PREPARING OREGON'S WORKFORCE FOR HIT TRANSFORMATION

Oregon Healthcare
Workforce Institute

Advancing Solutions

Developed out of an initiative from the Governor's office and sustained by dedicated health care, education and business professionals from private industry and the public sector, the Oregon Healthcare Workforce Institute exists to advance a comprehensive statewide response to Oregon's health care workforce needs.

At the nexus of health care, education and workforce development arenas, the Oregon Healthcare Workforce Institute promotes existing endeavors and harnesses Oregon's collaborative spirit and tradition of innovation to develop sustainable health care workforce solutions.

In Fall 2008, the Institute established the Health Information Technology Workforce Initiative as one of four key initiatives critical to the mission of developing a high-quality health care workforce.

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Executive Summary: Preparing Oregon's Workforce for HIT Transformation

The tipping point for the health information technology workforce and a technology-savvy health care workforce has arrived.

Federal and state health care reform is leading this urgent workforce demand. The American Recovery and Reinvestment Act of 2009 sets ambitious goals to create an electronic health record (EHR) for every U. S. resident by 2014, adopt standards-based health information technology (HIT) systems and launch a national health information network. A window of opportunity presents itself as federal stimulus funding is pumped into efforts to realize these objectives.

To meet these goals, a skilled HIT workforce is needed to install, operate, and optimize EHR systems. National estimates project that up to 200,000 HIT workers are needed to implement EHRs by 2014. The federal Office of the National Coordinator for Health Information Technology (ONC) estimates a shortfall of 51,000 HIT workers over the next five years and announced the availability of $118 million to date in grants to educational institutions for the rapid, short-term training of HIT professionals.

Add to this demand the need to train the current health care workforce in the use of EHR systems and the need to incorporate EHR training into the health professions' curriculum.

Towards this wide-scale workforce transformation, the Oregon Healthcare Workforce Institute, in partnership with the Oregon Department of Community Colleges and Workforce Development and WorkSource Oregon, convened a "Brain Trust" of health information technology experts. Over the course of four months, the Brain Trust identified the workforce needs associated with state and federal reform, analyzed supply and demand estimates, reviewed current education programs, examined federal training grant opportunities, and assessed the challenges to building Oregon's HIT workforce and training the current health care workforce. The result is this strategic action plan to:

- Build the health information technology, informatics and information management workforce;

- Train the current health care workforce to meet basic competencies in the use of EHRs; and

- Integrate HIT coursework into health care profession education programs to ensure that graduates are competent in the use of EHRs.

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Preparing Oregon's Workforce
for HIT Transformation

Information technology is transforming the health care world. New technologies, vast amounts of information, cost controls and quality improvements are just some of the factors contributing to the need for a technology-savvy health care workforce and health information technology (HIT) professionals. Recent federal and state health care reform efforts have pushed this demand to a tipping point.

On the federal level, the American Recovery and Reinvestment Act of 2009 and related legislation included $36 billion for the implementation of electronic health records (EHRs) for every U.S. resident by 2014, the adoption of standards-based HIT systems and a national health information network.

For Oregon, HIT is a critical component of recent state legislated health care reform efforts to provide access to high quality, affordable health care for all residents. This includes an objective to stimulate, coordinate, and support statewide efforts towards the adoption and use of EHRs.

HIT is considered a crucial element of health reform and has the potential to enhance the delivery of health care services, reduce costs through greater efficiencies, improve communication with patients and between providers, and provide data to improve systems of care.

> "To realize the widespread adoption of EHRs and achieve the vision of a transformed health system that health IT can facilitate, the workforce needs to be expanded and properly trained to facilitate rapid uptake of health IT by health care providers."
>
> *David Blumenthal, M.D., M.P.P.*
> *National Coordinator for Health Information Technology*
> *U.S. Department of Health & Human Services*

The success of these state and federal investments depends on a qualified workforce to install, implement and use the technology. Add to this demand the need to train the current health care workforce in the use of HIT and EHRs and the need to integrate HIT into health professions' standard curriculum.

Oregon's HIT Workforce Development Brain Trust

Towards this wide-scale technological transformation, the Oregon Healthcare Workforce Institute (OHWI), in partnership with the Oregon Department of Community Colleges and Workforce Development and WorkSource Oregon, convened a statewide panel of HIT subject matter experts (the "Brain Trust") from the areas of HIT, health care, education, workforce development, and health policy to develop a five-year strategic plan to:

- Build Oregon's health information technology, informatics and information management workforce;

- Train Oregon's current health care workforce to meet basic competencies in using EHRs and related technology; and

- Integrate HIT coursework into Oregon's health care profession education programs to ensure that graduates are competent in the use of EHRs and related technology.

Over the course of four months, the Brain Trust conducted an environmental scan, analyzed supply and demand and reviewed education programs and funding streams relating to the HIT transformation. The result is this statewide action plan for education, industry, workforce investment boards, associations, government, health care workers, and other stakeholders to use in developing a sufficient HIT workforce supply and a high quality health care workforce capable of using HIT to improve the delivery of health care to all Oregonians.

This effort will impact the economy through industry and job growth. As with any industry, job growth is a positive indicator and sources predict that job creation along the HIT career spectrum will be large. The range of degrees and experience required for HIT careers broadens the attraction to the field, and Oregon will do well to encompass displaced workers in recruitment efforts, including medical transcriptionists whose jobs are directly affected by this transformation. The effort to train incumbent health care providers in proper EHR use increases their value as employees. Similarly, the competency of health profession students in EHR use contributes to their employability and retention.

THE HIT WORKFORCE

HIT workers come from multiple career and education paths, including health care, information technology, and health information management. They fill a variety of roles and reflect a wide range of competencies (Hersh & Wright, 2008). It is often easier to talk about the HIT workforce in terms of competencies and roles rather than standard occupational classifications which do not yet exist for many projected or anticipated HIT jobs.

The American Health Information Management Association and the American Medical Informatics Association identified two health information workforce categories: those who specialize in health information management, clinical informatics and information technology resource management and those who use HIT and EHRs in the performance of their jobs (2006).

The federal Office of the National Coordinator for Health Information Technology within the U.S. Department of Health and Human Services has identified twelve job roles that fall within three general categories of HIT workers (see Table 1):

An electronic medical record (EMR) is an application environment composed of the clinical data repository, clinical decision support, controlled medical vocabulary, order entry, computerized provider order entry, pharmacy, and clinical documentation applications. This environment supports the patient's electronic medical record across inpatient and outpatient environments, and is used by health care practitioners to document, monitor, and manage health care delivery within a care delivery organization.

