Health Workforce Snapshot: Imaging

HEALTH CAREERS FUTURES

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Executive Summary

Health Careers Futures (HCF), a supporting organization of the Jewish Healthcare Foundation (JHF), was formed in 2002 to address the healthcare workforce shortage in Southwestern Pennsylvania. Working collaboratively with healthcare workforce organizations, HCF creates mechanisms to align the supply of and demand for qualified healthcare workers. Specifically, it seeks to strengthen the "pipeline" through which potential healthcare workers flow—from high school through post-secondary training, certification or degree programs to employment, retention, and skill growth—by assuring that when employers "tap" the pipeline, they have access to a qualified pool of workers.

To help improve the healthcare workforce pipeline, a media campaign to infuse the health workforce pipeline with new job seekers was under consideration in 2003. A similar media campaign had met some success in Lancaster County, Pennsylvania, drawing new entrants to healthcare training programs. HCF and its partners convened a taskforce to investigate the need for and feasibility and potential impact of replicating such a campaign for southwestern Pennsylvania. The taskforce focused the investigation on the region's imaging sector, a sub-sector of health care that includes a variety of occupations in fields such as radiography (x-rays) or magnetic resonance imaging (imaging). Imaging was chosen because regional data and employers' reports indicated that the sub-sector appeared to face the most acute need for workers in the near future.

This investigation confirmed that the imaging sector has a high demand for new workers, but revealed a major bottleneck in the pipeline of potential workers. Training for radiologic technologists, the entry point into the imaging sector, has a fixed number of clinical internships at any point in time. The number of internships—essential to complete radiography training—is constrained by the supply of equipment, the patient flow, and type of hospital setting.

This revelation prompted a more in-depth study of the region's imaging workforce. HCF sought to understand the factors affecting supply and demand in the imaging sector through interviews with radiography department directors and clinical supervisors to:

- Examine the current vacancy levels for radiologic technologists and the imaging specialties
- Assess the clinical placement "bottleneck" in the workforce pipeline
- Identify the qualities employers find most important for both students and radiologic technologists and the types of training programs that generate them
- Examine hospitals' current hiring processes and the drivers of demand for radiologic technologists

HCF and JHF staff, with assistance from workforce and marketing consultants, completed qualitative interviews with staff from nine hospitals in the Pittsburgh region. The hospitals included tertiary hospitals (facilities that provide highly specialized care) and community hospitals from urban, suburban and rural settings. The notes from each interview were analyzed to identify themes across hospitals.

Key Findings

Vacancy Levels: Eight of the nine hospital reported employing a total of 151 full-time and 52 part-time radiologic technologists. Vacancy rates for full-time positions ranged from 24 percent at one hospital to no vacancies at two hospitals. Seven of the eight hospitals had no open part-time positions.

Clinical Placement Bottleneck: All radiology department directors and clinical supervisors reported that they fill all available clinical internships at their facilities. The limited availability of clinical internships relates to the varied patient volumes at different sites (fewer students must be

placed in settings with lower patient volumes, in order to assure that each student has a sufficient caseload for learning). Hospital staff is not required to provide clinical training, but are strongly encouraged to do so. Clinical training can slow departmental productivity during the initial phases of a student's placement unless trainers are allowed to see fewer patients.

Qualities Employers Seek: All directors reported that they prefer to recruit and hire radiography employees from the pool of students that complete the clinical training/internship component of their education at their hospital. These students understand the workings of the department and require less time in orientation upon hire.

All directors reported that within six to 12 months, radiologic technologists have determined whether they want to stay working in a hospital-based setting. Directors at urban hospitals reported a higher attrition than community hospitals. Directors described urban settings as requiring a larger physical demand on people and that the workday is generally more stressful; lacking predictability.

Some directors reported that students are not fully prepared for the intense work schedule or the level of interaction with patients that comes with working at a hospital. Fully informing prospective students about what to expect in an imaging career before they enter training could increase the quality of students and workers and reduce attrition both in training and employment.

Current Hiring Processes and Drivers of Demand: The study found that employers adjust to the market in the short term by increasing the salaries offered and running internally developed marketing campaigns on training and tuition reimbursement programs.

All those interviewed acknowledged the implications of the growing aging population and the shrinking workforce. Some stated it was shortsighted to not plan for future workforce demand now while others reported that they would be able to find needed workers.

Technology was identified by all hospital directors as a major factor influencing worker demand. Technology was reported to change demand patterns and increase the need for specialized skills as new procedures become more widely used. Eight of the nine hospitals in the interview sample were using digital technology, in turn both reducing work error and time spent per patient.

Overall, these findings led the task force to determine that a mass recruitment initiative akin to Lancaster County's model did not suit southwestern Pennsylvania's purposes, at least in relation to the imaging sector, as hospitals and training providers conduct successful recruitment activities to meet their individual needs.

