation within maximally acceptable levels. Workers might also be involved in patient education, evaluating and maintaining equipment, and administrative duties such as quality assurance evaluations, supervising other workers, and managing a medical imaging department.[12]

Sixty-five percent of diagnostic imaging professionals work in hospitals, and 28 percent in private physician offices.[13] Others work in cancer centers, specialized imaging centers, and urgent care clinics. They are also found in educational and industry settings as educators, researchers, and managers, as well as in manufacturing, where they are found as technical consultants or in sales. [14]

Education

One source of confusion in understanding the diagnostic imaging professions is the multiple educational paths for entry into the field. Generally speaking, a certificate or associate degree is required for entry into the diagnostic imaging professions, though advancement opportunities are more available to workers with baccalaureate degrees or master's degrees.[15]

Diagnostic medical sonographers and cardiovascular technologists can practice with one year of formal education and training in their fields. Nuclear medicine technologists must have an associate degree plus an additional year of professional training to be eligible to work in their field.

Currently in California, there are 32 radiography programs, 3 nuclear medicine technology programs,

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4 diagnostic medical sonography programs, and 1 cardiovascular technology program.[16]

Certification and Credentialing

Certification is a designation of professional status used in many health professions. It verifies that a person has the necessary expertise to perform the functions of his or her profession and is granted to individuals who have passed an exam in a particular specialization, after satisfying certain educational and training prerequisites for examination in that field. In California, the Department of Health Services, Radiologic Health Branch, requires that radiologic technologists be certified by the ARRT in one of three categories: diagnostic, mammographic, or therapeutic radiologic technology. Certified radiographers are added to the ARRT's registry, and they are given the credentials RT, or Registered Technologist. They are subsequently required to either take 24 hours of continuing education, or pass a certification examination in an additional discipline every two years to maintain their registered status with the ARRT.[17]

Certification of nuclear medicine technologists, diagnostic medical sonographers, and cardiovascular technologists is voluntary in California. However, many employers recruit and hire only certified/registered workers. The ARRT certifies workers in several advanced specialties. Examples are mammography, invasive cardiovascular technology, and computed tomography. Other organizations that credential workers in diagnostic imaging professions are the American Registry of Diagnostic Medical Sonographers,[18] the Nuclear Medicine Technology Certification Board,[19] and Cardiovascular Credentialing International.[20]

There are 37 states that regulate and/or license radiographers, and 25 of these states will issue permits to perform radiographic services to individuals who are trained to administer X-rays to restricted areas of the body.[21] Examples are chest radiography, or radiography of the heart and lungs, and dental radiography. These workers are not permitted to X-ray any part of the body for which they have not received training.

In California, individuals who complete at least three months of clinical training in a specific area can receive limited permits.[22] Training can be received in a formal academic program, or under the supervision of an on-the-job training licentiate who is approved by the Radiologic Health Branch.[23] Applicants for the limited permit must also pass a certification tests in their area, which are offered by the ARRT.[24]

Earnings

Earnings vary by type of diagnostic imaging profession, with nuclear medicine technologists earning the highest average salary, and cardiovascular technologists earning the lowest. California wages reflect the high cost of living in the state, but follow a pattern similar to the national data.

Table 1. Average annual salaries of diagnostic imaging workers in the United States and California, 2001[25]

Position	U.S.	California
Radiographers	$38,860	$45,610
Diagnostic Medical Sonographers	$48,010	$52,760
Cardiovascular Technologists	$36,510	$40,190
Nuclear Medicine Technologists	$51,270	$56,380

Demographics

As illustrated in Table 2 (next page), the diagnostic imaging professions are female-dominated and predominantly Caucasian. In terms of race/ ethnicity, radiologic technologists in 2001 were somewhat representative of the U.S. population at large. However, Hispanic/Latinos, Asian/Pacific Islanders, and individuals falling into the "other" category were each underrepresented by 50 percent or greater relative to their share of the population.