Dave Garets and Mike Davis
HIMSS Analytics, 2006

- Mobile adoption support workers who install and support the implementation of EHR systems in health care settings.

- Staff in health care settings who provide ongoing support for HIT efforts.

- Informaticians, engineers and scientists engaged in research and development efforts to advance the capabilities of HIT.

Table 1: Health IT Workforce Roles
Identified by the Office of the National Coordinator

HIT Adoption Workforce Roles Requiring Short-Term Training

PRACTICE WORK FLOW AND INFORMATION MANAGEMENT REDESIGN SPECIALISTS: These individuals assist in reorganizing the work of a provider to take advantage of the features of health IT. These workers may have a background in health care or information technology and integrate information technology functions into work flow.

CLINICIAN/PRACTITIONER CONSULTANTS: These workers are similar to "redesign specialists" but bring the background and experience of a clinical or public health professional. In addition to the activities noted above, these professionals suggest solutions for implementation problems in clinical and public health settings and address work flow and data collection issues from a clinical perspective.

IMPLEMENTATION SUPPORT SPECIALISTS: These workers provide on-site user support for implementation of health IT systems in clinical and public health settings. With backgrounds in information technology or information management these workers execute implementation project plans by installing hardware and configuring software and incorporate usability principles into design and implementation.

IMPLEMENTATION MANAGERS: These individuals provide on-site management of mobile adoption support teams for implementation of health IT systems in clinical and public health settings and have experience in health or IT environments as well as administrative and managerial experience and apply project management and change management principles.

TECHNICAL/SOFTWARE SUPPORT STAFF: These workers maintain systems in clinical and public health settings, including patching and upgrading of software. With backgrounds in information technology or information management, these workers interact with end users to diagnose IT problems and implement solutions.

TRAINERS: These workers design and deliver training programs to employees in clinical and public health settings. With experience as a health professional or health information management specialist, trainers use a range of health IT applications, communicate both health and IT concepts and design lesson plans and active learning experiences for users.

HIT Professional Roles in Health Care Settings

CLINICIAN/PUBLIC HEALTH LEADERS [e.g., Informaticists]: By combining formal clinical or public health training with training in health IT, these individuals lead the deployment and use of health IT to improve the quality, safety, outcomes and value of health services. In the health care setting this role may include job titles such as Chief Medical Information Officer and Chief Nursing Informatics Officer.

HEALTH INFORMATION MANAGEMENT AND EXCHANGE SPECIALISTS: These workers, frequently titled Health Information Management Administrators, support the collection, management, retrieval, exchange, and analysis of information in electronic form in health care and public health organizations. Training for this role would require specialization in baccalaureate-level studies, certificate of advanced studies, or post-baccalaureate-level training in Health Information Management, health informatics, or related fields.

HEALTH INFORMATION PRIVACY AND SECURITY SPECIALISTS: These individuals serve as institutional information privacy or security officers. Training for this role includes specialization in baccalaureate-level studies, certificate of advanced studies, or post-baccalaureate-level training in health information management, health informatics, or related fields.

HIT Professional Roles in Research and Development

RESEARCH AND DEVELOPMENT SCIENTISTS: These individuals support efforts to create innovative models and solutions that advance the capabilities of health IT, and conduct studies on the effectiveness of health IT and its effect on health care quality. These individuals would also likely be teachers in institutions of higher education

PROGRAMMERS AND SOFTWARE ENGINEERS: These individuals are the architects and developers of advanced health IT solutions. These individuals train in IT and health domains thereby possessing a high level of familiarity with health domains to complement their technical skills in computer and information science.

HEALTH IT SUB-SPECIALISTS: The ultimate success of health IT requires a small number of individuals whose training combines health care or public health generalist knowledge, knowledge of IT, and knowledge from disciplines that inform health IT policy or technology. The understanding of an external discipline, as it applies to health IT, enables these individuals to complement the work of the research and development scientists. These individuals would likely be employed in research and development settings and as faculty in higher education.

Source: Office of the National Coordinator for Health Information Technology, 2010

THE RAPIDLY GROWING DEMAND FOR THE HIT WORKFORCE

The American Recovery and Reinvestment Act of 2009 (ARRA) provided billions of dollars for HIT infrastructure, training, dissemination of best practices, telemedicine, inclusion of HIT in clinical education, and grants to states to promote HIT. This investment and related goals have accelerated the demand for a skilled HIT workforce capable of transforming health care.

Included in the ARRA are financial incentives through the Medicare and Medicaid programs to encourage physicians and hospitals to adopt and use certified EHRs. For example, physicians demonstrating meaningful use of EHRs by 2011 may collect up to $44,000 in incentive payments over five years in additional Medicare payments (Centers for Medicare & Medicaid Services, 2009). Physicians and hospitals that do not adopt EHRs by 2015 will be penalized through reductions in Medicare and Medicaid payments (Centers for Medicare & Medicaid Services, 2009).

Generally, the transition to a fully-functional EHR system is a time-consuming process. Because 70% of these provider incentive payments are paid out in the first two years (2011 and 2012), early adopters of EHRs receive greater financial benefits. Delays in installing and implementing EHR systems because of HIT workforce shortages can result in a significant loss of revenue.

The American Medical Informatics Association estimates that nationally 130,000 information technicians and 70,000 informatics specialists are needed to achieve the goal of implementing EHRs for every U.S. resident by 2014 (Lauer, 2009).