HCF in turn identified its major role as a provider of clear and diverse information to students, job seekers, educational and workforce development organizations about:

- Health sector occupations experiencing the highest demand
- How students and job seekers can enter those jobs and
- How employees can advance in their chosen careers through additional training and education

This kind of comprehensive information—currently unavailable—will strengthen the health workforce pipeline, assuring a better alignment between the region's health workforce supply and demand.

Introduction

Health Careers Futures (HCF), a supporting organization of the Jewish Healthcare Foundation (JHF), was formed in 2002 to address the healthcare workforce shortage in Southwestern Pennsylvania. Working collaboratively with healthcare workforce organizations, HCF creates mechanisms to align the supply of and demand for qualified healthcare workers. Specifically, it seeks to strengthen the "pipeline" through which potential healthcare workers flow—from high school through post-secondary training, certification or degree programs to employment, retention, and skill growth—by assuring that when employers "tap" the pipeline, they have access to a qualified pool of workers.

One mechanism under consideration in 2003 was a media campaign to infuse the health workforce pipeline with new job seekers. A similar media campaign had met some success in Lancaster County, Pennsylvania, drawing new entrants to healthcare training programs. HCF and its partners convened a task force to investigate the need for and feasibility and potential impact of replicating such a campaign for southwestern Pennsylvania.

Lancaster County's Model

In Lancaster County, Pennsylvania, partners recruited, assessed and trained those interested in nursing careers. Partners included the Lancaster County Career and Technology Center, the Lancaster General Hospital, the Lancaster County Workforce Investment Board (WIB) and the Lancaster County CareerLink, a public workforce development agency. The campaign targeted three nursing occupations: Certified Nursing Assistants, Licensed Practical Nurses, and Registered Nurses.

Lancaster partners launched a two-year, $1.2 million television campaign, initially funded by the WIB, to attract people to the program.

Lancaster created print materials to complement the television campaign. CareerLink provided response management for inquiries responding to the campaign and two CareerLink staff were dedicated to fielding calls and completing assessments. Lancaster included employers in the planning of the campaign; they found, however, that there was no need to link graduates to employers after training. Employers were independently able to locate graduates, and had better options given a larger and more qualified pool of graduates.

Scott Sheely, Executive Director of the Lancaster County WIB reported that prior to the initiative, the regional training programs produced 200 graduates in allied health professions annually. Currently, they produce approximately 500 graduates each year.[1] Mr. Sheely also reported that the Lancaster campaign encountered several bottlenecks due to the inadequate supply of workers and the fixed training capacity. The increase in graduates did not meet the increasing demand created by the aging population and shrinking workforce in the community. He estimated that ideally, 1,000 allied health professionals needed to graduate each year to meet demand. This was not feasible; entry into education and training programs overall was low, due to the region's relatively low unemployment rate, now at 3.3 percent.[2]

Principally, Lancaster partners found that allied health program enrollment was at its maximum, with a one-year waiting list for most programs. Training providers were already increasing capacity and offering varied training schedules, including part-time, evening and weekend programs and classes to accommodate students. Schools were also holding "completer" programs for students entering the program who already had credits toward their degree or certification. However, these activities did not reduce the training bottleneck, an issue which still plagues the Lancaster model. Job seekers were disappointed to wait to enroll in and complete training.

Could Southwestern Pennsylvania Adapt the Lancaster Model to Its Needs?

As the Lancaster region was executing its media campaign, the Pittsburgh region was grappling with changes in the economy and workforce demographics. Could a media campaign in the Pittsburgh region address the growing shortage of healthcare workers?

Health Careers Futures convened a task force to assess and develop a regional media-based recruitment plan adapted from the Lancaster model. The task force included representatives from the Pittsburgh's CareerLink, Community College of Allegheny County, KDKA-TV, regional healthcare employers and HCF and JHF staff. Workforce development expert Sylvio Baretta and marketing expert John Elliott were hired to facilitate the task force's work.

The task force had to determine the region's healthcare specialty areas experiencing the greatest need for workers. Two questions drove discussions:

- What occupations in healthcare experienced a strong unmet workforce demand (due to the growth of the population needing care or the retirement of incumbent workers)?
- Were healthcare providers and trainers moving effectively to meet the projected workforce demand?

HCF and JHF staff conducted a survey of healthcare providers and examined available quantitative labor data. Based on this preliminary research, the task force determined that of sectors requiring post-secondary training, the region's imaging sector experienced the strongest workforce demand. The task force agreed to recruit qualified people into radiologic technologist training and employment. Each hospital would then recruit incumbent radiologic technologists within their facility to advance to the imaging specialties.