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Table 2. Race/ethnicity of radiographers and the U.S. population in 2001.[26]

	Radiographers	Population
Race/Ethnicity		
White	84%	74%
Hispanic/Latino	4 %	10%
Black	9%	10%
Asian/Pacific Islander	2%	4%
Other	1%	2%
Sex		
Male	27%	48%
Female	73%	52%

Critical Issues and Policy Concerns

Workforce shortage

The national workforce shortage among diagnostic imaging workers is among the most severe of all allied health care professions. Imaging technicians had the highest vacancy rate (15.3 percent) among nine professions in the 2001 AHA study.[27]

Numerous factors have been cited as causes of the shortage of diagnostic imaging workers. The period from the mid-1980s to the early 1990s has been referred to as a "glut era," in which the labor market became saturated with new graduates in radiology who were unable to find jobs.[28] The rise of managed care, with its focus on cost containment, is believed to have played a role in the lack of demand for imaging workers during the early 1990s.[29] These factors led to the rapid closure of economically vulnerable hospital-based programs, as well as community college programs. Radiography programs declined from 692 in 1994 to 584 in 2000.[30] Currently, there remain 584 programs nationally.[31]

Our society's aging population has also been a factor in the imaging workforce shortage, because it has increased demand for diagnostic imaging services, and science has been able to supply new technologies and diagnostic tests to meet these increasing diagnostic needs. A 2001 survey of hospitals found that average annual procedure volumes for five categories of diagnostic imaging workers had increased since 1995.[32] Cardiovascular-interventional technologists had the largest increase at 97 percent. Computed tomography technologists' procedure volume grew by 60.9 percent, and magnetic resonance imaging technologists' by 38.9 percent. Increases for sonographers and radiologists were 26.6 percent and 15.7 percent, respectively.[33] The aging of the baby boomer demographic is expected to exacerbate the problem further as baby boomers, who currently comprise the majority of the diagnostic imaging workforce, reach retirement age.[34]

Practitioners in the field of diagnostic imaging point to a lack of professional recognition and low salaries as causes of the workforce shortage.[35] They cite the absence of standard educational criteria for entry into the field and unclear distinctions between workers at different levels of education as underlying reasons why diagnostic imaging workers are often not regarded as professionals, even within their own ranks. An overlapping concern is with issues of patient and worker safety, especially as regards the regulation of "limited" radiographic technology workers.[36]

California is experiencing particularly severe shortages of diagnostic imaging workers, as it is with several other allied health professions. In 1998, California ranked 49th in per capita employment of radiologic technicians, and 43rd in employment of nuclear medicine technologists.[37] As shown in Table 3, the number of diagnostic imaging workers per capita in California was lower than the national average in all categories in 2001.

Table 3. Diagnostic imaging professionals per 100,000 population in 2001.[38]

	National	California
Radiographers	55.8	44.3
Diagnostic Medical Sonographers	11.2	7.4
Cardiovascular Technologists	13.7	8.4
Nuclear Medicine Technologists	5.8	3.4
Total	90.9	65.1

California is not producing enough radiographers. The EDD projects that 730 radiography jobs will

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open annually in the state through 2010,[39] yet in the 2000-2001 academic year there were only 508 graduates from the state's radiography programs. California produces fewer radiography graduates per capita than any of the other seven most populated states. The per capita graduation rate of radiographers in California was only 1.4 in 2000-2001, compared to 5.0 in Texas, which has a population 62 percent the size of California's population.

Table 4. Radiography programs and graduates in the eight most populated states, 2000-2001 academic year.[40]

State	Population (millions)	Graduates	Per 100,000
CA	35.1	508	1.4
TX	21.8	1100	5.0
NY	19.2	354	1.8
FL	16.7	331	2.0
IL	12.6	383	3.0
PA	12.3	285	2.3
OH	11.4	291	2.6
MI	10.1	256	2.5

Risk of injury

Excessive radiation exposure may be the first thing we think of when considering the physical risks of diagnostic imaging professions, but musculoskeletal injury is also a major risk for workers in these professions. Physical tasks such as lifting patients from wheelchairs and positioning them correctly for accurate scanning are inherent to diagnostic imaging work. A 2003 study found that 16 tasks commonly performed by radiographers are "biomechanically quite demanding," and in many cases they exceed the limitations set by the National Institute for Occupational Safety and Health.[41]