Table 2: Oregon's Health Care Industry Employer Count	
Data source: Oregon Employment Department, 1/10	
U.S. Department of Labor Industry Title	**# of Employers**
Offices of Physicians	2,894
Offices of Dentists	1,958
Offices of Chiropractors	873
Offices of Optometrists	287
Offices of Mental Health Practitioners	81
Offices of Specialty Therapists	520
Offices of Podiatrists	113
Offices of Misc. Health Practitioners	1,308
Kidney Dialysis Centers	31
Freestanding Emergency Medical Centers	393
Medical Laboratories	156
Diagnostic Imaging Centers	39
Home Health Care Services	220
Misc. Ambulatory Health Care Services	422
All Other Out-Patient Care Centers	82
General Medical & Surgical Hospitals	70
Psychiatric & Substance Abuse Hospitals	182
Other Hospitals	15
Nursing Care Facilities	308

> The workforce development program is expected to generate highly skilled professionals in key roles to meet 85 percent of the estimated need for expansion of the health IT workforce, who will in turn support health care providers and hospitals to implement and maintain electronic health records and use them to strengthen the delivery of care.
>
> *David Blumenthal, M.D., M.P.P.*
> *National Coordinator for Health Information Technology*
> *U.S. Department of Health & Human Services*

The Office of the National Coordinator (ONC) estimated a shortfall of 51,000 HIT workers over the next five years to meet the needs of health care providers and facilities in the adoption of EHRs (2010). To address this shortage, the ONC has announced the availability of national competitive grants totaling $118 million to educational institutions to increase the availability of workers qualified to fill HIT roles rapidly (see Appendix A)(2009). The ONC expects this investment to train 85% of the total workforce needed for EHR adoption.

Grants available through the U.S. Department of Labor have also been awarded for short-term training of HIT workers in an effort to address the estimated 3,000 HIT

workers needed to fill jobs in 40 recently funded Regional Extension Centers, including one in Oregon (2010). Funded by ARRA stimulus dollars, Regional Extension Centers provide outreach and support services to health professionals and hospitals implementing and using EHRs.

In a study focusing on the hospital-based information technology workforce, Hersh and Wright (2008) estimated that 108,390 HIT workers were employed in hospitals across the nation. They estimated the need for an additional 40,784 workers (FTEs) in hospitals in order to meet the federal goal of adoption and meaningful use of EHRs.

A September 2009 HIMSS survey of health care IT professionals found that 79% of the respondents reported their organization would need to hire additional staff over the next two years to meet IT needs in the transition to EHRs. To fill these jobs, 62% of the respondents said they would need to hire clinical informatics staff and 57% indicated they would need to hire implementation workers.

In another national survey of health care Chief Information Officers (CIOs), 55% reported that they expected their organizations to invest in IT projects during the first quarter of 2010 (McGee, 2009). The information technology skills sets that their organizations are seeking include network administration, desktop support, Windows administration, database management, wireless network management, telecommunications support, virtualization, business intelligence/reporting services, Web development and site design, and enterprise resource planning implementation.

The demand for a qualified HIT workforce goes beyond that needed to implement EHRs for every U.S. resident by 2014. Hersh (2010) identified growing opportunities in bioinformatics, including genomics and personalized medicine, clinical and translational research, public health, medical imaging, and consumer health, including Internet-based health sites.

In the emerging field of remote patient monitoring, Zitzelberger (2010) identified new HIT-related job roles for technology-savvy clinicians, data entry specialists, biostatisticians, call center specialists, data technicians, field technicians, programmers, web masters, and project managers. A qualified HIT workforce is needed to install, implement and maintain the growing use of technologies in health care delivery, including telemedicine communication systems, interactive patient technologies, wireless diagnostic and communications systems, medication administration technologies, diagnostic imaging technologies, and robotic technologies (Turisco & Rhoads, 2008).

> "Remote-monitoring technologies can extend the reach of health care professionals into the home. As a result, many members of the health care workforce will need to be trained in the proper use of all of these technologies."
>
> *"Retooling for an Aging America: Building the Health Care Workforce"*
> *Institute of Medicine*

Two subcategories of HIT workers are captured in the U.S. Bureau of Labor Statistics' Standard Occupational Code: Medical records and health information technicians, and computer support specialists. The Oregon Employment Department's occupational forecast for 2008-2018 estimated a 24% growth in new jobs for medical records and health information technicians, with a total of 1,238 additional workers needed in Oregon over the ten-year period to fill new jobs and replace those leaving the workforce. Computer support

specialist jobs are expected to grow by 10% over the same ten-year period in Oregon, creating a projected need for a total of 2,855 new workers to fill new jobs and to replace those leaving the workforce.

Translating Information Technology into the Health Care World

Beyond the sheer demand for trained HIT workers, employers have identified additional competencies and skills required for the successful interface between information technology workers and the world of health care. The ability of an information technology worker to understand medical terminology, analyze the clinical work flow in a fragmented health care system, and quickly solve problems is paramount in patient care settings. These workers put tools in the hands of those who touch patients' lives (Glass, 2010).

Health care employers frequently comment that it is easier to take workers from the health care industry and train them in information technology rather than the other way around. A survey by the American Society of Health Informatics Managers found that 90% of the respondents believe that HIT employers want both IT and health care experience and knowledge (2010). Employers have found that HIT workers who have knowledge and experience in health care settings tend to understand the work flow and terminology as well as regulatory, behavioral, cultural, and economic issues specific to the health care industry.

Brain Trust members identified an opportunity to use federal training funds, if awarded, to retrain displaced IT workers from other industries by developing short-term training programs that include internships and courses in health care systems and medical terminology.

Fast-paced health care settings with ingrained organizational cultures and multicultural health care staff require a significant set of "soft skills" to integrate HIT into health care practices successfully. Brain Trust members identified a list of these soft skills for HIT workers, including those relating to critical thinking, systems thinking, project management, change management, customer relations, communication, listening, negotiations, diplomacy, teamwork, working independently, creativity, emotional intelligence, adapting to health care organizations' cultures, and integrity.

> Modernizing our health care system requires the mobilization of an educated and talented workforce. By supporting such training we will accelerate the meaningful use of health IT and create tens of thousands of secure jobs when and where they are desperately needed.
>
> *David Blumenthal, M.D., M.P.P.*
> *National Coordinator for Health Information Technology*
> *U.S. Department of Health & Human Services*

DETERMINING OREGON'S HIT WORKFORCE NEEDS

Because of federal and state health reform efforts and the increasing use of technology in health care settings, Oregon has a burgeoning demand for HIT workers. However, it is difficult to identify just how many and what type of additional HIT workers will be needed in this emerging labor market. The Brain Trust identified several factors that figure into determining the demand for and type of HIT workers needed in Oregon:

- The short timeframe for health care providers to take advantage of federal dollars to purchase, implement and use EHRs creates a huge demand for a skilled HIT workforce.

- Oregon's health care providers have a higher rate of adoption of EHRs than most other states. This indicates that Oregon will need fewer workers to install EHR systems relative to other states and more workers to support health care providers in the implementation and optimization of EHR systems.