The task force members were then organized into sub-groups to tackle the three different components of a marketing campaign:

1. The "offer" and message
2. The market, or audience
3. Campaign response management

The Imaging Sector

The imaging field encompasses a number of careers and includes:
Diagnostic:

- Radiologic technologist
- Magnetic resonance imaging (MRI) technologist
- Computerized tomography (CT) technologist
- Diagnostic medical sonographer (Ultrasound)
- Nuclear medicine technologist
- Mammographer

Interventional:

- Cardiovascular technologist

Radiation Oncology:

- Radiation therapist
- Medical dosimetrist

Radiological technology is often the entry point to diagnostic radiography and requires at least an Associate's degree. A variety of training programs offer this degree, including community colleges, proprietary schools, hospital-based programs and four-year schools. Radiologic technologists can then pursue advanced training or specialization in one of the above modalities.

But enthusiasm for the project was tepid, and Lancaster's mixed results regarding the efficiency of the pipeline, from interest generated to training to employment, caused concern. Employers didn't challenge outright the basic assumptions that demand was strong in imaging and employers needed assistance to meet demand. However, there was a fear that the entire workforce pipeline needed to be realigned, or else targeted interventions would increase friction along the route to employment. So the staff at JHF decided to investigate further before embarking on an expensive outreach effort.

The exploration resulted in an unexpected finding. Although demand is present, at least one major bottleneck limits employers' ability to increase supply: the fixed number of clinical internships essential to complete radiography training. The number of available internships is constrained by the supply of equipment, the patient flow, and the volume of work within a hospital. This finding led the task force to reassess the feasibility of the recruitment model and prompted a more in-depth study of the region's imaging workforce.

HCF sought to understand the factors affecting supply and demand in the imaging sector through interviews with radiology department directors and clinical supervisors to:

- Examine the current vacancy levels for radiologic technologists and the imaging specialties
- Assess the clinical placement "bottleneck" in the workforce pipeline
- Identify the qualities employers find most important for both students and radiologic technologists and the types of training programs that generate them
- Examine hospitals' current hiring processes and the drivers of demand for radiologic technologists

The resulting snapshot, based on surveys conducted by HCF and JHF staff, offers the region important lessons regarding the most effective collaborative methods to address the imaging workforce shortage and strengthen the overall health workforce pipeline.

Study Methodology

Staff completed qualitative interviews with department directors and clinical supervisors from nine hospitals in the Pittsburgh region. The hospitals included tertiary hospitals (facilities that provide highly specialized care) and community hospitals from urban, suburban and rural settings. Directors from two urban specialty hospitals, four urban tertiary facilities, one suburban community hospital and two rural community hospitals participated in the study. All hospitals provided radiography clinical internship programs. Three of the hospitals, one rural hospital and two urban tertiary facilities, had training (academic) programs for radiologic technologists.

The interviews were designed to determine the likelihood of success of a marketing campaign to encourage people to pursue imaging careers. Questions were designed to:

- Examine the current vacancy levels for radiologic technologists and the imaging specialties
- Assess the clinical placement "bottleneck" in the workforce pipeline
- Identify the qualities employers find most important for both students and radiologic technologists and the types of training programs that generate them
- Examine hospitals' current hiring processes and the drivers of demand for radiologic technologists

Each interview ranged from 45 minutes to one hour. The notes from each interview were analyzed to identify themes across hospitals. (See Appendix A for the full questionnaire.)

Findings

Employer Perceptions of Imaging Workforce Demand

All those interviewed acknowledged the implications of the growing aging population and the shrinking workforce on the imaging sector's future labor needs. Some stated it was shortsighted to extemporize planning for future workforce demand while others reported that they were equipped to find needed workers.

One director reported that two issues drive overall workforce demand in imaging:

- A need to expand capacity at outpatient centers
- New technologies expand technologists' areas of responsibilities, which now include what were previously physicians' duties in areas such as positron emission tomography (PET,

including new procedures for Alzheimer's disease), cardiac magnetic resonance imaging (MRI) and cardiac computerized tomography (CT).

Radiologic Technologists: Interviewers found that contrary to popular belief and outdated data, employers are not experiencing a critical shortage in radiologic technologists. Eight provided current statistics on the number of full-time and part-time radiologic technologists employed and the number of full-time and part-time vacancies. The hospitals reported employing a total of 151 full-time and 52 part-time radiologic technologists. Across the eight hospitals, 13 full-time and 1 part-time radiological technologist positions were open. Vacancy rates for full-time positions ranged from 24% at one hospital to no vacancies at two hospitals. Seven of the eight hospitals had no part-time positions open.

Directors further reported that they do not plan for workforce shortages in the long term, but respond to current staffing needs on a monthly basis. In turn, they employ "just-in-time" methods of budgeting for staff.

Many directors described the market as cyclic, with employers responding to high vacancies by increasing the salary for new entrants or expanding marketing. Training providers also respond by increasing capacity within limits imposed by faculty and clinical internship availability. When positions at hospitals are full, new graduates can seek employment in outpatient facilities and in equipment sales.