Given the substantial increase in procedure volume since the mid-1990s, the risk of injuries may have risen.[42] A 2001 survey of the ASRT membership found that a majority of radiologic technologists see staff shortages as a threat to their workplace safety.[43] The figure was highest – 80 percent – for hospital workers. Among all respondents, the most frequently cited cause of injury was lifting patients, and 93 percent believed that patient safety was also at risk because of staff shortages. A 2003 task force on work-related musculoskeletal disorders in sonography points out that the loss of sonographers due to such disorders worsens the existing workforce shortage as well as decreasing patient access to services.[44]

Job burnout

Job "burnout" among diagnostic imaging workers is regarded as having a relationship to the workforce shortage. Burnout, "defined as "emotional and physical exhaustion," resulting from "exposure to environmental and internal stressors combined with inadequate coping and adaptive skills," is a common problem in health professions.[45] As radiography workloads increase due to staffing shortages, workers are more likely to experience symptoms of burnout, such as insomnia, stomach disorders, social withdrawal in the workplace, and a sense of dread over going to work each day.[46] Burnout severely impacts job satisfaction and increases turnover, ultimately maintaining and perhaps exacerbating vacancy levels. A 2000 survey of radiographers found that 41 percent were experiencing work-induced emotional exhaustion, which is the first of three stages of job burnout.[47]

One strategy for addressing shortages of health care workers is use of temporary workers, both local and "traveling" workers who move around the country for temporary work. While using temporary workers can alleviate a staffing crunch on a short-term basis, it is not an ideal solution to the labor shortage in diagnostic imaging. Staffing managers report that bringing in temporary workers can have a negative effect on morale in imaging departments. Regular staff members "may think the hospital is more interested in bringing in temporary help than being invested in their permanent staff."[48] Further, traveling workers generally make higher salaries than permanent staff, which can engender anger and resentment on the part of regular staff as well as being less cost-effective for the imaging department.[49]

Solutions

Regulatory changes

A proposed solution on the national level to the lack of standardized criteria for entry into the profession

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is addressed in the "Consumer Assurance of Radiologic Excellence Act" (CARE)[50], currently before the U.S. Congress. The bill mandates that all states impose licensing requirements and minimum licensing standards for all medical imaging and radiation therapy technologists. This would include regulation of limited practice permits. The ASRT supports CARE as a means of assuring "quality patient care, radiation protection and the production of quality images."[51]

Workforce shortage

Although employers continue to be concerned about workforce shortages, there is some evidence that the national shortage of diagnostic imaging workers is decreasing. In 2002, the ASRT compared enrollment estimates in diagnostic imaging programs to Bureau of Labor Statistics employment growth projections, and found that the nation is likely to produce enough of these workers to meet the projected demand for them in 2010.[52] However, this prediction did not hold for radiographers, despite the fact that U.S. radiography programs were operating at their enrollment capacity at the time of the survey.[53] Efforts to find and implement solutions to the workforce shortage should therefore not be abandoned.

Recruitment and retention

For imaging managers, recruitment and retention of good workers is a key strategy for maintaining adequate staffing levels. Literature on staffing cautions against hiring less qualified workers, despite the temptation to do so when the labor supply is low, because poor performers have a depressive effect on employee morale and reduce quality of service to patients.[54] Rather than over-focusing on recruitment by, for example, paying sign-on bonuses, managers can reward current employees by paying referral bonuses instead.[55] Other strategies to increase retention are rewarding workers with multiple or advanced registries with higher pay scales, and rotating them through different specialty areas to maintain their skills.[56] These strategies pay off because they help managers keep their best performers and increase departmental stability, and are a more cost-effective use of departmental funds than paying replacement costs.[57]