- The early stage of EHR implementation leaves many workforce issues undefined.

- It is estimated that an additional 100 information technology (IT) workers will be needed statewide to install and provide technical support for EHR systems over the next two years. After the initial installation of EHRs in Oregon's health care setting is completed, roughly half of this workforce will no longer be needed and would move to other industries.

- Health care providers in rural areas face a variety of obstacles in adopting and using EHRs, including access to training and retention of HIT staff.

- Oregon is home to a strong HIT industry and accordingly has a need for access to a trained workforce.

- Highly skilled IT professionals from Oregon's high tech industry have moved into the health care technology industry, creating new businesses and job opportunities.

- The Oregon Community Health Information Network (OCHIN) recently received a $13.2 million award from the U.S. Department of Health and Human Services to serve as a Regional Extension Center to provide outreach and support services to health professionals and hospitals to implement and use HIT. It is estimated that up to 100 new jobs could be created as a result of this funding.

- The State of Oregon received nearly $8.6 million in federal funds to build a Health Information Exchange capable of facilitating the secure exchange of patient health information among health care providers, their patients and health insurance payors. A skilled HIT workforce is needed internal to these organizations to support the secure exchange of patient health information.

- The implementation of the Oregon Health Network's high quality broadband network to provide patient access to enhanced telehealth services and education throughout Oregon requires a skilled HIT workforce to install and support telehealth and distance education technologies.

- The number of IT workers needed to support health providers' use of EHR systems is relative to the computer literacy of the health care workers.

- HIT is a dynamic field and changes will have an impact on the demand for an HIT workforce.

Thus, in order to build Oregon's HIT workforce, the Brain Trust members recognize that:

- The HIT educators must work in close concert with representatives from the HIT and health care industries to ensure that workforce supply meets the industry's demand and competencies match employers' needs now and into the future.

- The priorities and deadlines set by the federal government for the implementation and meaningful use of EHRs are the key drivers of HIT workforce development efforts.

- The current HIT workforce training available in Oregon's public higher education institutions needs to be more visible, accessible and sustainable (see Appendix B for an inventory of current HIT-related education programs).

- Bilingual/bicultural workers are needed in the HIT workforce to provide technical support and training to the multicultural workforce in health care organizations.

PREPARING THE HEALTH CARE WORKFORCE

Transforming the health care delivery system through EHRs reinvents the way patient information is collected, processed and used. First and foremost, EHR use requires that health care providers (clinical and support staff) have basic computer skills.

In 2005, the American Health Information Management Association and the American Medical Informatics Association convened stakeholders from academia, professional associations, provider organizations, businesses and government to develop initial strategies to address workforce challenges related to EHRs (2006). These experts identified five crucial factors for the health care industry's successful implementation of EHRs and development of a national health information infrastructure:

- The need to invest in people to use technology wisely and well.

- The need for academically prepared core health information specialists to design, implement and manage IT systems.

- The need for clinicians who can competently provide patient care using EHRs.

- The need to develop new strategies for recruitment and retention of health care employees, particularly health information specialists.

- The need for curriculum and learning environments that reflect the electronic environment in which health professionals will practice (2006, page 8).

In 2006, a national summit of nursing informatics leaders convened to craft action steps to develop a "nursing workforce capable of using electronic health records to improve the delivery of health care" (TIGER, 2009, page 4). The participants created the "Technology Informatics Guiding Education Reform Initiative," or TIGER Initiative, focused on a defined set of basic computer, information literacy and information management competencies for the safe, effective and efficient use of EHRs by practicing nurses.

> "The licensed nurse:
> (a) Acquires and maintains knowledge, skills and abilities for informatics and technologies used in nursing practice settings; and
> (b) Promotes the selection and use of informatics and technologies that are compatible with the safety, dignity, and rights of the client."
>
> *Oregon's Nurse Practice Act OAR 851-045-004-(4)(a-b)*

The important role of EHRs and informatics in the practice of nursing has been recognized by the Oregon Board of Nursing. Regulatory language within the Oregon Nurse Practice Act requires nurses to have competencies in nursing informatics and related technologies.

The 2008-2018 Oregon Employment Department (OED) occupational estimates show that in 2008 there were roughly 160,400 workers in Oregon's health care industry (see Table 3)(2009). These included 7,456 jobs held by physicians, 30,656 jobs held by registered nurses, 2,582 jobs held by licensed practical nurses, and 3,112 jobs held by medical and health service managers (OED, 2009).

Table 3: Oregon Statewide Employment Projections by Industry - 2008 to 2018				
Data Source: Oregon Employment Department 11/09				
	2008	2018	Change	% Change
Ambulatory health care services	67,600	86,200	18,600	28%
Hospitals	52,800	64,600	11,800	22%
Nursing & residential care facilities	40,000	50,500	10,500	26%

The OED's estimates project that Oregon's health care workforce will grow to 201,300 by 2018. By this time, it is expected that EHRs will be firmly established in health care settings and health care providers will be well-versed in the use of EHRs to improve patient care.

In order to transform health care, Brain Trust members underscored that training health care professionals is the key to meaningful use of EHRs. Brain Trust members emphasized that:

- Health care providers and their staff need basic computer skills that will enable them to set up a computer, join a wireless network, conduct decision support and troubleshoot. These skills will reduce technical support costs.

- Health care providers need to understand how EHRs can be used to improve clinical practice, quality of care, and patient safety.

- Health care providers and administrators must know the legal and regulatory requirements regarding EHR systems, including issues of compliance, integrity, privacy, security, and the associated legal implications.

- Employers need to assess the resources needed for training health care employees in EHR use and for system upgrades. This includes time allotted for training and additional staff to cover shifts.

- The costs of deploying vendor support and training staff hinders smaller and rural practices from converting to and properly using EHRs.

- Inexpensive methods to deliver competency-based EHR training and continuing education programs, particularly to rural areas, need to be developed.

- Health care employers have had success in identifying and training one or more employee "super users" and clinical champions who are versed in both HIT and clinical aspects to promote EHR use, provide training, troubleshoot, and act as liaisons with EHR vendors.

- It is crucial to recruit clinical health care workers into the first-round of HIT workforce training to serve as champions for EHR implementation, as "super users" to support and train other health care professionals, and to translate and integrate health systems work flow into EHR systems.