All directors reported that increases in salary levels several years ago significantly reduced vacancies. Data from the Pennsylvania Center for Workforce Information and Analysis generally confirmed this trend for the region. Table 1 shows the change in salary for radiologic technologists and technicians and diagnostic medical sonographers, once included under the same occupational title. Salaries for radiologic technologists and technicians averaged $30,700 in 1997 and have since increased to $36,130 in 2003. This 17.7% increase is more than the 14% ($35,115) increase in approximate cost of living during the equivalent period.[3]

Table 1: Average Annual Wages for Radiologic Technologists and Technicians and Diagnostic Medical Sonographers in the Pittsburgh MSA from 1997 to 2003[4]

Average Annual Wages ($)	Radiologic Technologists and Technicians	Diagnostic Medical Sonographers	Nuclear Medicine Technologists
1997	30,700		35,690
1998	30,880		36,980
1999	34,470	43,580	38,940
2000	33,050	40,510	41,300
2001	34,580	46,730	42,800
2002	35,230	43,720	42,980
2003	36,130	44,690	43,720

Note: Prior to 2000, diagnostic medical sonographers were included in the occupational title radiologic technologists and technicians.

Table 2 charts employment for radiologic technologists and technicians from 1990 to that projected in 2010. Data shows that overall there has not been a large increase in the number of radiologic technologists needed in the Pittsburgh region. Additionally, projections for 2010 do not indicate a large need for additional radiologic technologists in the Pittsburgh region.

Table 2: Employment for Radiologic Technology and the Specialty Fields in the Pittsburgh MSA from 1990 to 2010[5]

Annual Openings	Radiologic Technologists and Technicians	Diagnostic Medical Sonographers	Nuclear Medicine Technologists
1990	2,170	-	150

1994	2,550	-	140
1998	1,800	-	210
2000	1,010	670	120
2010	1,040	720	120

Note: All openings for 1990 through 2000 are actual openings and openings for 2010 are projected. Prior to 2000, diagnostic medical sonographers were included in the occupational title radiologic technologists and technicians.

Table 3 illustrates the change in projected openings from 1990 to 2010. The number of openings for radiologic technologists has also been steadily decreasing. Data from 1990 projected 122 openings annually from 1990 to 2000 for radiologic technologists and technicians and diagnostic medical sonographers. More recent data projects just 45 annual openings in these fields from 2000 to 2010.

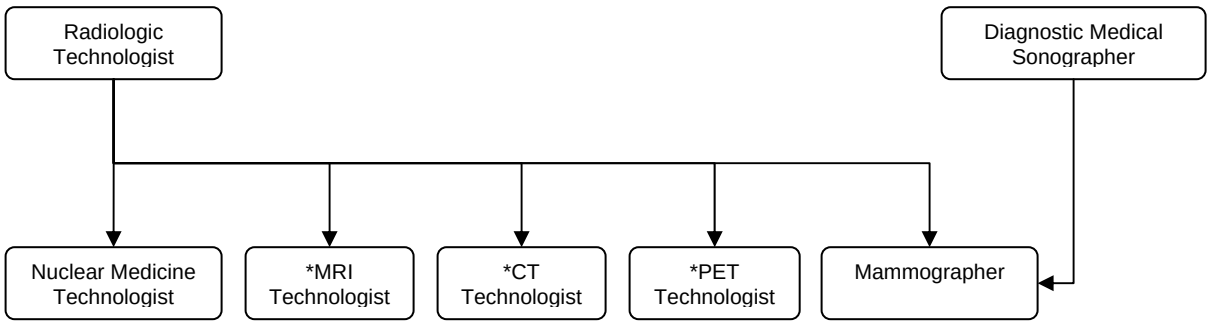
Table 3: Projected Annual Openings for Radiologic Technology and the Specialty Fields in the Pittsburgh MSA from 1990 to 2010[6]

Projected Annual Openings	Radiologic Technologists and Technicians	Diagnostic Medical Sonographers	Nuclear Medicine Technologists
1990 to 2000	122	-	8
1994 to 2005	101	-	4
1998 to 2008	68	-	3
2000 to 2010	25	20	3

Note: Prior to 2000, diagnostic medical sonographers were included in the occupational title radiologic technologists and technicians.

Other Imaging Specialties: Other specialty positions were projected to be in greater demand, but students must first complete training in radiologic technology before moving into these specialties. One director identified ultrasound (diagnostic medical sonography) as a growing field and yet another identified computerized tomography (CT) and magnetic resonance imaging (MRI) as growing fields.

Figure 1: Imaging Pathway (Diagnostic)



*MRI stands for Magnetic Resonance Imaging
*CT stands for Computed Tomography (CT) imaging or CAT scan (Computed Axial Tomography)
*PET stands for Positron Emission Tomography

Positron emission tomography (PET) was identified as a growing field that would draw workers from and, perhaps, create vacancies in nuclear medicine. At 13 percent, nuclear medicine technologists had the largest number of vacancies across reporting hospitals. In 1998, the number of nuclear medicine technologists employed was at its highest at 210 (Table 2). This number dropped to 120 in 2000 and the need is not projected to increase in 2010. It is unknown whether these figures account for the pull from nuclear medicine to other specialties.