Prevention and treatment of burnout

Workers who show symptoms of job burnout are often held solely responsible for their state of mind, but researchers suggest that worker burnout is often an indication of dysfunction in the workplace.[58] Simply recognizing the symptoms of worker burnout is an important first step towards dealing with the problem. Managers should recognize that worker burnout is something that can be addressed by organizations through changes in management style and by educating workers about how to manage stress to avoid burnout. Organizations can offer workshops in time management and stress management to help their workers cope with the pressures brought on by heavy workloads in understaffed imaging departments.[59]

Summary

The diagnostic imaging professions provide critical services in the U.S. health care system, however workforce shortages, worker burnout, and safety risks to both imaging professionals and their patients present challenges to these professions. To successfully meet these challenges and the growing need for high quality diagnostic imaging services increased attention to these professions and the challenges they face will be essential. The severity of staffing shortages in California makes it imperative to attend to the diagnostic imaging workforce and its current challenges. This is especially important in light of the tendency for the state to underproduce radiographers and allied health care workers in general relative to its workforce needs.

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References

[1] First Consulting Group. *The Healthcare Workforce Shortage and Its Implications for America's Hospitals.* 2001. A study commissioned by the American Hospital Association, the Association of American Medical Colleges, the Federation of American Hospitals, and the National Association of Public Hospitals and Health Systems. http://www.fahs.com/publications/studies/FCG percent20Workforce percent20Report.pdf
[2] American Medical Association. Health Professions: Career and Education Directory, 30th Edition, 2002-2003; AMA Press.
[3] American Registry of Diagnostic Medical Sonography http://www.ardms.org/aboutardms/about_frameset.html
[4] The American Heart Association. *What Is a Coronary Angiogram?* 2003. http://americanheart.org/downloadable/heart//1046715993947WhatIsaCoronaryAngiogram.pdf
[5] The Society of Nuclear Medicine http://www.snm.org/nuclear/what_is_PET_main.cfm
[6] Dyson, Susan L., Erin P Fraher, R. Bert Wilkins, Laura M. Smith. *Scanning the Radiologic Sciences Workforce in North Carolina.* Chapel Hill, North Carolina. The Council for Allied Health in North Carolina. 2003.
[7] Reid, Jerry. Demographics of the Profession. *Radiologic Technology*. 2001;March-April, v73:377.
[8] Bureau of Labor Statistics. Occupational Employment Statistics: National Industry-Specific Occupational and Wage Estimates;2001.
[9] Bureau of Labor Statistics. Career Guide to Industries: Health Services. http://www.bls.gov/oco/cg/cgs035.htm
[10] Bureau of Labor Statistics. Occupational Employment Statistics; State Industry-Specific Occupational and Wage Estimages:2001. http://www.bls.gov/oes/2001/oes_ca.htm#b29-0000
[11] Achtelik, Laurie, Mike Davis, Linda Hax, Janet Peters, Cindy Rose, and Jenifer Taylor. *Help Wanted: Making a Difference in Health Care.* Employment Development Department, Labor Market Information Division, Information Services Group, Occupational Research Unit. 2003.
[12] American Medical Association. Health Professions: Career and Education Directory, 30th Edition, 2002-2003; AMA Press.
[13] Bureau of Labor Statistics. Occupational Employment Statistics; National Industry-Specific Occupational and Wage Estimates;2001.
[14]Bureau of Labor Statistics. Occupational Outlook Handbook: Radiologic Technologists and Technicians. http://www.bls.gov/oco/ococ105.htm
[15] Ibid.
[16] American Medical Association. Health Professions: Career and Education Directory, 30th Edition, 2002-2003; AMA Press.
[17] The American Registry of Radiologic Technologists. http://www.arrt.org
[18] http//www.ardms.org
[19] http://www.nmtcb.org
[20] http://www.cci-online.org
[21] Maloney, Eileen. Response to "Limited License XMOs." *RT Image*;2003:v16(3).
[22] California Department of Health Services, Radiologic Health Branch. Instructions for Completing Limited Permit Examination Application. http:www.dhs.cahwnet.gov/rhb/HTML/rhbapps.htm
[23] American Registry of Radiologic Technologists. http://www.arrt.org
[24] Ibid.
[25] Bureau of Labor Statistics. Occupational Employment Statistics: National Industry-Specific Occupational and Wage Estimates;2001.
[26] Current Population Survey, Outgoing Rotations 2001, CPS Utilities, Unicon Research Corporation, http://www.unicon.com.
[27] First Consulting Group. *The Healthcare Workforce Shortage and Its Implications for America's Hospitals.* 2001. A study commissioned by the American Hospital Association, the Association of American Medical Colleges, the Federation of American Hospitals, and the National Association of Public Hospitals and Health Systems. http://www.fahs.com/publications/studies/FCG percent20Workforce percent20Report.pdf
[28] Luckett, Douglas R. Recruitment and Retention Topics for a Changing Environment in Medical Imaging. *Radiology Management.* 2000 Sep-Oct;22(5):32-7.
[29] Ibid.
[30] Williams, Charles D. *Radiology Allied Health Professional Work Force Shortages.* Florida Radiological Society Newsletter;Spring/Summer 2001. http://flrad.org/newweb/members/newsletters/2001_SP_SUM_pg5.cfm
[31] Joint Review Committee on Education in Radiologic Technology. http://www.jrcert.org
[32] American Society for Radiologic Technology. *Profession at a Glance.* 6/22/01. http://asrt.org/profession_glance/workplace_issues.htm
[33] Ibid.
[34] Luckett, 2001.
[35]Conversation with Annemarie Sundquist, Imaging Manager at Sharp Memorial Outpatient Pavilion, San Diego, CA.
[36] Ibid.
[37] Health Resources and Services Administration, Bureau of Health Professions National Center for Health Workforce Information Analysis. State Health Workforce Profiles: California. 2000.