PRIMING THE HEALTH CARE WORKFORCE PIPELINE FOR COMPETENCY IN HIT

To adequately prepare the health care workforce pipeline for jobs requiring competencies in EHRs and related HIT, the American Health Information Management Association and American Medical Informatics Association (2006, page 12) offered recommendations to academic institutions, which include:

- Standardized informatics embedded in relevant curriculum.

- Faculty development in electronic information technologies.

- The passage of legislation to strengthen programs and increase funding for health information and informatics education programs.

- More professionals trained in work flow redesign, care processes or quality improvement, EHR implementation and health information management.

> AHIMA calls upon leaders of the healthcare industry and federal and state governments to support and fund the education necessary to ensure adequate numbers of HIM professionals are in place to provide access to accurate, complete health information in this transitional electronic environment, and to manage, sustain, and improve our nation's use of health information in the years to come.
>
> *American Health Information Management Association Position Statement October 2009*

The nursing informatics leaders participating in the national TIGER Initiative stated the imperative that nursing graduates be "fluent" in the use of EHRs and related HIT "in order to practice safe and effective patient care" (2009, page 3). Recommendations were formed for integrating informatics into standard nursing curriculum and promoting faculty development in informatics education. These include:

- Informatics competencies, theories, research, and practice examples integrated into nursing curriculum.

- Programs and resources to develop faculty with informatics knowledge, skills and abilities.

- Strategies to recruit, retain, and educate current and future nurses in the areas of informatics education, practice and research.

The Brain Trust members identified that:

- Competencies in EHRs and related HIT are not included in accreditation standards for health profession education programs, yet will be vital for employment.

- EHRs and related HIT training should be integrated into Oregon's health profession education programs to ensure competency by graduation.

- Currently, most health profession education students only receive training on EHRs during on-site clinical internships.

- Although EHR systems vary by provider site, there is common ground that should be mastered before graduation.

- EHR training by simulation should be used to supplement exposure in clinical settings and relieve preceptors of teaching basic principles.

- Curriculum should include legalities, ethics and compliance as related to EHRs and the dynamics of using an EHR while dealing directly with a patient.

- Students should learn the broader purposes and advantages of EHRs; e.g., cost controls, error reduction, and population research leading to better health outcomes.

- In 2009, the Oregon Department of Education developed an industry-informed skills set in health informatics for use in high school health occupation courses.

While many drivers are influencing the transformation of health care into the digital age, federal goals are dictating the timeline for EHR adoption and optimization with major consequences for those who delay. Thus, the Brain Trust recognizes the need to address the HIT workforce needs quickly. To prepare an adequate supply of HIT workers and a health care workforce competent in the use of EHRs, the Brain Trust assimilated their findings, conducted a SWOT analysis and created a strategic plan with key action steps for 2010 through 2014 to position Oregon for success in the transformation of health care through HIT.

SWOT Analysis: Preparing Oregon's Workforce for HIT Transformation

STRENGTHS

- Education leaders in Oregon are on the forefront of HIT program development, establishing our state as a center of expertise.
- The HIT industry has a strong presence in Oregon.
- Oregon's major health systems have implemented EHRs, providing for workforce lessons learned.
- Small health businesses are implementing EHRs.
- Education has a desire to respond to industry's workforce needs.
- Educators from the community colleges, OIT and OHSU have formed an HIT consortium.
- Oregon's research infrastructure allows for pilot tests of new models.
- Robust broadband is present throughout the state, creating capability to deliver education and training statewide ($20 million FCC grant for the Oregon Health Network).
- Across sectors, including industry, government, and education, there is consensus on the need for HIT in healthcare.
- Industry currently enjoys a competitive job market because of unemployment rates.
- Products of the information age, the new generation of workers will adapt easily to computer-based record systems.
- Oregon's collaborative, innovative spirit has been instrumental in building a workforce in this emerging field.

WEAKNESSES

- Not enough HIT workers are currently trained to meet the forecasted demand for Oregon and the Nation.
- In this emerging field, some faculty/education institutions lack the knowledge and resources to train students in HIT and EHR use.
- Education and industry are not sharing concerns, needs and expertise on an optimal level.
- The IT workforce has very limited knowledge of health care systems and work flow.
- Health care providers lack knowledge of and need training in the use of HIT and EHRs to improve clinical practice and quality of care.
- Health care providers in rural areas face a variety of obstacles, including access to training and retention of HIT staff.
- With the basics to be mastered first, optimization in the use of EHRs seems far in the future and is not even on the current training radar screen.
- Training renders a high price tag, whether formal or on-the-job.
- The high cost of deployment of HIT professionals to implement systems, train clients and troubleshoot hinders rural and smaller practices from both converting to EHRs and properly using them.
- The provider community differs widely in its adoption stage of EHRs.
- Providers may not have financial resources and time to purchase and implement EHRs.
- Current health care workers have limited knowledge in ethics, legalities and security measures in the use of EHRs.
- No sustainability plans are in place after the federal grant funding for training ends.
- The lack of standardization in the use of EHRs complicates curriculum development.
- When the economy recovers, recruitment of workers will be more difficult.

OPPORTUNITIES

- Oregon educational institutions have applied for federal HIT workforce training grants.
- Oregon is poised to be a model and lead the nation in health informatics workforce development.
- Training the HIT workforce will help Oregon be more resistant to economic downturn.
- Consumer expectations are driving change for HIT/EHR use.
- HIT is attractive to investors and collaborators.
- Developed wisely, curriculum models can answer the myriad workforce needs.
- Education will have access to nationally developed training modules.
- Stakeholders can leverage the expertise and lessons learned from organizations that are advanced in HIT use.
- Projects can be beta-tested in hybrid/distance programs.
- OHSU is a part of the state's Regional Extension Center.
- Existing resources can be consolidated to avoid duplication.
- HIT can be a strong contributor to the economy.
- A wide cross-section of IT and health care workers need training.
- Training will reduce health providers' costs by reducing tech support-related costs from vendors/contractors.

THREATS

- Training changes rapidly because technology changes rapidly.
- Current federal funding streams for HIT programs are one-time grant opportunities. No funding exists yet after federal training and education grants end.
- Many issues, including actual workforce demand, are yet undefined short of general estimates because of the early stage of EHR implementation.
- Providers who have money to buy EHRs may not have money to train staff in the use of EHRs.
- EHR infrastructures require ongoing maintenance which requires money, time and expertise.
- Too many unknowns and a lack of cohesiveness among providers make it difficult to build a business case.
- Federal dollar incentives (in reimbursement for care) for providers to adopt EHRs decreases after 2011.
- Eight small hospitals in Oregon lack EHRs.
- The short timeframe for providers to take advantage of federal dollars and to implement meaningful use of EHRs creates a huge HIT workforce demand.
- Patients will expect providers to have meaningful use.
- Current EHRs may not support integrated health home practice models.