Other respondents suggested that the expected significant growth in imaging specialties presented a great opportunity to expand training programs. One director identified the increased potential for career advancement in imaging as an important enticement for applicants.

Employers' Demand Driver: Changing Technology

Technology was identified by all hospital directors as a major factor influencing worker demand. Technology was reported to change demand patterns and increase the need for specialized skills as new procedures become more widely used. One director reported that training curriculum was not keeping pace with the technology being used. Eight of the nine hospitals in the interview sample currently use digital technology, in turn both reducing work error and time spent per patient.

One director reported that "going digital" has accelerated the information flow between technologists and physicians, leading to better diagnoses. It had, however, dissociated physicians from the technical staff, decreasing the opportunity to continually improve work on a patient-by-patient basis.

For example, with film, a doctor would let a radiological technologist know immediately if the technologist took a poor picture. Now, with digital imaging, three days can elapse before the technologist learns about a poor picture—and the notification comes in an impersonal report. By then, the technologist would have taken over 400 images since the faulty one. Identifying why the error occurred becomes practically impossible, as the immediate feedback process no longer exists.

Another director stated that the retake decision generally occurs at the radiological technologist level, before the image is passed on to the radiologist. When doctors request a retake, then the supervisor issues a warning to the radiological technologist regarding the quality of their work. One director pointed out that technology has distanced the radiologic technologist from patient care. They no longer hear from doctors about individual patients and how they are doing.

As technological advancement decreases time spent servicing each patient, radiologic technologist have become more efficient and can therefore handle larger patient volume. Therefore, technological advancements (difficult to account for in earlier forecasts) may have ameliorated the expected shortage of imaging professionals.

Employer Recruitment Efforts: Jobs

All directors reported that they prefer to recruit and hire employees from the pool of students that complete clinical internships at their hospital. These students understand department operations and require less time in orientation upon hire. Employers reported that they carefully observe students in clinical internships to determine who will be good candidates for employment.

Directors at hospitals with training programs also reported that they prefer to hire from their own training program. Directors stated that these students have an edge over those trained in academic settings, as they receive more clinical training. Internal hospital-based programs were the primary supplier of new hires at these hospitals. Referrals from colleagues were also reported to be a large source of new hires. Additionally, facility closings provided experienced prospective employees that require less time for adjustment to the job.

All directors and clinical supervisors reported currently hiring one to three people per year, taking on average three to four weeks to hire each new employee. One director reported that marketing job openings does not produce enough response for the money spent. On the other hand, another reported that their hospital insufficiently advertised vacancies.

Employers reported that a higher acuity level of patients significantly affected radiologic technologists' employment preferences. Patients with high acuity require more physical demands from workers. One clinical supervisor stated that it was important that new hires understand how physically demanding the job can be, often requiring an employee to lift patients or move X-ray machines.

Employer Recruitment Efforts: Training

Employers recruit students into radiography training through high school visits, career fairs, advertisement, and letters to guidance counselors. The clinical instructor for the University of Pittsburgh Medical Center's (UPMC) training program reported that the numbers of those in training have steadily increased from seven in 2002 to 19 in 2004. This represents a big jump from 1996 when only two people entered training and graduated from the program. The major factor contributing to the growth has been the addition of other hospitals in the UPMC system as clinical sites.

UPMC has established an institutional scholarship for students willing to commit to work in the UPMC system for two years after graduation. This has aided UPMC's recruitment efforts. In addition, evening classes began in 2004 to attract older students.

Attrition: Training

The clinical instructor at UPMC reported that less than half of those who began training in the latest class graduated. Academic ability, attendance and an inability to conform to school policies were the major reasons for the existing attrition. The instructor commented that tighter admission requirements are reducing the attrition rate.

One director at a tertiary facility that provides highly specialized care, technology, and support services reported that those who leave clinical training do so to be closer to home or to find a different work environment. These students are generally looking for a smaller institution with a slower work pace and less physical requirements. People who withdraw tend to do so in the first three months of the program.

Another director acknowledged that the major reason for attrition from clinical training was students' awareness of the level of patient interaction required when in direct exposure to the work environment. Some discover that they cannot work with people as well as they had anticipated.

Placing Students in Clinical Training

One of the main goals of this study was to determine the degree to which radiography clinical internship placement is the bottleneck for increasing training capacity. Employers participating in the task force contended that clinical training would be a major impediment to a recruitment initiative. More people could be placed in academic training but clinical training would be difficult to find due to its firm number of openings that are heavily dependant on external factors.