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http://www.bhpr.hrsa.gov/healthworkforce/reports/profiles
[38] Bureau of Labor Statistics. Occupational Employment Statistics: National Industry-Specific Occupational and Wage Estimates;2001.
Bureau of the Census
[39] Kumar, S., L. Moro, and Y. Narayan. A Biomechanical Analysis of Loads on X-ray Technologists: A Field Study. *Ergonomics.* 2003:15;46(5):502-17.
[40] American Medical Association. Health Professions: Career and Education Directory, 30th Edition, 2002-2003; AMA Press.
Bureau of the Census
[41] Kumar, S., et al. 2003.
[42] American Society for Radiologic Technology. *Profession at a Glance.* 6/22/01.
http://asrt.org/profession_glance/workplace_issues.htm
[43]The American Society for Radiologic Technology. *Radiologic Technologists say Staffing Shortages Compromise Safety of Patients and Themselves*. 2001.
http://www.asrt.org/other_categories/press_room/safety_issues_pr.htm
[44] The Society of Diagnostic Medical Sonography. *Industry Standards for the Prevention of Work-Related Musculoskeletal Disorders in Sonography.* 2003.
[45] Collins, Kevin S. and Karen Nolen. Job Burnout: Symptoms, Causes and Solutions. *Radiology Management.* 2002 Jul-Aug;24(4):51-3.
[46] Ibid.
[47] Anderson, Robin. R.T.s and Research: A Report from the ASRT Annual Conference. *ASRT Scanner.* 2000;7:9.
[48] Todd, Francine. Management Assumptions are Challenged. *Imaging Technologist Forum.* 2003.
http://www.imagingtechforum.com/archives/2001/0403_coverstory.htm
[49] Conversation with Annemarie Sundquist, Imaging Manager at Sharp Memorial Outpatient Pavilion, San Diego, CA.
[50] H. R. 1214. March 11, 2003.
[51] Maloney, 2003.
[52] American Society for Radiologic Technology, 2002.
http://www.asrt.org?profession_glance/workplace_issues.htm
[53] Ibid.
[54] Luckett, 2000.
Todd, 2001.
[55] Todd, 2001.
[56] Luckett, 2000.
[57] Volkin, Laurie. *Management Vital to Retention of Employees.* American Society of Radiologic Technology.
http://www.asrt.org/profession_glance/workplace_issues.htm
[58] Collins, 2002.
[59] Ibid.

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