The Strategic Action Plan:
Preparing Oregon's Workforce for HIT Transformation

STRATEGIC GOAL 1: BUILD OREGON'S HIT WORKFORCE

Target training efforts and funds to develop the HIT workforce needed for the installation, implementation and optimization of EHRs in Oregon's clinical and hospital settings in accordance with federal and state health care reform policies and deadlines.

	Action Step	Lead	Target
1.1	**Create a leadership team of HIT and health care industry representatives and HIT and health care educators.**	Education and Industry	August 2010
1.1.A	Guide optimization of education's capacity and ability to respond to industry's need for a highly skilled HIT workforce.	Leadership Team	Ongoing
1.1.B	Guide optimization of education's flexibility to incorporate the use of state of the art technology into curriculum rapidly.	Leadership Team	Ongoing
1.1.C	Support education's efforts to obtain state and federal grants for HIT workforce training.	Leadership Team	Ongoing
1.1.D	Define EHR and HIT competencies for curriculum development.	Leadership Team	September 2010
1.1.E	Define clinical and business career paths, including opportunities for displaced workers.	Leadership Team	December 2010
1.1.F	Inform a sustainability plan to continue education and training programs that used federal grant funding for start-up costs.	Leadership Team	July 2011
1.1.G	Review and update the strategic plan.	Leadership Team	Annually
1.2	**Build the implementation and application workforce needed to install and provide technical support for EHR systems in clinics and hospitals (as identified in Table 1).**	Community Colleges and Universities	January 2012
1.2.A	Develop short-term (six-month) HIT training programs for job roles listed in Table 1.	Community Colleges and Universities	December 2010

		Action Step	Lead	Target
	1.2.A.1	Include coursework in medical terminology, health care systems and work flow, regulatory and legal issues associated with EHRs, and professional work behaviors (soft skills).	Community Colleges and Universities	December 2010
	1.2.A.2	Include hands-on internships in health care settings.	Community Colleges and Universities	December 2010
	1.2.A.3	Develop online, distance-distributed HIT training programs available statewide, particularly targeting access for participants in rural areas.	Community Colleges and Universities	July 2011
1.2.B		Recruit health professionals, displaced IT workers from other industries, and those whose jobs may be made obsolete by the adoption of EHRs into short-term HIT training programs.	Community Colleges, Universities and Health Care Employers	2010-2014
	1.2.B.1	Collaborate with WorkSource Oregon, the Veteran's Affairs Department, professional associations, and other stakeholders to identify and recruit workers into short-term HIT training programs.	Community Colleges and Universities	2010-2014
1.3		**Build the information technology and health information management workforce needed for the state's Regional Extension Center.**	Community Colleges and Universities	2014
	1.3.A	Collaborate with Oregon's Regional Extension Center to identify workforce needs and internship opportunities.	Community Colleges, Universities and Regional Extension Center (OCHIN)	2010-2014

	Action Step	Lead	Target
1.3.B	Recruit bilingual/bicultural students into HIT training to provide technical support and training to the multicultural workforce in Oregon's health care organizations.	Community Colleges, Universities and Regional Extension Center (OCHIN)	Ongoing
1.4	**Build the information technology and health information management workforce needed to promote and support the clinical adoption of EHRs in Oregon's hospital and clinical settings.**	Community Colleges and Universities	December 2014
1.4.A	Increase public awareness of the availability of current information technology, health information management and informatics education and training programs at Oregon's higher education institutions.	Community Colleges and Universities	Ongoing
1.4.B	Collaborate with health care employers, WorkSource Oregon, the Veteran's Affairs Department, professional associations, and other stakeholders to identify and recruit students into community college- and university-based training.	Community Colleges and Universities	Ongoing
1.4.C	Recruit bilingual/bicultural students into HIT training.	Community Colleges, Universities, and Industry	Ongoing
1.4.D	Expand HIT education programs and admissions capacity to meet employers' workforce needs.	Community Colleges and Universities	December 2011
1.4.D.1	Create a sustainability plan to continue education and training programs that used federal grant funding for start-up costs.	Community Colleges, Universities and Leadership Team	July 2011

		Action Step	Lead	Target
	1.4.E	For information technology students interested in working in the health care industry, include coursework in medical terminology, health care systems and work flow, regulatory and legal issues associated with EHRs, professional work behaviors (soft skills) and hands-on internships in health care settings.	Community Colleges and Universities	September 2011
1.5		**Build the clinical and research informatics workforce needed to analyze patient and population data to improve clinical outcomes, quality patient care, and population health.**	Community Colleges and Universities	December 2014
	1.5.A	Increase public awareness of the availability of university-based informatics programs at Oregon Institute of Technology and Oregon Health & Science University.	OIT and OHSU	Ongoing
	1.5.B	Recruit clinical health professionals and HIT workers into Oregon's university-based informatics training programs.	OIT and OHSU	Ongoing
	1.5.C	Collaborate with health profession education programs to recruit and cross-train students in informatics.	Community Colleges and Universities	Ongoing

STRATEGIC GOAL 2: PREPARE THE HEALTH CARE WORKFORCE

Train Oregon's current health care workforce to meet basic competencies in using EHRs and related technology.