Clinical internship placement was constrained by staffing and the number of rooms and equipment available for procedures. One director at a hospital with a training program reported that the administration would prefer to accept more students in its training program, but is constrained by the number of clinical internship placements. Additionally, the accreditation program for radiologic technology training limits the trainer-to-trainee ratio. All radiology department directors and clinical supervisors reported they fill all clinical placement internship positions.

Directors also reported that staff, although not required, is strongly encouraged to provide clinical training. Most directors said that all staff members provide training at some point. One hospital

provided extra pay for those who provided clinical training and one was investigating an increase in pay; however most directors reported that clinical training is part of the job.

Three of the department directors reported that clinical training during work diminished departmental productivity during the beginning of a student's placement. Once a student understands the work flow, productivity returns to normal. Another director reported that in the past clinical training reduced productivity; now they no longer expect trainers to see as many patients.

The limited availability of clinical sites to place students relates to the workload in different sites. For instance, it is impossible to place 10 students in a "slow" hospital environment, where there are insufficient cases to expose students to required areas of training.

Directors at specialty hospitals believe they offer a unique experience of training in specific fields, but lack many areas in which students must train to complete their degrees. One director reported that they could create a relationship with a tertiary facility to provide training in their unavailable areas.

One director reported that some trainers have a tendency to exploit students, by asking them to perform errands or other menial tasks. Getting the right people to work with students was very important.

Retention in Employment

All directors reported that within six to 12 months, radiologic technologists have determined whether they want to stay working in a hospital-based setting. Directors at urban hospitals reported higher attrition than community hospitals. Directors thought that urban settings require greater physical demand and generally more stressful workdays. The workload is also extremely high. As hospitals' imaging needs fluctuates, employers are subject to an unpredictable work environment with constant department and floor changes. As a result, for urban hospitals with radiography training programs, recruitment of employees and students is ongoing and a constant concern.

For all urban hospitals, commuting time plays a large role in attrition. People often ask to be transferred to community hospitals within the health system that are in a more convenient location. One community hospital director reported that the major reasons for leaving were retirement and career advancement. One barrier to transferring is it requires becoming a "rookie" again and losing seniority and its associated flexibility, such as choosing holidays and vacation time.

Two directors reported that radiologic technologists may leave for outpatient facilities with better pay and lower levels of patient acuity. One director reported that workers often leave for traveling jobs in equipment sales, where better pay is available. Another reported that staff leave to work at temporary agencies.

Community versus Urban Settings: As discussed above, hospital setting plays a large role in the retention of staff. Interviewees emphasized that what attracts people differs from hospital to hospital. The type of person attracted to a community setting is different from the type attracted to urban institutions. Those seeking a greater challenge in work often seek an urban setting that provides high patient acuity levels and non-stop activity. These people could get bored in a more sedate environment.

Those seeking a community setting prefer the work that is more predictable and less stressful. Additionally, commute time and expense for staff in community hospitals is less.

Academic versus Hospital-Based Radiography Training Programs: Directors acknowledged that there was a difference in training among students trained in academic versus hospital-based programs. Employers with training programs reported that their students were a better fit as employees. Hospitals without training programs reported that the students who complete clinical internships at their facilities were also good hires,

Those with training programs reported that students in hospital-based training programs received more clinical training and were better prepared for the working environment, while students in academic programs had less exposure to the clinical environment. However, after five months in the hospital, there was no noticeable difference between graduates of the two programs.

One disadvantage of hospital-based programs is that students receive a certificate and not a degree, which is often required to advance to management positions. Students in academic programs are required to take many courses not directly related to their degree, such as English and electives. People who want a degree pursue it, but one director reported that having a degree has no effect on one's ability to work as a radiologic technologist.

Quality of Students

All employers reported a range in the type of students entering training and seeking jobs. Students included not only 18 or 19 year olds just out of high school, but also adults looking for a second career. Many of the latter are dislocated workers, generally from US Airways. Almost all directors reported that older students were better workers. The most important thing for a student to have is devotion to the care of other people. Directors were generally pleased with the level of quality of the students.

Training programs with a heavy emphasis on job performance generally produced better employees. Overall, every director and clinical supervisor interviewed highlighted the importance of soft skills, including flexibility, good interpersonal skills, initiative, assertiveness and an ability to work in a fast-changing environment. One director cited the importance and understanding of teamwork. Students possessing these qualities tend to be hired.

All students require a strong science and math background for entry into training and must have completed coursework in biology, physics and algebra. One hospital-based instructor reported more difficulty for students to get into hospital-based programs than academic programs because the latter does not require a psychological test or interview. This instructor reported that the quality of the current hospital-based class is better than that of prior years due to more applicants and tighter admission requirements. Applications have been received from individuals with varied backgrounds, including those with degrees in biology and the arts.

Directors stated that schools training technologists are generally improving because student quality is improving. They reported this was due to improved pay and benefits for radiologic technologists and the marketing of these improvements. Also, schools are more honest about the nature and demands of technologists' jobs.