	Action Step	Lead	Target
2.1	**Develop basic competencies in computer literacy, EHRs, and information management.**	Health Care Professionals	2014
2.2	**Develop basic competencies in the ethics, legalities, and security measures related to the use of EHRs**.	Health Care Professionals	2014
2.3	**Identify and train in-house champions, super uses and vendor liaisons for EHRs and related HIT.**	Health Care Employers	2011

		Action Step	Lead	Target
2.4		**Provide training programs to promote the value of EHRs in improving clinical practice, quality of care and patient safety.**	Health Care Employers, HIT Vendors, Community Colleges, Universities and Professional Associations	2012
	2.4.A	Create and support competency-based continuing education programs to foster EHR use, develop health informatics skills, and enhance the use of HIT to improve clinical practice.	Health Care Employers, HIT Vendors, Community Colleges, Universities and Professional Associations	2012
	2.4.B	Allocate adequate resources and staff time for training on the use of EHRs, including upgrades, and related HIT.	Health Care Employers	Ongoing
2.5		**Develop and use inexpensive methods to deliver training programs, particularly to rural areas, on HIT and EHRs.**	Health Care Employers, HIT Vendors, Community Colleges, Universities, and Professional Associations	2012
	2.5.A	Use the Oregon Health Network's broadband capacity to deliver online training programs.	Health Care Employers, HIT Vendors, Community Colleges, Universities, and Professional Associations	2012

STRATEGIC GOAL 3: PRIME THE HEALTH PROFESSION EDUCATION PIPELINE

Integrate HIT coursework into Oregon's health care profession education programs so that graduates are competent in the use of EHRs and related technology.

		Action Steps	Lead	Target
3.1		**Develop faculty with competency in EHR systems and informatics.**	Community Colleges and Universities	2012
	3.1.A	Recruit informatics faculty from the HIT and health care industries.	Community Colleges and Universities	2012
		3.1.A.1 Collaborate with industry to share qualified employees as faculty.	Community Colleges and Universities	Ongoing
	3.1.B	Obtain financial resources to enroll faculty members in the OHSU/AMIA 10x10 short-term informatics program or similar training.	Community Colleges and Universities	2011
	3.1.C	Create on-the-job training rotations for faculty in industry environments.	Community Colleges, Universities and Industry	2011
3.2		**Develop curriculum to teach basic competencies in computer literacy and information management.**	Community Colleges, Universities and Leadership Team	2012
3.3		**Ensure students' competency in EHR use by graduation.**	Community Colleges and Universities	2014
	3.3.A	Integrate EHRs and informatics into curriculum.	Community Colleges and Universities	2012
	3.3.B	Develop curriculum to teach basic competencies in ethics, legal and regulatory requirements, and security measures in the use of EHRs.	Community Colleges, Universities and Leadership Team	2012

	Action Steps	Lead	Target
3.3.C	Expand EHR simulation training.	Community Colleges and Universities	2012
3.3.D	Ensure that current research findings and best practices are integrated into curriculum in order to keep pace with evolving technology that will eventually affect practice.	Community Colleges, Universities and Leadership Team	Ongoing

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Appendices

A: Summary of Oregon Applicants for Federal HIT Workforce Grants

B: Inventory of HIT Education Programs in Oregon - March 2010

Name of Opportunity	Objective/Amount	Oregon Applicant	Deadline/ Award date	Duration
Curriculum Development Centers (ONC) (Companion grant to the Community College Consortia to Educate HIT Professionals in Health Care Program)	Provides $10M in grants (up to 5 awarded) to institutions of higher education (or consortia) to support HIT curriculum development. Develops curriculum for the CC Consortia to Educate HIT Professionals. Each center may receive up to $1,820,000. One curriculum development center will be selected to serve as the National Training and Dissemination Center and may receive up to an additional $900,000 to support related activities.	OHSU	1//14/10 Award anticipated 3/18/10	Each center funded up to 2 years.
Community College Consortia to Educate HIT Professionals in Health Care Program (ONC) (Companion grant to the Curriculum Development Centers)	Seeks to rapidly create HIT education and training programs at community colleges or expand existing programs. Community colleges funded will establish intensive, non-degree training programs that can be completed in six months or less. Will utilize curriculum from the Curriculum Development Centers. $6.2M for Region A.	Bellevue Community College to lead for Consortium. PCC ($1M award) to lead for Oregon.	1/22/10 Award anticipated 3/15/10	2 years/Training must commence by 9/30/2010. Oregon colleges must train 300 students within two-year period.
DOLETA for the Health Care Sector and Other High Growth and Emerging Industries	Teach displaced and incumbent workers the necessary skills for, and help them pursue careers in, healthcare and other high growth and emerging industry sectors. $25M total funds for 45-65 grants ranging from approx. $2M-$5M.	OHSU to train 412 participants. Award request is $4.9M in collaboration with OIT, PCC, MHCC, Clark College and WorkSystems, Inc.	10/05/09 Not awarded	Up to 36 months: includes implementation, start-up, completion of training and award of certificates and follow-up.
Information Technology Professionals in Health Care: Competency Examination for Individuals Completing Non-Degree Training (ONC)	Provides ~$6M to an institution of higher education to support the development and initial administration of a set of HIT competency exams. Creates an objective mechanism to assess basic competency for individuals trained through short-duration, non-degree HIT programs, and for members of the workforce with relevant experience or other type of training who seek to demonstrate competency in one or more roles.	OHSU	1/25/10 Award anticipated 3/10	2 year project period.
Information Technology Professionals in Health Care: Program of Assistance for University-Based Training (ONC)	Provides ~$32M to 8 or more institutions of higher education to establish programs that will rapidly increase the availability of individuals qualified to serve in specific HIT professional roles requiring university-led training. Graduates will play important role in supporting meaningful use of HIT nationwide.	OHSU	1/25/10 Award anticipated 3/10	39 month project period. Programs to be completed in 12 months or less and lead to a university-issued certificate of advanced training or a master's degree.

School	Degree/ Program	Description	Length	National Certification Eligibility	2010 Graduates & Program Capacity
OHSU	Graduate Certificate in Biomedical Informatics (BI)	Provides knowledge and skills in the application of IT to health care. Geared to meet the educational needs of both health care and non-health care professionals seeking additional training in information management and technology. Serves as an entry point for the Master of BI or Master of Science in BI programs.	8 3-week courses (24 credits); ~ 2 years on part-time basis	N/A	~ 100 alumni since inception in 2001
OHSU	Graduate Certificate in Health Information Management (HIM)	Includes a blend of HIM foundation coursework and Biomedical Informatics with an underpinning of ethical decision-making in health information collection and dissemination. Certificate courses offered via distance learning and on campus.	33 credits; ~ 2 years on part-time basis	RHIA	First graduates in 2009
OHSU	Master of Science in Biomedical Informatics	On-campus program; requires a master's thesis. Primary goal is to educate the future developers and managers of health care information systems, as well as researchers in bioinformatics. Also allows doctorates to pursue research in medical informatics to prepare for research positions in academia or industry. Two tracks of study available: Bioinformatics and Clinical Informatics.	1.5-2 years full-time; longer part-time possible	N/A	~ 10 graduates/ year; ~60 alumni since 1998
OHSU	Master in Biomedical Informatics	Identical to the MS in Medical Informatics Program with the exception that a thesis is not required. Instead, students must take additional elective courses and complete a Capstone Project. Offered via on-campus instruction or distance learning. Two tracks of study available: Bioinformatics and Clinical Informatics.	1.5-2 years full-time; longer part-time possible	N/A	~15 graduates per year, ~ 60 alumni since 2002
OHSU	Doctor of Philosophy in Biomedical Informatics	Provides a technical grounding in medical informatics, health and medicine, computer science, and research methods for careers that require an understanding of information technology, health, and biomedicine.	36-48 months	N/A	~ 2-3 per year