While all hospitals reported that they were providing clinical training at capacity, two directors reported that quality was declining and they would like to have more quality students. Problems in quality included students' immaturity, incomplete preparation, and inflexibility with regard to work schedules. Several directors reported that the new generation of workers was not prepared to work varying shifts and instead expected nine-to-five work days—a rare occurrence in the health professions. These directors preferred older students, who were perceived to have stronger work ethics.

Quality of Employees

The qualities sought in employees were similar to sought in students. Important qualities include responsibility, good interpersonal skills, initiative and flexibility. Directors reported that a main reason for not succeeding in work was a lack of these skills. The desire to be challenged in work was most important for those seeking career advancement. One director reported that a few years ago it was more difficult to find quality people and that has changed for the better in recent years.

Career Advancement

Staff can pursue a range of advancement opportunities. Some pursue administrative positions, while others seek further technical work. One community hospital director reported that there was a split between those staying as radiologic technologists and those moving on to specialty fields such as MRI and CT scanning. Additional work experience is needed to pursue specialty fields. New graduates cannot immediately seek certification in a specialty. One director discussed the possibility of setting up a CT school to provide the needed training.

Two directors cited the problem with having radiological technology as the entry point for imaging specialties (Figure 1). There are no training programs that allow students to begin entry-level training in an imaging specialty. Ultrasound (diagnostic medical sonography) offers the only other training program that can substitute as an entry degree for imaging specialties. One specialty hospital director reported difficulty in attracting enough radiologic technologists for advancement to specialty positions.

One director thought there was no reason why specialty disciplines, such as CT and MRI, should have a career path that passes through general radiology. Current career paths do not reflect technological change, and eventually will need to be transformed. This director predicted that if specialty schools were not created, there would soon be too many generalists and too few specialists.

As career ladders are not well defined in the field, income is not based on education as in other health professions. Therefore, recruiting for direct entrance into the specialties was considered easier than recruiting for general radiology with emphasis on later training for specialties.

Conclusions

A mass recruitment initiative similar to Lancaster County's model is not appropriate for southwestern Pennsylvania's purposes, at least in relation to the imaging sector. Employers adjust to the market in the short term with increased salary offers and internally developed marketing campaigns about available training programs and opportunities for tuition reimbursement upon employment. Across all hospitals participating in the interviews, directors reported that salaries have increased; this was confirmed upon examination of state labor market data.

All directors and clinical supervisors were aware of the implications of the changing general and workforce demographics of the region that are increasing the need for healthcare services. The process of managing increase in demand would not be initiated until hospitals see immediate evidence of the workforce shortage. Only then will hospitals implement a market driven response as they have in the past.

Technology plays an important role in shaping the demand for imaging occupations. The emergence of new procedures drives the need for certain imaging specialties, varying training and employment needs.

Changes in technology also have implications for the radiologist-radiologic technologist relationship. Digital technology has increased the length of time it takes for radiologic technologists to learn of their error from the radiologist. Learning at point of care is now replaced by warnings from supervisors. Additionally, the radiologist and radiologic technologist have much less need for interaction because the digital process has significantly decreased the need for retakes.

While digitizing film has reduced error overall, it has created a lag in the time that an error in the image is reported. Creating a mechanism for the radiologist to report any film error to the radiological technologist immediately will assist in identifying and rectifying the error made and increase the interaction between the radiologists and radiologic technologists. It will also return radiologic technologists to involvement at the point of patient care.

Yet technological advancement has made it possible for radiologic technologist to be more efficient and handle larger patient volume. This in turn may have ameliorated the expected shortage of imaging professionals.

The interviews confirmed the bottleneck in clinical internship placement discussed in taskforce meetings. Hospital-based training programs are exploring ways to expand capacity and create direct conduits of training for the specialties.

Overall, directors were in agreement regarding the qualities required for students to succeed in clinical training and a career in radiological technology. Soft skills, such as flexibility and communication were as equally important as technical ability. Most directors were satisfied with the primary source of students for clinical rotation and new hires, whether they were hospital-based or academic programs. All directors preferred to hire students that completed clinical training at their site as this reduces the orientation process after hiring.

Some directors reported that students were not fully prepared for the intense work schedule that accompanies hospital environments or the level of interaction with patients. Generally, training programs are held during first shift. However, a radiographer can be assigned to all (first, second and third) shifts, each varying in patient acuity and activity. Fully informing prospective students about expectations of an imaging career before they enter training could increase the quality of students and workers and reduce attrition both in training and employment.

Overall, given the study's findings, the task force determined that a mass recruitment initiative akin to Lancaster County's model did not suit southwestern Pennsylvania's purposes, at least in relation to the imaging sector, as hospitals and training providers conduct successful recruitment activities to meet their individual needs.