School	Degree/ Program	Description	Length	National Certification Eligibility	2010 Graduates & Program Capacity
OHSU	Fellowships	Prepares fellows to undertake independent biomedical informatics research in the academic community, or to assume leadership positions in hospitals or commercial efforts in biomedical informatics.	Predoctorals must enroll in PhD program; postdoctorals in a master's program.	Possible future board subspecialty certification for physicians.	~ 3-4 per year
OHSU	Certificate: 10x10 Program	In partnership with the American Medical Informatics Association (AMIA), this introductory-level, distance learning program trains in basic informatics to create local experts who represent users in their communities. No degree granted but can be used for subsequent credit in the other OHSU programs.	16 weeks	N/A	Goal to train 10,000 by 2010.\n\nOver 800 graduates since 2005
PSU and OHSU	B.S. and MBI/Dual-degree program	Accelerated degree program in BI. Designed for high achieving freshmen to receive both a B.S. Computer Science degree and an MBI in BI in five years.	5 years	N/A	One graduate; several students in pipeline
Providence-OHSU	Informatics Program	Addresses the need for a greater understanding of medical informatics by operational hospital and clinical personnel at Providence Health & Services. Can be studied online.	22 weeks	N/A	~ 15 graduates since 2009
OIT	Bachelor degree in IT with Health Informatics Option	Prepares students for a career as health informatics, information and computing specialists in the health care field.	4 year curriculum	N/A	Current is estimated at 5 per year\n\nCapacity: 25-30
OIT	EHR Sim Lab	Provides learning and research opportunities using real-world health care IT systems, primarily EHRs with virtual patient data. Users include students from the Health Informatics bachelor's program, IT programs and varied allied health programs at OIT and at regional community colleges.	Available online 24/7 for qualified subscribers	N/A	N/A
Central Oregon Community College	AAS with certificate options in Health Information Technology	Trains students in health information management including coding, statistics and data management. Accredited by CAHIIM.	Two-year degree with certificate options	RHIT	23 grads\n\nCapacity: 28
Central Oregon Community College	AS in Health Informatics; articulation with OIT's bachelor's degree in HI programs	With an emphasis on computer science, trains students in information technology for health care environments.	Two-year program	N/A	Has been in place for 2 years but no graduates\n\nCapacity: 28

School	Degree/ Program	Description	Length	National Certification Eligibility	2010 Graduates & Program Capacity
Chemeketa Community College	1 year certificate or AAS degree in Health Services Management	Certificate is for health information technician, medical coder, insurance biller, or other support staff. AAS program includes Health Services Management and Medical Transcription.	Offers one- and two-year training on a career ladder in health care services.	CCA; RHIT with additional education	28 grads Capacity: 30
In Progress: Chemeketa Community College	AS in Health Informatics; articulation with OIT's bachelor's degree in HI programs	With an emphasis on computer science, trains students in information technology for health care environments.	Two years	N/A	Capacity: ~20 -24
Lane Community College	Certificate in Health Records Technology	Prepares students to produce and maintain health records. Looking to update this program into HIM; need funding.	Option of completing in one or two years.	N/A	20-24 grads Capacity: 20-24
Mt. Hood Community College	Certificate in Medical Office Coding	Prepares students to check medical charts for accuracy and completion, verify signatures and medical data in computers, clarify information with the provider, and assign diagnosis and procedural codes.	1 year	N/A	Capacity: 35
Portland Community College	AAS in Health Information Management	Teaches how to maintain, collect and analyze health care data. Accredited by CAHIIM.	2 years	RHIT	25 grads Capacity: 25-30
In Progress: Portland Community College	AS in Health Informatics; articulation with OIT's bachelor's degree in HI programs	With an emphasis on computer science, trains students in information technology for health care environments.	Two-years	N/A	Capacity: ~20
In Progress: Portland Community College	Certificate in Computer Information Systems (CIS)	For out-of-work health care professionals and incumbent workers. Note: a one-year certificate will be addressed once this short-term one is sent to the state for approval. *Expected start date no earlier than Fall 2010.*	2 terms	N/A	Capacity yet unknown
In Progress: Rogue Community College	Certificate of Completion/ Health Informatics Assistant	Provides skills, including computer hardware and software basics, to prepare students for work in the health care industry.	1 year	N/A	16 grads Program is less than 2 years' old No caps on capacity at this time

School	Degree/ Program	Description	Length	National Certification Eligibility	2010 Graduates & Program Capacity
Rogue Community College	AAS in Computer Support Technician/Health Care Informatics Specialist Option	Prepares students for employment in computer support positions with organizations or as health care informatics specialists within medical organizations. Both the Computer Support Option and the Health Care Informatics Option provide skills in computer hardware and software. The Health Care Informatics Option also teaches skills necessary for working in the medical industry.	2 years	N/A	Program is less than 2 years' old No caps on capacity at this time
Rogue Community College	AS in Information Technology/ Health Informatics Option Articulated with OIT.	Designed for students transferring to OIT's baccalaureate degree program in Information Technology/Health Informatics Option. Curriculum allows for 40 core credits within the major area.	2 years	N/A	Program is less than 2 years' old No caps on capacity at this time
In progress: The Community Colleges of the Health Informatics Consortium	AS in Health Informatics	Will provide basic training for students interested in health informatics careers. Could be a pathway to OIT's bachelor program and beyond. Lead schools are Portland Community and Umpqua Community College. *Program is approved by State Board of Education and is expected to start Fall 2010.*	2 years; might include short-term certificates	N/A	Unknown but large due to online statewide capacity

RHIA: Registered Health Information Administrator
RHIT: Registered Health Information Technician;
CCA: Certified Coding Associate

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