One primary liability with this system, as stated above, is the prevalence of incomplete information – students lack information on required prerequisites and duties of their training and profession, and the healthcare work environment lacks adequate information to support a viable career pathway. This lack of information leads to an imaging workforce that exhibits drainage at key points in the system. Although sufficient entrants are in the system, many students do not complete training programs or remain in and excel at their chosen field. More specifically, the lack of information leads to an inadequate supply of quality imaging workers.

Therefore, HCF identified its major role as a provider of clear and diverse information to students, job seekers, and educational and workforce development organizations about:

- Health sector occupations experiencing the highest demand
- How students and job seekers can enter training programs and jobs and
- How employees can advance in their chosen careers through additional training and education

As a result, HCF has created the *Health Careers Futures Toolkit* (Toolkit) to inform and empower quality job seekers to enter the growing healthcare industry. The Toolkit focuses on diverse fields experiencing high regional demand that require a broad range of interests and skills. The Toolkit provides easy-to-use information on career awareness, literacy, and job preparedness in both electronic and print formats, including:

- Practical and personal testimonials on the day-to-day work in careers;
- Maps of career pathways, training requirements and opportunities for advancement;
- Highlights on how to pursue such careers, including directories of local training, job placement and healthcare employers.

This kind of comprehensive information - currently unavailable - will guide quality entrants into the right training and the right jobs; strengthening the health workforce pipeline with quality workers.

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[1] Email correspondence from Scott Sheely, Executive Director, Lancaster County Workforce Investment Board to Karen Iobst, Health Careers Futures, October 29, 2003.
[2] United States Bureau of Labor Statistics, 2004.
[3] Bureau of Labor and Statistics, Consumer Price Index for All Urban Consumers (not seasonally adjusted)
[4] Pennsylvania Department of Labor and Industry, Center for Workforce Information and Analysis, 2004.
[5] Ibid.
[6] Ibid.

APPENDIX A: QUESTIONNAIRE

Healthcare Professions Training Survey

Health Careers Futures (HCF), a non-profit entity of the Jewish Healthcare Foundation, and the Three Rivers Workforce Investment Board are conducting research regarding healthcare-related educational opportunities in Southwestern Pennsylvania. We are collecting information from training providers about the specific healthcare programs they offer.

To date, there is no such resource in Southwestern Pennsylvania; therefore, your participation in helping us develop the database by completing the survey is crucial. Please return the survey to Mackenzie Tobin at intern@jhf.org. If you prefer, you may call Mackenzie at (412) 594-2588 to complete the survey by phone.

We would like to have our information gathered by June 25 and look forward to hearing from you by that date. Thank you in advance for your help, and, please feel free to contact Mackenzie if you have any questions.

1. General Information	
a. Bidwell Training Center, Inc.	
b. Health Unit Coordinator	
c. Please indicate the appropriate program offering.	Certificate_____ Diploma_____ Degree (please specify) Associate_____ Bachelor_____ Master_____ Doctorate_____ Post-Doctorate
d. Please specify the program duration	Credits_____ Number of Semesters_____
e. Are students able to pursue part-time study?	Yes_____ No_____
2. Tuition/Financial Aid	
a. Please list the financial aid options available to students.	1. _____ 2. _____ 3. _____

b. Please provide a breakdown of the current tuition.	Full-time resident: $_____ per credit_____ or per semester_____ Part-time resident: $_____ per credit_____ or per semester_____ Full-time non-resident: $_____ per credit_____ or per semester_____ Part-time non-resident: $_____ per credit_____ or per semester_____
3. Application Information	
a. When are applications due to the office of admissions?	Date_____
b. Do you have rolling admissions?	Yes_____ No_____
c. Please list the application requirements (transcripts, fee, program-specific application, GED, etc.).	1. _____ 2. _____ 3. _____
d. Please provide the address where the completed application should be sent.	Address: _____ Address: _____ City, State, Zip: _____

4. Program Information	
a. Who is the current program coordinator/chair?	Name: _____ Telephone: _____ Email: _____
b. Does the training program have specific prerequisites? If so, please list them.	1. _____ 2. _____ 3. _____
c. Does the program offer classes during evening hours?	Yes_____ No_____
d. How many students were enrolled in the program during the 2003 and 2004 school years?	2003_____ 2004_____
e. How many graduates did you have from this program in 2003 and 2004?	2003_____ 2004_____
f. How many available student openings did you have in 2003 and 2004?	2003_____ 2004_____
g. Please provide the most recent attrition/turnover rates.	Year_____ Rate_____
h. Please briefly discuss the capacity for growth of this program.	_____ _____ _____

i. What percentage of your students are female and male?	Female_____ Male_____
j. What percentage of your students are non-traditional?	Percent_____
k. What is the average time it takes your students to secure a job after graduation?	Months_____
5. Additional Information	
a. What academic support systems are in place at your institution/training program (e.g. tutoring, study skills, etc.)?	1. _____ 2. _____ 3. _____
b. Please share any additional information about your program that you feel students should know.	_____ _____ _____